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VOLUME 3

50th Anniversary Conference
Brighton, UK

Design + Research + Society
Future-Focused Thinking

EDITED BY:
PETER LLOYD
ERIK BOHEMIA

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Proceedings of DRS 2016

Design + Research + Society
Future–Focused Thinking

50th Anniversary International Conference
Brighton, UK, 27–30 June 2016

Volume 3

Editors
Peter Lloyd and Erik Bohemia

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email: admin@designresearchsociety.org
website: www.designresearchsociety.org

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DRS2016
Design + Research + Society
Future-Focused Thinking

2016 Design Research Society
50th Anniversary Conference
27-30 June 2016, Brighton, UK

Editorial

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The 50th Anniversary conference of the Design Research Society is a special event at an interesting time for Design Research. The Design Research Society was formed in 1966 following the *Conference on Design Methods* held at Imperial College London in 1962. In the lead up to DRS2016 we contacted the secretary to the 1962 conference, Peter Slann, who now lives in Scotland, and who sent us the original reel-to-reel audio tape recordings of that conference. Listening to those tapes it is striking not only how similar some of the discussions are about design and design research, but also how much has changed. In 1962 every voice is a male British voice. One comment at the end of the conference stands out as significant. Thanking people for coming to the conference and looking towards the future at the end of the closing session, John Page, then Professor of Building Science at Sheffield University, asks the audience three questions (the quote is verbatim):

> "if one agrees that there are bodies of knowledge that have been raised here, which need further exploration – particularly a case in point would be the terminology of design – is there any point in trying to get some kind of inter-disciplinary working party going on these problems? In this question of disciplines, is there any machinery or any way of arranging for an interchange of information between specialists and people working at Universities? Lastly, is there any point in making the whole thing more of a formal entity, a society, or something of that kind?"

Fifty years later it is clear that there was a point. The DRS as it exists today can trace its origins to the affirmation of that last question in 1962, and the 'some kind of interdisciplinary working party' that Design Research has become owes its identity to that 1960's future-focused thinking.

Since the Conference on Design Methods in 1962 many Design Research conferences have been held, with the DRS often as a key organiser. Certainly in the earlier days, defined sub-fields of research originated from these conferences. Design Participation in 1971 started the participative design movement that has grown into present day co-design. Design for Need, held in 1976, and taking a global view of the population, started both sustainable and inclusive design, and Design Policy held in 1980 introduced a much needed social, political and international dimension to the design research field as Design itself lurched into the consumerist 80s.

From almost every conference comes a thread that leads to the present day, so the fiftieth anniversary conference represents a point to gather these threads together, see how they complement and blend with one another, and consider what kind of textile they might weave in the coming years. Indeed, the early advice that many gave was not to spend too much time looking back and to concentrate on the future. For DRS2016, as well as the Design Research field more generally, the increasing number of PhD researchers is a sign that this future is set to be a healthy one. A significant number of papers in these proceedings are the result of doctoral research projects and organisations like PhD by Design, who had a strong presence at DRS2016, ensure that today's PhD Researchers will become tomorrow's Design Research leaders.

The DRS Conferences have always looked to develop new formats for people to engage with one another, over and above the standard paper presentation. The 1973 Design Activities conference aimed at:

> "the provision of an extension of media forms beyond the normal 'verbalized' media of the average conference with the idea that such extensions were significant contributions to dialectical form, and not just 'entertainments'."

The 2014 DRS conference, in Sweden, continued that tradition by introducing 'Conversations' and 'Debates' alongside the more traditional academic paper presentation. It feels entirely appropriate that the field of Design Research is at the forefront of conference design, appropriating new technologies in developing more productive formats for discussion, networking, and presentation. And rightly so, because in an age when research papers and keynote presentations are available online we need to ask whether a conference, with all the travel, expense, and carbon involved, is still the most effective way of energizing and invigorating a research field.

DRS2016 is no exception and continues this ongoing conference prototyping activity. We have tried to develop a discursive conference that leans both towards the academic, in research papers, but also towards the practical in Conversations and Workshops. So this is a conference that presents existing research, projects, and discussions not as fixed end points, but as ongoing dialogue. To do that we have tried to balance the online conference with the offline one, and the ephemeral with the enduring. Partly this approach helps to provide a continued legacy for the conference, but it also helps to include as many people as possible in (re)directing the dialogical flow of research activity.

As an organising committee we met in January 2015 to talk about key questions, conference themes and conference design. From that discussion the three individual words of the DRS – Design, Research, and Society – were felt to define an interesting area for a conference; one that was about the practice and *doing* of design but also about design's societal impact and the moderating role that research plays between the two. Design + Research + Society perhaps represents a larger area than that of the Design Research Society, but as these proceedings demonstrate the appetite is clearly apparent for Design Research to embrace ever-wider concerns.

The underlying premise, however, was that 50 years of design research has provided us with a sound understanding of design and a solid foundation upon which to build. The interesting questions, then, appeared to us as not so much how we do more of the same – though that of course has its place – but in how we use what we now know. Hence the three broad questions that the papers in these conference proceedings respond to:

- How can design research help frame and address the societal problems that face us?
- How can design research be a creative and active force for rethinking ideas about Design?
- How can design research shape our lives in more responsible, meaningful, and open ways?

The DRS has a number of established Special Interest Groups (SIGs) which the organising committee thought important to prioritise but we also wanted to find a way to add additional emerging and complementary research themes to these. This resulted in a call for additional themes in June 2015 and a selection process that resulted in 15 further themes (from 25 proposals) alongside the 9 themes represented by the Special Interest Groups. The idea of a 'conference of conferences' began to emerge, with theme papers managed by sub-chairs, but consistency of peer-review overseen by a central review committee across all themes.

The systems currently available for managing paper submission, in the case of DRS2016 the excellent ConfTool system, now provide comprehensive integrative platforms to conduct sophisticated submission, peer-review, rebuttal, discussion, communication, and programming of papers, which means we can be more confident than ever about the academic quality of the final papers accepted for DRS2016. In total we received just under 500 paper submissions all of which were reviewed by two, and sometimes three reviewers, as well as being managed by theme chairs. In total 939 reviews were written by 290 reviewers with 200 papers being accepted, and a further 40 accepted following revision. This represents an acceptance rate of 49%.

The 240 papers in these proceedings have been grouped under 26 themes, 23 of which have been closely managed and developed by theme chairs (the other 3 themes derived from an Open Call). In these proceedings you will find an introduction to each theme by the relevant chair(s), outlining the background to the theme and putting the papers that were finally accepted and published into a wider context. Nine of the themes are the result of calls from the Design Research Society Special Interest Groups, which are active throughout the year and that report to the DRS council regularly. Many Special Interest Groups hold their own conferences, supported by the DRS, so the papers in these proceedings, responding to the overall theme of Future-focused Thinking, should be seen as a sample of those specialisms.

Fittingly for a 50th Anniversary conference there is a strong historical thread of papers – the field of Design Research now becomes a subject of historical study in the themes of *Histories for Future-focused Thinking*, *50 Years of Design Research,* and *Design for Design: The*

Influence and Legacy of John Heskett. This is a useful development, and shows the maturity of the field now, with early work not just a familiar citation in reference lists, but something that can be looked at in a wider cultural and historical context.

Many of the new themes bring a more critical and speculative approach to Design Research, framing research questions and practices in ways other than what some see as more 'traditional' evidence-based approaches to research. These are papers that argue for a particular position or approach to understanding design or practice. Examples of these themes include *Aesthetics, Cosmopolitics & Design*; *Design-ing and Creative Philosophies*, and *Reframing the Paradox: Evidence-based Design and Design for the Public Sector*. The emerging area of Social Design is well represented in the areas of *Design Innovation for Society* and *The Politics of Commoning and Design* and shows the importance of Design Research to discussing and achieving concrete outcomes for social good.

The idea and limits of Design and Design Research are explored in many themes, but in particular *Objects, Experiences, Practices & Networks*; *Design and Translation*; and *Design for Tangible, Embedded and Networked Technologies* take a more systemic view of design, placing it within a network of activities and technologies. In contrast to this other themes focus much more on the individual and collective experience of designers and others involved in the process of design, for example: *Experiential Knowledge*; *Embodied Making and Learning*; *Aesthetic Pleasure in Design*; and *Food and Eating Design*.

Of course there are themes that have been ever-present in DRS, and in other Design Research, conferences – understanding design process and the nature of design knowledge are the subject of the *Design Epistemology* and *Design Process* themes. The practical impacts that design can have on all types of organisations are explored in *Design Thinking*, an area of continued and increasing interest, and *Design Innovation Management*. *Design Education and Learning,* now with its own large biennial conference series, was the most popular theme for DRS2016, with 28 papers accepted from 53 submissions.

Finally, there are a set of well-developed themes, organised as part of DRS Special Interest Groups, that broadly explore the welfare of others both in a small and large sense embracing ideas of person-centredness, responsibility and ethics. These themes include *Design for Health, Wellbeing, and Happiness*; *Inclusive Design*; and finally *Sustainable Design.*

As in any research field the definitions between sub-areas often blur and overlap, and there are themes that contradict and conflict with one another, strongly arguing against a particular approach or theoretical grounding of another area. The DRS2016 keynote debates were designed to explore some of these issues and fault lines but more generally this should be taken as a sign of health and maturity. For many years we have heard that Design Research is a new field, still finding its feet, but as an organising committee we think the definition and extent of the themes in these proceedings demonstrate precisely the opposite. In Fifty years we have built up a strong and diverse research field that is widely applicable, broadly inclusive and, in 2016, more relevant than ever.

There is a sense in which design research sits at the crux of a false dichotomy; between on the one hand research in a 'pure' form (which values objectivity, subjectivity, experiment, discourse, history, analysis) and on the other the active engagement in shaping future forms by suggestion, prototype, speculation, practice, and intervention at all levels, from the molecular to the political, from the anthropological to the computational. In an increasingly fragmented and atomised world Design Research is a field which reveals the falsehood of the dichotomy. It is a field that collectively links disciplines, audiences, and technologies in a critical but productive way. The design of a conference – with its implicit value systems, partiality to statistical analysis, but with an emergent structure and representation – is no bad example of a future-focused design research that shares what knowledge is known and explores what knowledge is possible.

Finally, we would like to thank all people – the local organisation, the international programme and review committee, and all the reviewers – involved in organising DRS2016 and who have contributed to such a huge collective effort. The valuable time that has been given in helping to shape and deliver the conference has been very much appreciated. Thanks should also go to the Design Research Society, for supporting the conference so effectively; to the Royal College of Art and Imperial College London for providing time and resources as partner Universities; and to the University of Brighton, particularly the College of Arts and Humanities, for enabling the early vision of a 50th Anniversary DRS conference to be fulfilled.

Peter Lloyd
DRS2016 Conference Chair
Vice Chair of the DRS
Brighton, UK

Previous Design Research Society and Associated Conferences

1962 *Conference on Design Methods,* London, UK
1964 *The Teaching of Engineering Design*, Scarborough, UK
1965 *The Design Method*, Birmingham, UK
1967 *Design Methods in Architecture*, Portsmouth, UK
1971 *Design Participation*, Manchester, UK
1972 *Design and Behaviour*, Birmingham, UK
1973 *The Design Activity*, London, UK
1974 *Problem Identification for Design*, Manchester, UK
1976 *Design for Need*, London, UK
1976 *Changing Design*, Portsmouth, UK
1978 *Architectural Design*, Istanbul, Turkey
1980 *Design Science Method*, Portsmouth, UK
1982 *Design Policy*, London, UK
1984 *The Role of the Designer*, Bath, UK
1998 *Quantum Leap*, Birmingham, UK
1999 *CoDesigning*, Coventry, UK
2002 *Common Ground*, London, UK
2004 *Futureground*, Melbourne, Australia
2006 *Wonderground*, Lisbon, Portugal
2008 *Undisciplined!*, Sheffield, UK
2010 *Design And Complexity*, Montreal, Canada
2012 *Uncertainty, Contradiction and Value*, Bangkok, Thailand
2014 *Design's Big Debates*, Umea, Sweden

Volume 3

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SECTION 5

AESTHETICS, COSMOPOLITICS AND DESIGN

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DRS2016
Design + Research + Society
Future-Focused Thinking

2016 Design Research Society
50th Anniversary Conference
27-30 June 2016, Brighton, UK

Introduction: Aesthetics, Cosmopolitics and Design

Alex Wilkie

Goldsmiths, University of London
a.wilkie@gold.ac.uk
DOI: 10.21606/drs.2016.509

The fields of design research, design studies and science and technology studies (STS) have, in recent years, become increasingly interwoven, entangled and variegated. The Design Research Society theme 'Aesthetics, Cosmopolitics and Design' seeks to explore a particularly salient nexus of such interdisciplinary engagements where practice-led design researchers and STS scholars collaborate in productive dialogue in order to study the social in the making, including the novel technoscientific entities and objects that are brought into being through inventive research techniques and methods. The combined take-up of the conceptual and analytic resources, offered by STS, with the inventive methods typically employed by practice-led design research necessarily involves a preoccupation with both epistemic and ontological questions: about the knowledge that such research practices yield in relation to design, science, technology and the social as well as the nature of the elements that compose these socialities, including the active role of the research devices and instruments used therein. In foregrounding the notions of aesthetics and cosmopolitics the aim of this theme is to signal a nascent and shared concern with the aesthetic qualities of experience and knowledge (manifested through aesthetic research practices) that are intimately tied to the reformulation of how the social is made and what is is made up of and the political implication of these ontological compositions. In what follows, I briefly review some of the noteworthy points of interface between between design and STS before moving onto to a discussion where I sketch out a redefinition of aesthetics which, in contrast to classical sociology and social theory, shifts from matters of taste and judgement to questions concerning aesthetic experience. Crucially, the shift to aesthetics entails the bracketing out of the normative epistemic criteria of truth, validity and foundationalism. Drawing on the work of of Isabelle Stengers and Bruno Latour, I point to how interdisciplinary research collaborations between design and STS that involves the introduction of new research entities (designs, research instruments and devices) produces new social associations and arrangements which can be productively thought through using the notion of cosmopolitics.

For scholars in STS, the discipline of design and its associated practices has emerged as an increasingly explicit and important empirical topic where the irreducible interrelations between science, technology and society play out. Although the history and sociology of technology has long held an implicit interest in the design of sociotechnical systems (Hughes, 1983), how the success of designs are determined by the meanings attached to them by social groups (e.g. Bijker, 1995; Pinch & Bijker, 1984) and the failure of transportation design projects (Callon, 1986a; Latour, 1996) it is, perhaps, in conjunction with the disciplinary uptake of actor-network theory (ANT), the intervention and application of ethnomethodology in the design of ICTs (Suchman, 1987) and the insistence of feminist scholars of technoscience to expose gender relations embodied in designs (Cockburn & Fürst-Dilic, 1994; Rommes, Van Oost, & Oudshoorn, 2003) that design practice – and 'design' as a distinctive domain of expertise – has emerged as a substantive empirical topic. Here, empirical analysis of design practice has included studies of advertising (Hennion, Meadel, & Bowker, 1989), industrial design (Dubuisson & Hennion, 1996), participatory design (Callon, 2004), architectural design (Yaneva, 2005; Yaneva & Zaera-Polo, 2015), user-centered design (Garrety & Badham, 2004; Wilkie, 2010), healthcare design (M. Berg, Langenberg, & Kwakkernaat, 1998; Danholt, 2005) as well as specific design practices, such as prototyping (Wilkie, 2014), and sites where design expertise is enacted, such as studios (Farías & Wilkie, 2015; Wilkie & Michael, 2015).

Meanwhile, scholars in design studies and design research have drawn on STS to provide theoretical and analytic resources with which to critically reflect on the social shaping and life of design artefacts (Woodhouse & Patton, 2004) as well as conceptualise the doing of design research and inform design pedagogy (Wilkie & Ward, 2008). Notable examples, here, variously address the role of public participation and citizen engagement in governance and democratic processes. Here, participatory design is undergoing reconceptualization where participation is (symmetrically) broadened to include the active involvement of humans and non-humans (Binder, Ehn, De Michelis, Jacucci, & Linde, 2011; Ehn, 2008) in deliberative design processes, thereby acknowledging the ontological diversity of political collectives. Similarly, design researchers have developed a sustained interest in the public accountability of science and technology and the ways in which practice-led research can mediate public engagement (DiSalvo, 2009; Kerridge, 2015) with the risks posed and controversies precipitated by developments in technoscience. Such techniques have also inspired a reciprocal take-up of design by STS as part of experiments in exploring the relations between laypersons and experts enacted in science communication (Horst & Michael, 2011).

Though heuristic and certainly schematic, the above highlights just some of the interplays between the two fields that serves as a backdrop for another, more interdisciplinary, mode of engagement. In this mode we can discern a more explicit 'mutual imbrication' (Barry, Born, & Weszkalnys, 2008, p. 25), or reciprocal capture (Stengers, 2010, p. 36), where distinctive knowledge practices and interests intra-act, co-producing mutual obligations and requirements. An early (1998–2000) and particularly noteworthy example of design and STS collaboration began as the 'Web Geographies' project, a collaboration between Science

Dynamics at the University of Amsterdam and members of the Computer Related Design Department at the Royal College of Art, London, which grew into govcom.org as part of the Design and Media Research Fellowship at the Jan van Eyck Akademie in Maastricht. Here, the web was viewed as a novel and active site for knowledge politics (Rogers, 2000) and as an experimental setting for the deployment of research devices, such as the Issue Crawler (Marres & Rogers, 2005), a search engine-like application for tracing and disclosing issue-networks and publics, around debates such genetically modified food and climate change. Arguably, this collaboration pre-figured and informed the more recent sociological pre-occupations with big data (Kitchin, 2014; Ruppert, Law, & Savage, 2013), digital instruments for social research (Marres, 2012; Ruppert, 2013) and digital sociology more broadly. More recently, the RCUK funded Energy and Co-Designing Communities (ECDC) project involved an interdisciplinary collaboration between designers and scholars of STS in which a more-than-human (Tsing, 2013) and cosmopolitical approach to design was pursued. Here, the researchers sought to explore the nature and composition of energy-demand reduction practices and problems by way of engagement workshops, cultural probes (B. Gaver, Dunne, & Pacenti, 1999), Twitter bots (Wilkie, Michael, & Plummer-Fernandez, 2015) and the Energy Babble research device (W. Gaver et al., 2015), all of which were specifically designed to investigate the research milieu of local community engagement with climate change. Common to both projects I have described above, is the involvement of design researchers in devising and shaping the visual, material and auditory (in the case of the Energy Babble) qualities and therefore the specificity of the aesthetic form and experience of the various research instruments and materials that were deployed in their interdisciplinary research practices. Arguably, the rationale for such efforts, briefly put, is that such research instruments are an active addition to the settings in which they are deployed and, rather than being downplayed, bracketed out or rendered invisible as is often the case, their functional and aesthetic roles are situated and reflexively acknowledged.

If one of the key lessons of STS is to open up and investigate the black boxes and hard cases that contribute to the dynamics of sociality and its manifold modes of existence whilst keeping an open mind as to the (ontological) contents of said boxes and nature of cases, it follows, then, that aesthetics might hold much promise with such a perspective. At first glance aesthetics might appear to be beyond the pale as a practico-theoretical concern, as the preserve of philosophy, art theory and cultural sociology (De la Fuente, 2000) arguably predicated on, following Kant, reflexive judgements, reasoning and appreciation concerning taste and nature (e.g. the sublime). If, however, aesthetics precedes cognition this raises the possibility of a non-human centered and practical approach to aesthetics (Binder et al., 2011) in which both humans and non-humans undergo uncooked (Dewey, 1934/2005, p. 207) or pre-esthetic aesthetic experience. In other words, the principle of analytic symmetry (Bloor, 1976; Callon, 1986b) can be extended to that which produces and experiences feelings rather than reducing aesthetics to and inflating is as a human-only privilege. For interdisciplinary engagements between design and STS, aesthetic practices and experiences can thus become a shared concern for the kinds of entities that are researched and elicited

during research events. As Steve Shaviro (2009, p. 47), citing A.N. Whitehead (1933/1967, p. 176) puts it: "Aesthetics is the mark of what Whitehead call our *concern* for the world, and for entities in the world".

The move to (generic) aesthetics as part of research practices, proposed by this theme, therefore includes a commitment to the nature and quality – the modes of existence (Souriau, 2015, p. 131) – of all those involved and composed in the research process: researchers, researched, research devices and a commitment to what they become in the research process. This move necessarily involves a move away from the normative politics of design (Garrety & Badham, 2004) where what counts as human and what counts as the technological is pre-given, to an unfixed, heterogeneous and emergent political ontology where design and design research practices, for example, occasion novel ontological possibilities as well as the eligibility to participate in collective life (cf. Marc Berg, 1998; Wilkie, 2010). The wager of this theme, then, is that research practices (in this case linking design and STS) involves, following Stengers (e.g. 2005), a cosmopolitical commitment to working with those affected by a (research) issue as well as a speculative obligation to those entities (users, collectives, communities etc.) who emerge by way of research practices.

With the above in mind, the papers included in this theme explore the notions of aesthetics and cosmopolitics in different (implicit and explicit) ways. In almost all, however, there is a distinct preoccupation with aesthetic processes and the nature and composition of participation in the empirical settings of the research and during the enactment of research practices. Substantively, and in no particular order, the contributions variously explore how common worlds and collectives are fashioned (or not) in a diverse array of empirical settings, including but not limited to: Scandinavian furniture design (Gasparin and Green), the Chilean National Zoo (Hermansen, Tironi and Neira), the Internet of Things (Reddy and Linde), computational fashion (Forlano), the web (Mauri and Ciuccarelli**)** and social media (Alshawaf), Eselek village, Gokceada Island, Turkey (Cheung-Nainby), cultural institutions in Copenhagen (Olander), the Berlin Laboratory for innovative X-ray Technologies (Marlen Dobler), the Mellunkyla neighborhood in Helsinki (Koskinen) as well as various UK-based biomedical institutes (Kerridge). It is in this emergent ecology of design research practices (visual, material, speculative, critical, ethnographic, diagrammatic etc.) that the interplay between aesthetics, cosmopolitics and design is beginning to play out.

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About the Author:

Alex Wilkie is a Senior Lecturer in the Design Department, Goldsmiths, University of London where he is the Director of the PhD programme in Design and a Director of the Centre for Invention and Social Process (hosted by the Sociology Department). He has recently co-edited Studio Studies (2015) and Speculative Research (both published by Routledge).

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Framing Values in Design

Marta Gasparin* and William Green

University of Leicester
*mg352@le.ac.uk
DOI: 10.21606/drs.2016.109

Abstract: In this paper, we outline a framework that explains how creating value in a design product takes place in practice, as a result of a negotiation and translation process. Through an ethnographic study, we analyse how the values of an iconic Scandinavian design product emerged and were managed during the product life cycle, translating the values when new actors or new markets were enrolled. More specifically, the paper uses the notion of features in order to capture and express the value process. It suggests that the work of the spokesperson of associating and disassociating features is the key dimensions that determines the emergence of value. It also argues that value as product is not static rather dynamic that is changed by the process of associating and disassociating new features.

Keywords: values; Actor-Network Theory; design management

Introduction

In this paper, our aim is to contribute to the literature is twofold. First, we mobilise the notion of value in design by outlining how value takes place in practice as a result of a translation process. Second, we discuss how ANT can contribute to the value discourse, in particular we refer to value in design management. The motivation for proposing this in the design context emerges from the limitations of previous research. The first limitation concerns the lack of knowledge of how value actually emerges in a design context, if it is fixed or malleable. The second one concerns the lack of focus on design studies through the lenses of ANT and STS in analysing value process. Therefore, we are contributing to the discussion proposed in the call for papers of aesthetic and its crafting by exploring what constitutes value in design products. Through an ethnographic study, the paper discusses how the values of a design furniture product emerged and were managed during the product life cycle, translating the values when new actors or new markets were enrolled. More specifically, the paper uses the notion of features (Latour, 1996) in order to capture

and express the value process. It suggests that the work of the spokesperson of associating and disassociating features is the key dimension of the emergence of value. It also argues that value is not fixed, but it can evolve by associating and disassociating new features.

The paper will address the question of how does the value of a design emerge by first setting out how values have been analysed in the literature of design. Second, the paper will present how ANT might contribute to the value debate. Third, the interpretation of the analyses provides interesting insight for the theory of design management reinterpreted through the lenses of management of translation. This also has implications for design practice.

Literature

Perspectives on values and aesthetic in design management

Design management is a diversified field, as such the literature review has been organised into four perspectives, created after dividing the papers into their philosophical foundations. The identified perspectives are: first, “Design for Decision Making”, based on pragmatism, in which design is concerned by conceiving and creating artefacts to reach certain goals (Simon, 1969, pg. 114) that evolved into the second “Managing As Designing”, based on Constructivism, which considers design as a tool for inspiring managers in designing organisations and to stimulate creativity (Bolland & Collopy, 2004). Third, “New Product Development Process in Industrial Design”, based on functionalism, considers design an activity and its outcome that is meant to give form and order to life’s processes (Ulrich, 2011). Finally, “Design As Proposals Of New Meaning”, based on hermeneutic, considers design as a driver for innovation, and radical innovation happens when designers design products with new meaning (Krippendorf, 2006; Veganti, 2009).

In the design for decision-making perspective, value is created when a problem is solved through a solution that has been designed and emerged among multiple possibilities. Since the problem can be solved by preparing a tree with paths of different solutions, the scheme for fastening value to partial paths may be quite different from the evaluation of function for proposed complete solutions (Simon, 1969). The process for seeking problem solutions can be used for gathering information about problem structure, and is valuable when a solution is found. Value can be calculated, and is an acting force operating on and through design, and the principle of substitution: when there is no more value, the product should be substituted. Recently, this concept has been reinterpreted in managing as designing, based on the studies of Simon (1969) and Weick (1993). The value is created through the architecture of the organisation, in order to achieve lasting value for society. Design is a vehicle for creating dialogue across socialised professions (Weick, 1993). If managers behave with a design attitude, they can be flexible and reactive, creating sustainable products, sustainable working conditions that can benefit and create value for all the stakeholders involved in the firm (Boland and Collopy, 2004). Problem representations determine how

well managers perform and create value, and such value is created through the use of language, developing awareness.

The value in the second perspective consists in having a product which is stylish, aesthetic, of high quality, attentive to the customers' needs and that consequently enhances the company's reputation. Value creation refers both to value delivered to the customers and to the value created for the company. As such, value is considered both in economic terms and customer satisfaction and loyalty (Pullman and Gross, 2004). Value is critical for providing sustainable competitive advantage to the firms that are adopting a design-oriented strategy for new product development (Kotler and Keller, 2009), which includes delivering innovative products that meet the customers' needs and are high-performance (Borja de Mozota, 2003). Hertenstein, Platt & Veryzer (2005) quantified the value that design produces, which resulted in economic value, added value, and percentage of sales and economic value, customer satisfaction, innovation, and creativity. Marketing is considered the organisational function through which value is delivered to the consumers (Jun, 2008) as exchange process (Borja de Mozota, 2003). Norman (2004) affirms that the value of design resides in the emotions that it is able to elicit. Their value depends on the occasion, contest, meaning that they are conveying, and on the beauty that is embedded. Thus, design is valuable because it creates emotions (short lasting), stimulates moods (long lasting), traits and personality.

In the third perspective, value is created when the firm delivers a product to the customers with better design, performance, quality and experience (Utterback et al., 2006). Value is created by adding to a final aesthetic of a product which conveys new meanings, defined by its emotional and symbolic value, a personality and identity, which may easily go beyond the style (Verganti, 2009). The meaning in products is a link between the social aspects, specific languages, sets of signs, symbols and icons associated with the product. The value of using design driven innovation is asserted to the increase of the profit by increasing sales or by decreasing manufacturing costs, conquering the market share, increasing the competitive advantage, and revamping the mature and failing products (Verganti, 2009). The value created for the customers is reflected into the increase of value at the level of corporate image, including brand, stationery, publications, exhibitions and web design.

The following table summarises the perspectives

Table 1 Value in the perspectives of design management.

Value	Design for decision making process	Managing as designing	Industrial design	Design as a proposal of new meanings
Generated in	Its properties and fitness to the task	Social structures	Price and desire for products	Social and cultural context
Understood as	Durable	Determinable within the organisation structure	Objectively determinable	Subjective, arbitrary, depending on the culture
Design product	Utility	A mean to an higher end	Cost- opportunity object that is measurable economically	A sign
Implication for managers	Need to meet specific ways of doing things	Need to cope with different belief systems	Need to make the products competitive, distinguishable and more desirable	Need for understanding the social and cultural context

Emerging perspective

Recently, Actor Network Theory and Science and Technology studies have been used as frameworks for analysing design, for the discussion of architectural design (Yaneva, 2009), of user-centered and human-computer interaction design (Wilkie, 2010), and participatory design (Callon, 2004).

ANT considers reality as relative and co-constructed, existing only within the network and in the translations. For this reason it has been indicated also as sociology of translation (Callon, 1986). The word translation means "*displacement, drift, invention, mediation, the creation of a link that did not exist before and that to some degree modifies two elements or agents*" (Latour, 1994, pg. 32).

Human and non-human actors are constantly working to stabilise the reality and constituting design. Design is the outcome of the process of constructing things by translating interests and goals, enrolling and mobilising actors. Design is a technical artefact in which the actors belonging to the socio-technical network are inscribing characteristics, values and behaviours (Akrich et al., 2002b). Design is not a discovery momentum or an act of genius by a designer, but the outcome of the work done by the actors enrolling other actors, analysing, prototyping, interpreting the inscriptions, the trials with the machines and the materials (Latour, 1987). Thus, design is made coherent inside different networks, forged as the history of its construction and its transformation. Design is constantly in search of allies and the designer and the manufacturer are the actors who are acting to capture the allies' attention, displacing goals and explanation after explanation, the reinterpretation of the features of the design (Latour, 1988). During the process, the spokesperson emerges, trying to create a stable network of human and non-human actors across social, organisational,

and technical domains. Design process happens through translation to make the network stable by solving struggles, in a context that is not planned, sketched or anticipated, but emerging from the capability of entering into a dialogue with multiple actors. Each modification of the interests and each translation are visible and modify the inter-relational systems. The design processes can be seen as a mishmash of decisions that cannot wait in an environment of complex changing markets and customer tastes, in which actions cannot be planned or predicted in any mechanical way (Akrich et al., 2002a). The meaning and the qualities of the objects are produced, not given, as objects do not have inner properties; the semiotic meaning of design is not *a priori* determined, but constructed in the network by engaging a multitude of the complex micro-processes that happen in the design creation, development, launch, and post launch phase. Design is performative through the relations (Latour, 1999). Latour (1991) explains that the success of an innovation is not only due to the fact that a technology is simpler or better than another one, but rather to the fact that the customers could understand and accept a long chain of translations embedded in the product and black box them. After the launch, the design is displaced, moving in space and time, presented to the consumers through its features. The features are elastic and they can break in any moment if not supported when the negotiations become tense and difficult. The features might be understood as accidental because they are framed and built-in to the relationships (Latour, 1999), and the spokesperson is translating the features associated and disassociated with customers. Value is generated from this process, it resides in the relations, it is emergent, fragile, and in the need of a spokesperson responsible for translating it to customers (Latour, 1994), including and excluding features that otherwise would not be associated or disassociated from the design.

Method

The aim of this research is to establish how ANT can facilitate the exploration of the emergence of values in the design of products, overcoming the limitations of the four philosophically routed paradigms described above, which are commonly ascribed to in everyday design practice and accompanying literature. To collect data, an ethnography was performed in a Danish design company, Fritz Hansen, following the actors in their process of network construction, their trials to make the ties stronger; to see how they have compromised, negotiated, and compacted their associations; how translations happened and what was actually translated, how were the features associated and disassociated. The chair was the object of the analysis, the Serie7, that is the most sold chair in the world, designed by Arne Jacobsen. The information were completed with three years of visiting the company and the showrooms, 28 formal interviews and informal chatting at the lunch table or at the coffee break, all noted or recoded. All the data were transcribed and coded with software for qualitative research. The first two episodes of the analysis are based on historical data, the third and the fourth on interviews and historical data analysis.

The product life cycle was constructed to investigate the values, how (if) they changed over the years from conceptualisation of the idea to the date of research collection. The units of

analysis are called episodes (see Figure 1), a term borrowed from a previous study by Latour (1987), that distinguished the moments of analysis to facilitate interpretations.

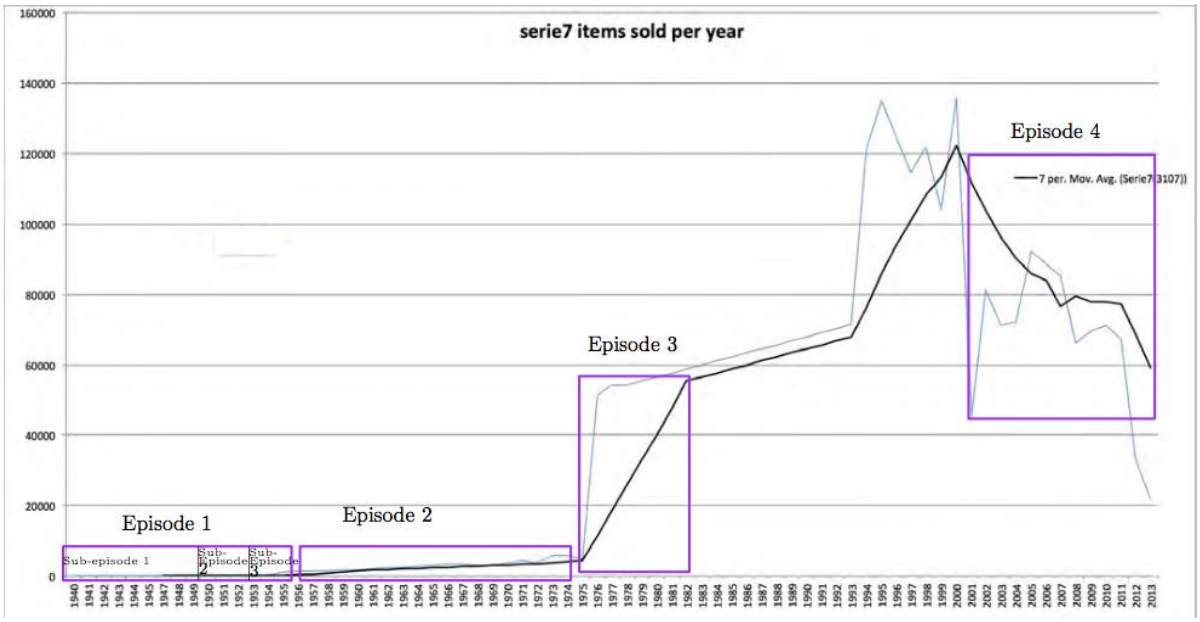

Figure 1: Serie7 items sold per year from 1940-2013, detailing the four episodes.

Analysis of the Serie7

The first episode involves the design of the chair. The Serie7 is the first chair made of plywood designed in Denmark (Figure 2).

Figure 2: Image of Serie7 chair, from the website fritzhansen.com

The manager of the company and the designer worked together to promote the features of this new chair that was made of plywood and had a modern design. They qualified the chair describing the plywood as being flexible for the industrial production, allowing high volume mass production, and decreasing the price per item. This design created the mass market. The features associated and disassociated were presented in similar ways in Scandinavia and

USA, which were the two main markets. After the second world war (1939-1945), Denmark's economy flourished; according to economic reports from the Danish Government of that time, wages increased, resulting in greater consumer purchasing power, factories increased production capabilities and this was coupled with an increase in the export of products. The USA government wanted cheaper solutions for furniture for the numerous refugees escaping Europe, and in Denmark for new housing.

The values attached to the Serie7 emerged to answer to those needs. These values were different from the values of the design before the war, which were typically made of precious or bent wood. Pre-war furniture was considered to be an object of art, handcrafted, produced in small quantities, for wealthy customers that were willing to pay a high price. The spokespersons for the Serie7 chair worked to disassociate the new episode from these values. The spokespersons promoted the features of the plywood being functional, nice, flexible for the industrial production, allowing high volume, mass production, and decreasing the price per item. The plywood was valued as an alternative to the bent wood technique for steam which became very costly to produce, as it was handcrafted. Moreover, Fritz Hansen Company was among the first one to change the timber used in the furniture, switching from walnut to beech, Denmark's most common tree, and developing a new technique to transform it into veneer, the material for the plywood. The Serie7, thanks to the modernisation of the factory in 1954 and the use of gluing and veneer, was very fast to produce.

The production manager did not oppose resistance to the new industrial technology, but worked actively to find and build the machinery necessary to work with the plywood and expand the industrialisation process. The spokespersons worked to enlist the factory workers to the goals of the new technology, explaining that they would not loose their job, their tasks would be less complex, more efficient and produce higher quality products, and as a result new jobs would be created.

In an interview for the newspaper1, about the industrial production and the design process, the manager at that time affirmed:

"Fritz Hansen is considered not only Denmark' s but Scandinavia' s largest and best furniture factory. This means something in Scandinavia, where furniture design, like most other industrial arts, is of a very high standard. (…) We are especially known for the excellent chairs. Not only artistically but also technically, the factory has done a pioneering job and several stages of the manufacturing process are built on inventions and pieces of machinery that have been experimental."

The spokesperson associated the features that concerned the high volume of mass production to increase the profits by reducing the cost per chair, without impairing the quality that was translated to the customers as elevated and constant, and promoted the features of cost saving, innovative, working chair but also a chair ideal for families.

[1] møbel- kultur9/64

Arne Jacobsen, the designer, was aware of the framing power of the press for building a strong network to sustain his designs, and "he did not draw a single line without informing the press." Arne Jacobsen attached and worked to promote the features of being lightweight, of good quality, organic, and stackable, since the new flats were built smaller, so there was the need for having stackable furniture. The Serie7 was translated as a chair of good seating, novel, organic, innovative, beautiful, with armrests, with a good price, and able to provoke a good feeling in their users.

The second episode analysed the introduction in the market of the Serie7. The spokesperson in this episode (the manager) organised numerous exhibitions and participated in fairs to display the chairs. Through the press, he publicised that these new chairs to the public, and through the press, described them as communicative, intimate, pleasant, and suitable for different tastes. The way in which the exhibitions, curated by Jacobsen, were staged, framed the chairs accordingly; they were able to bridge the gap between old and the new since they were pictured both in old and in modern flats surrendered by old and modern furniture; they were warm, new, not made by a cabinetmaker, suitable for big and small environments, modern, Danish, for families, stackable, ergonomic, durable, and of good quality. The interior designers were describing the Serie7 as ideal furniture for the "ideal family". The price of the chairs was increased to indicate quality and long-lastingness: in considering a long-term perspective, the customers save money because they were not required to replace the chairs. The manager commented1:

"It is stupid to think that Fritz Hansen is doing everything by hand, in a cabinetmaker way and not having a rational production, but the quality is still high. The chairs are designed by an architect, who has been working very thoughtfully with a prototype. The factory is pushing the architects to play with the prototype that are handmade, and then they look together to a suitable technique for manufacturing."

In the third episode, the chairs experienced a sudden increase in sales. The new CEO successor of Hansen, Lassen, invested in the production of plastic chairs by Verner Panton in the 60s, but due to the oil crisis in the 70s, the factory had to reconvert back to the production and use of wood again, which had become a cheaper material. The management decided to decrease the variety of chairs produced and to focus mainly on the Serie7, which was the favourite among the customers, with 40% of the production exported, especially to the Arabian market, which was profiting from oil production. The company was relying on the heritage of the past: in the interviews for the press, Lassen referred to reputation of Danish Design. The plywood was black boxed, enabling features to be attached to the chair that were associated with it in previous episodes. The Serie7 was featured as being ergonomic; office-friendly; flexible; Danish; resistant; of good quality; reusable in the sense that it can be used by different people (mothers were giving them to their children once they moved out from home); and sustainable because it was made of wood and not of plastic. In this episode, the environmental movements were mobilising attention to the

[1] Korte træk af en lang historie

pollution caused by plastic and its associated waste. Therefore, Lassen mobilised the value that the chair was sustainable, a good alternative to plastic chairs that were polluting. Being of good quality, long-lasting and resistant, therefore, these products did not have a drastic impact on the environment. The chairs were disassociated from the features of the modern chair.

In the fourth episode, the sales decreased. The former design manager, during an interview, explained that the choice of the CEO was to increase the prices, to become more iconic and reposition the brand, declining discounts for large commissions, so the sales suffered. The current design manager described how the three values that the CEO had chosen to promote: visual (original pure, long lasting), emotional (genuine, serene, Danish), rational (superior, quality refined, ageing with beauty) values, had worked for promoting the chairs and inspire new product development.

"We work with design [of the serie7] at three levels: visual, emotional and rational level. The visual level is about the immediate attraction when you see something you find attractive, it is beautiful, and you want to know more about it. At the visual level we have three values that are: original, pure, not too many unnecessary ornamentations. We want things to be as pure as possible, easy to read, so they can be iconic. (…) For the value to be long lasting, we try to be as long lasting as possible because we want our products to have a long life span(…) At the emotional level we have three values: genuine, serene, and Danish. Genuine is about being honest, we want our products to be real materials, we are not trying to fake surfaces, paint or hide them. Serene, is about the atmosphere the product creates. We want our products to be calm, and of course serious. And the final value is Danish and that's is actually what we haven't focused a lot on for many years, whilst we have worked with a lot recently. (…) And finally we have the rational level and it is about more hard core facts related to a product: price, size, durability. We also have three values at that level; high quality or superior quality, refine and on the edge of beauty."

In recent years, the focus has been to promote the serie7 by emphasising the focus on natural furniture material, promoting the feature of being genuine, natural and cosy.

Therefore, the Serie7 is described as sustainable, the wood is resourced from certified forests; it is long lasting so there is limited waste. The standards for the production are high, meeting European requirements for all of the different markets. The Serie7 is translated as classic and timeless, simple, easy to recognise, quiet, but having their own character; therefore, they can be displaced in totally different contexts. It is also democratic, conveying good values: combined with the new social-democratic politics, modern design could offer the opportunity of an improved life at home and shared prosperity, and to this day the home remains absolutely central to the focus of Scandinavian life.

In the developing markets, the Serie7 is considered as a luxurious furniture, which customers are buying for reasons of status and notoriety, but in Europe and America it is promoted as a classical Danish product that is comfortable, good quality, and to have emotional value.

Discussion and conclusions

The value creation process in this analysis was seen as a construction that occurs through the work of managers by translating the features, which are continuously negotiated and defined in networks incorporating different actors. The features are recognised as contingent and negotiated upshot of local and historical processes (Neyland and Senekova, 2012, Woolgar, 2004). The values are not inherent in the object. In the perspectives of value creation presented in the literature it seems that, once the product has been developed, the interpreters explain to the customers and the customers will be ready to accept in a passive way. In the analysis, the value creation process is a process of associating and disassociating features through relations and they are transformed every time the relations change. The values are fragile, mediated, intended as created and constructed in the release starting from the features. Values are also enacted in a continuous process of reproduction (Law, 2004). The features that form the value of the product are not embedded in the products (as it is for the previous perspectives), but built around it through narratives. The features are not fixed, but they change during the process, sometimes what was disassociated could become associated and and vice-versa.

Value creation is a never-ending process, in that the products are considered the result of a process in which value constructions are constantly negotiated in actor networks, it is not certain, indicating that it cannot be predicted and planned. It is complex and ambiguous and needs to be framed (Akrich et al., 2002b).

In the first perspective, value is generated in its properties and fitness to the task, as it is created whenever the manager has a system to make decisions, based on standards that determine actions, preferences and beliefs: Simon defines design as the process by which the managers devise courses of action aimed at changing existing situations into preferred ones (Simon, 1976). Management creates a system that facilitates the permanence of routines that allow this specific way of doing things, creating the organisation value. Value is generated in the social structure, the organisation has to work properly in order to create value for the society, becoming a mean to a higher end. The management could benefit by using design as a translation to make the people in the organisation cope with different belief systems.

In the second perspective, industrial design, the value is centred on the customers' decisions to buy the products and this creates value for the company. The value is considered as value for money, a monetary sacrifice that the customers have to do in order to buy the product. The company and associated values have to offer a design product whose price is aligned with the willingness, price and values of the customers. This is a cost-opportunity that can be measured economically, including the experience of shopping for it (Pine and Gilmore, 1999). Csikszentmihalyi and Halton (1981) investigated the relation between investment and utility. They demonstrated that people invest in objects with meanings, but the meaning is not comparable to the utility: the meanings that the users explain are most of the time different from the meanings that the producer intended to give. There is a process of self-

awareness, an act of influence that opens the process of self and enable one to infer what the object of self awareness is (Csikszentmihalyi and Halton, 1981). Bourdieu (1984) depicts goods as sources of capital accumulation, economic, cultural (knowledge and education), social (relations) and symbolic (prestige) value. In this perspective, the values are embedded, fixed, non-changeable with time.

In the third perspective, value is generated in the social and cultural context, subjective and culturally determined (Verganti, 2009). The social and the cultural contexts are not stable but constantly changing and it depends on the meaning of the object. The value is associated with the meaning of the objects, therefore it is subjective, arbitrary, depending on the culture and embedded in the relationships (Krippendor, 2006). Thus, this perspective could benefit from understanding the meaning as flexible, changeable, adaptable to different markets and group of customers.

As a result of the analyses of the Serie7 ethnographic case study, it is argued that ANT can strengthen the value of the previous perspectives by giving designers an additional dimension, that the essence of the design is not embedded in the product but is constructed through the relationships. As described in the analysis, the spokesperson works to associate or disassociate the features, and it is a constant negotiation among different actors, who have to accept and agree upon them. They do not exist a priori, but are co- created. By understanding the value, design could be better understood. Translation has a double connotation: to translate and to displace. Hereby, the notion of translation sensitises to what remains in place, and what gets lost (or changed), as a result of the translation. A translation may also be resisted (some elements may not be easily enrolled into a network of relation), so translation is a product (result or effect) as well as a process. All actors who participate in even marginal negotiation contribute to the design translation and as a result the meaning emerges transformed to fit and to adapt to local circumstances (Latour, 1987).

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About the Authors:

Dr Marta Gasparin is a Lecturer in Innovation and Design Management. Her research interest is on design and innovation management and social sciences. In particular, she is interested in

exploring how value is created and managed, and the design processes.

Dr William Green is a Lecturer in Innovation at the University of Leicester School of Management. As a member of CIEHF, his research explores the role of technology in the production of innovation. He has recently led projects funded by Marie Curie Actions, Technology Strategy Board and Health Education England.

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The Prototype as a Cosmopolitical Place: Ethnographic design practice and research at the National Zoo in Santiago, Chile

Martín Tironi*, Pablo Hermansen and José Neira

Pontificia Universidad Católica de Chile
* martin.tironi@uc.cl
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Abstract: This article presents an empirical reflection about the design of prototypes and the individualization of some animals at the National Zoo in Santiago, Chile. Using the material produced by design students, we describe how the process of prototyping contributes to singularize those animals, therefore becoming a cosmopolitical device. The environmental enrichment for chimpanzees case will demonstrate how prototyping displays a truly ontological vocation, establishing open processes of dialogue and experimentation. Its provisional, malleable and fragile nature turns the prototype into a *locus* for inquiry and exploration; its cosmopolitical qualities derived from its many forms of ontological diplomacy: instead of stabilizing properties, it constantly re-specifies its conditions for verification. Finally, we attempt to develop the thesis of the prototype as a cosmopolitical device and its implications on design research as well as a way to intervene the world.

Keywords: protopype, cosmopolitics, design, zoo, ontologic diplomacy

Introduction

How to co-design zoos taking into account the priorities of the animals that live in them? What is the role of the prototype in the articulation of different ontologies concerning animals and humans? What is the specific knowledge that emerges from the provisional nature of the prototype?

This article reflects on the role of the design process in the configuration of certain animals living in the National Zoo in Santiago, Chile (NZSCh). Using the material produced by a team

of design students[1], we describe how the process of prototyping contributes to singularize those animals, therefore becoming a cosmopolitical device. We uphold that prototyping operations can be understood as cosmopolitical diplomacy devices, as these prototypes establish open processes of dialogue and exploration on the specificities and abilities of the animals. We will see how prototypes facilitates co-design processes, precipitating the interaction between the world of chimpanzees in captivity — who explore, use, and defy the prototypes —, and that of the professionals at the zoo — who comment and install the prototypes — and of the students — who design, produce and interpret the prototype in use.

From the local zoo to the global network of parks for animal welfare

In 19th Century Europe, zoological parks offered a healthy environment — counteracting the increasing industrial pollution —, gave prestige to cities in their race with neighboring ones, and as science displays, they operated as animal domesticating environments as well as educators of citizens, "engaging in (theoretical) classification and (practical) acclimatization." Lambrechts (2014, p. 9)

By 1989 the principles of environmental enrichment began to be applied systematically at the NZSCh, improving exhibition standards as well as the physical and psychological life conditions of animals3. Research for conservation has turned the NZSCh into a complex institution, entering important international zoological networks.

Being part of global networks does not only have consequences in the internal operations of the zoo, but also regarding the biography and record keeping of animals. Besides sheltering confiscated specimens from possession, illegal importing or exotic species that are abandoned, the majority of the animals have been born within the park, and have probably spent time in other zoos from the network.[2]

Benevolent confinement of animals: animals as users

From the first collections of exotic animals captured to show military power, to the current *parks for animal welfare*, zoological parks have developed different forms of management, according to the different ecosystems they comprise. Hence, animals play different roles: trophies of power; representations of the exotic and savage; samples of science; and, lately, survivals of *Progress* that require to be understood and preserved since their original habitats are in danger[3.]

[1] This team worked during the first semester of 2014 in the context of the course "Interaction Design Workshop" under a working agreement between the National Zoo in Santiago de Chile and the School of Design of Pontificia Universidad Católica de Chile.

[2] In fact, from the more than one thousand animals distributed in 158 native and exotic species, only Corneta, the sea lion, was born in the sea, that is, in the original environment of its species. (Cubillos, 2014)

[3] In a way, this idea reminds the positivist anthropological project of recording non-European ethnic groups before they become extinct in its pure state, because of the inevitable advance of mankind toward the homogeneity risen from progress. (Hermansen, 2013)

Today, for animals that belong to international zoo networks, *these are their native environments*, just like cities are to citizens. Most of the animals that now inhabit any zoo of relative complexity are descendants of animals raised within the same zoo network.

Humans and not humans are inscribed, and live within a socio-technical ecosystem, in collective experimentations (Callon, 2012; Callon, Barthe, & Lascumes, 2001; Latour, 2001). Advancements in techno-science transforms society in an experimentation space, blurring the boundaries between the "confined laboratory" and the "outdoor laboratory" (Callon et al., 2001). This sets in crisis the idea of a given world (*out there*) (Latour, 1997; Quessada, 2013). Quoting Latour (2008a), this involves "the slow and painful realization that there is no outside anymore. It means that none of the elements necessary to support life can be taken for granted." Just like the weather, the Internet, viruses, citizenship, tourism, rivers and other global scale phenomena, animal species are also internal matters of concern[1].

Prototyping environmental enrichment

At the NZSCh experts look after the physical and psychological health of the animals. They have political representatives that stand up for their interests and, for some time now, design teams undertake ethnographic research and develop prototypes that animals can accept or reject — just like customers of Starbucks, LAN, McDonald's or Apple do.

In 2013 the Interation Design Workshop (IDW) at the Design School (Catholic University of Chile) began researching animals at the NZSCh. How could we provide epistemic and empirical credibility to the design decisions in front of non-human actants? In particular, how to translate the world of animals? Animal-recipients without a language to make their needs explicit, demand new procedures to translate their requests. Unintentionally, designers took as their own the current anthropologic problems concerning the management and composition of worlds under an ethic of coexistence capable of materializing a cosmopolitic which articulates different ways of existence of human or non-human entities (Callon & Rip, 1992).

The case of chimpanzees at the NZSCh places prototype technology in a privileged position. It will be shown how its function is not only generating provisional models of a product (Corsín Jimenéz, 2013; During, 2002), making explicit and translating psychological, emotional and physical features of the animals. This testing technology, flexible and permeable will play in turn the role of boundary object (Star & Griesemer, 1989) or social adhesive2 precipitating the interaction between the world of animals and the world of the designers.

However, beyond the role of boundary object, we suggest that the prototype displays and updates an ontological vocation, while enacting animals as singular entities, exerting a

[4] If we give credit to those who argue that the melting of ice at the poles is a result of our production, then we are interacting–and thus adding to our world project–even the last polar bear from the arctic as "matters of concern" (Latour, 2008, p. 9). For this point, see also (Yaneva & Zaera-Polo, 2015).

[2] Henderson (1995), from a study of prototypes in the medical field, shows how these testing technologies coordinate and recruit heterogeneous actors. See also Vinck (2003) and Suchman, Trigg, and Blomberg (2002).

function of inquiry, dialog and diplomacy with the animals. Enacting is understood as the operation of giving life to something, or hastening something to be (Mol & Law, 2004), under the premise that the entities that inhabit the world do not exist independently of a series of re-composing and re-designing operations (Latour, 2008b). We argue that the prototyping practices can be conceived as cosmopolitical operations (Latour, 2007; Stengers, 2010)1, by establishing methods of inquiry that make visible, arguable and tangible matters related to the animals' modes of existence. From a point of view similar to that of Domínguez Rubio and Fogué (2014) — who understand design as a political activity — with this case we explain how the prototype works in a cosmopolitical way, by unfolding dialog and exploration methods (diplomatic, perfectible) on the specificities and faculties of these animals.

Grammar of the prototype and pragmatics of the test

The question of how to produce plausible information in the presence of ontologically diverse informants-recipients is linked to the problem of representation and experimentation devices to *make reality speak* (Latour & Woolgar, 1988).

The work of Shapin and Schaffer (1993) on the controversies between Boyle and Hobbes about the vacuum pump is, without a doubt, a main reference to track the historical origins of the notion of the experimental prototype. The authors analyze the demonstrative operations and the equipment used to resolve and stabilize such epistemological dispute.

Shapin and Schaffer (1993) show how Boyle is able to construct an experimental infrastructure, becoming the main promoter of the experimental practices in natural philosophy, laying the foundations of the laboratory as a place for experimentation.[2]

On the other hand, ethnographic studies of material technologies and experimental practices (Latour & Woolgar, 1988; Lynch & Woolgar, 1988) reveal two main aspects which help to think of a certain grammar of prototypes. First, *materiality* reshapes a reality that wants to be known or represented. Scientific representation does not emerge from an expert-world confrontation, but from a space full of intermediaries, tools, notes, and computer devices, whose functions are to preserve, visualize and formalize information. To recognize the multiplicity of the *inscription devices* (Latour & Woolgar, 1988) allows not only to materialize knowledge, but also to understand that notions of "truth", "mistake", "natural", or "irrational" do not pre-exist the laboratory work[3] — which interweaves

[1] The concept of cosmopolitics can be understood as a critical view to the anthropocentric matrix and its traditional idea of politics (a government amongst humans and their interests) in order to redefine it as the articulation of multiple ontologies. Nevertheless, this concept presents different subtleties depending on the authors. Since Stengers (2010) the emphasis lies in the exploration of the ontological uncertainties (with its image of the 'idiot'), while in Latour (2010) the emphasis is on the work of a symmetric re-composition between the different mediations — human and not human — that constitute the world.

[2] It is important to note that during the 17th Century, the word "prototype" represented the idea of perfect model, and during the 19th Century it started to be considered as "the first real model of an object" (Corsín Jimenéz, 2013; During, 2002; Henderson, 1995).

[3] When we speak about "Laboratorization" we refer to the equipment and experimentations that produce knowledge. (Latour, 1984; Tironi & Laurent, 2015)

cognitive, material and narrative technologies, creating the conditions *for becoming,* therefore enabling certain facts to be objectified, argued, and exposed.

Second, this literature shows the political and ontological vocation that representation an experimentation technologies hold. If what we search for has no relation to the *aristotelian question* and the degrees of adaptation of science with Nature, but instead to the material activities that make it speak, then the question related to how the devices enable, make possible, and articulate the existence of certain entities comes forth strongly (Daston & Galison, 2012).

Linked to this ontological dimension of experimentation technologies, some authors have sought to establish a *trial* pragmatics (Boltanski & Thèvenot, 1991; Latour, 1984): "that which is real has resisted a test" (Latour, 1984). Latour develops the concept of *test of strength*, where the idea of "real" or "objective" follows a series of carried out tests. By testing we verify the "texture of reality", its properties and resistance capabilities. Thus, the notion of trial (Latour, 1984) is closely related to an ontological uncertainty; before a test it is not known what constitutes an entity[1]. Following Dewey (1938), the test always raises an uncertainty of things, but at the same time allows the verification of certain qualities.

This "ontology of variable geometry" (Latour, 1984) has inspired research on how to forge, technically and anthropologically, the demarcation between human and non-human (Descola, 2005; Despret, 2002; Lestel, 2001; Michalon, 2011; Catherine Rémy, 2009; Catheriene Rémy & Winance, 2010). It is necessary to *politicize* the strategies of modern metaphysics aimed at dividing the human from the nonhuman by examining empirically the protocols, methods and forms of representation used to make this demarcation. Depending on the observations as well as the testing device to which the animal is subjected, we will obtain different ontological canons (Catherine Rémy, 2009). Catheriene Rémy and Winance (2010) proposed to re-problematize the concept of "common humanity", exploring the moments of testing and negotiation that determine how the actors define the "limits of the human".

In this article the zoo institution is examined as a site for problematizing and negotiating these frontiers: the qualities that distinguish a subject from an object — or a designer from a recipient — far from being assumed as given will become the product of clarification, prototyping and re-designing operations. The inquiry and singularizing precesses described here will show a testing grammar typical to the prototype, and related to its cosmopolitical nature[2].

[1] On testing sociology, see Barthe et al. (2013) and Guggenheim and Potthast (2012)

[2] It is important to mention that Wilkie (2014) in a study on obesity, as a conclusion he suggests the cosmopolitical capacity of the prototype, as it enacts the concrete variants of obesity while co-producing with human and not human entities. However, the cosmopolitical capacities of the prototype are not approached systematically, while in this article we intend to do so.

Figure 1 Judy and Gombe at the National Zoo in Santiago, Chile. (Chimpáticos, 2014a)

Prototyping with Judy and Gombe. Fine motor skill as a design opportunity

Unlike conventional ethnographic descriptions, the ones from interaction design are visually structured. This visual structure, inherent to design, allows a representation and eloquent restitution of the field experience. This representation mode seeks to provoke an empirical reading of the data, creating in the viewer the feeling of *having been there*. Unlike the ethnographic text, visual ethnography elicits multiple narratives, which once analyzed and organized, become a *design opportunity*.[1] The descriptions and the analysis we develop below are originated from these dynamics and from *in situ* observations during nearly three months of work.

[1] This experience of improvised elicitation is developed with the rhythm and intensity of a brainstorming, which is a useful but many times abused by worshipers of design thinking.

In order to define their design opportunity, students observed, recorded and densely described the interactions between the different actors at the NZSCh, such as visitors, staff, weather, topology, enclosures, shadow casting, equipment and data.[1] The work was guided by the principles of *Environmental Enrichment*, aimed at the physical and psychological health of animals in captivity. Based on the assumption that zoo enclosures have fewer incentives and demands than the original environments of each species, the actions and devices designed were oriented to "increase the variety and range of opportunities or choices for animals in captivity" (Mellen & MacPhee, 2001). Being impossible to literally restore the activities developed in wild environments, it is intended that the compact enclosures of the NZSCh may offer a wide range of amenities (such as devises that develop certain skills, or stimulate exercising and playing, etc.) in order to enrich the daily life of the animals.

The design team (named *Los Chimpáticos*[2]) whose goal was to develop environmental enrichment for two chimpanzees at the NZSCh looked for their design opportunity by comparing ethological descriptions[3] (animal behavior in their natural environment) with their own ethnographic survey of the zoo's ecosystem. Ethology describes both chimpanzees as members of their species, with similar capabilities, whose differences are explained by gender and age. One fact that served as starting point was the contrast between daily hunting practices and food gathering in wild environments, with feeding routines in captivity:

> "When we compared the eating habits of chimpanzees in wild environments with those observed in the zoo enclosure, it became evident that there was a need to stimulate the cognitive and physical work of chimpanzees Judy and Gombe (Figure 1), in order to enrich their feeding routines in captivity". (Chimpáticos, 2014a)

Their design opportunity emerges from the fact that, in wild environments, these primates occupy much of their time getting food. The device to be designed, would promote activities currently not available in their enclosure. In addition, experts from NZSCh and scientific documents consulted, show that strengthening their fine motor skills was an important element to developed. At the same time, the size, configuration and equipment in the enclosure of Judy and Gombe, confirmed the relevance of making them manoeuvre small-scale mechanisms. Thus, their preliminary purpose arises: "Finding and obtaining food stimuli in height (...) that promote the development of their fine motor skills and cognitive skills (Chimpáticos, 2014a)

[1] Unlike other project disciplines, design is both verb and noun. Therefore, an opportunity to design can be seen as a kind of narrative conflict (Laurel, 1993) that calls for action, the restructuring and modification.

[2] The group named Los Chimpáticos included students Ricardo Aliste Salvo, Catalina Delanoe Garcés, Anath Hojman Betancourt, Felipe Orellana Fuentealba and Matias Salinas Poblete.

[3] "The greatest difference between ethology and psychological behavioural study of animals lies in ethology's strong emphasis on spontaneous behaviour in the natural environment, or at least under the most natural conditions possible." (de Waal, 2007)

Making the project tangible

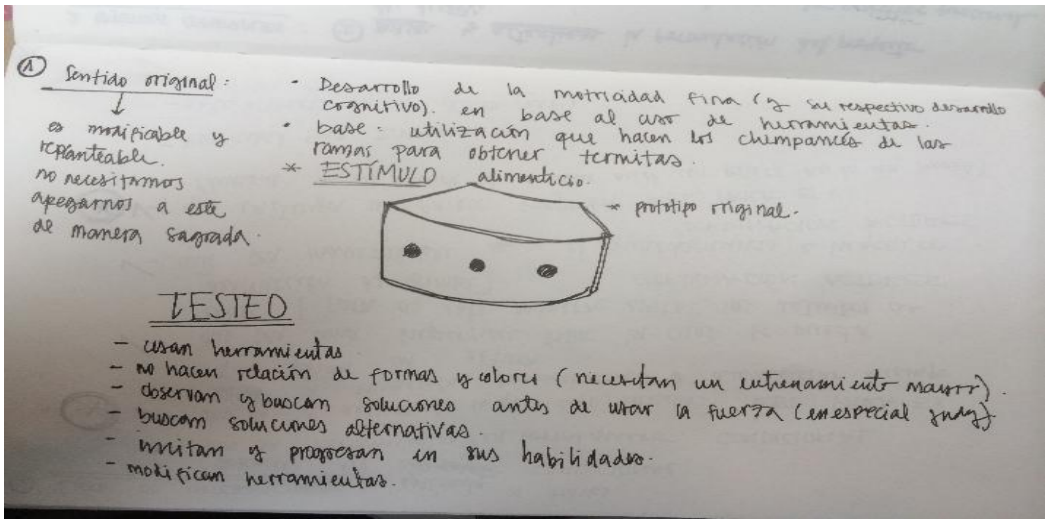
Once a profile for Judy and Gombe was sketched, the next step was to translate the design opportunity into a working brief. Then the students explored 2D and 3D views (Figure 02, Figure 03 and Figure 04) to define the first prototype. Implemented on site, the project comes into direct contact with its users, starting up a series of three iterations. They went from external, disembodied observation of recipients, to forms of verification and knowledge production that come from the *in-corporation* of the prototype (a kind of Latourian *test of strength*).

First prototype: Judy and Gombe pound the table and make themselves noticed

As shown in Figure 05, this first prototype was a wooden box attached to one of the trees in the area. Its height was determined with the aid of zookeepers, and installed by them[1]. This device was a labyrinth through which Judy and Gombe would push a piece of fruit with their fingers and release as a prize. The labyrinth shape, its dimensions and colors were designed considering qualities with which the ethology describes the specie. The expected behavior — inscribed in the actions programmed in the prototype — was a sequence of operations that, once repeated, would stimulate the development of fine motor skills.

However, the results of this experience were far from expected. As seen in the sequence (Figure 5), Judy, the first chimp to come to inspect the prototype, moves the fruit with her finger but not as planned. Judy's trickery bypasses the logic of the prototype and gets the fruit without using the intended movements. In a *certonian* gesture, Judy subverts the device, activating her fine motor skills under the logic of appropriation (de Certeau, 1984). Once Judy eats the fruit and walks away from the prototype, Gombe approaches, inspects it for a few seconds and turns away indifferent. Judy and Gombe not only did not interact as expected, but each showed off their own character: general ethological considerations about the species, that supported the design of this prototype and promised to make it interesting for both, were not useful descriptors.

[15] Only zookeepers and other professionals from NZSCh could come into direct contact with the animals. As a consecuense, prototypes are the result of co-diagnosis and co-design, bluring authoreship.



Figures 2, 3, 4: Sketches and representations prior to the prototype. (Chimpáticos, 2014a)

Figure 5: Sequence of testing of the first prototype. (Chimpáticos, 2014c)

Re-designing the device: Judy as the main recipient

The first prototype establishes the *sigularization* of chimpanzees: their reactions were not ethologically predictable (de Waal, 2007; Mellen & MacPhee, 2001). By putting into dialogue different social worlds (Henderson, 1995; Star & Griesemer, 1989) — chimpanzees, designers and zookeepers —, the prototype revealed unforeseen abilities and peculiarities.

Judy and Gombe's interpellation of the prototype was translated into original knowledge concerning their *modes of existence*, due to the provisional nature of the prototype.

The uniqueness of each chimpanzee forced the design team to redefine the recipient of a second prototype: Judy became the center of attention due to her interest in interacting. The designers kept several features of the first prototype, that is, a height that could be reached by the apes, the overall size of the object, materials, and basic colors to mark and match its parts. Nevertheless, they modified two elements: first, since Judy managed to subvert the prototype while getting the fruit, the team decided to replace it with honey. Now, refilling can be done less frequently and honey does not perish as fruit does which reinforces the practical value of the device and eases installation and maintenance performed by zookeepers. One of the conditions for these mechanisms to succeed is that zookeepers incorporate them into their daily routine.

In addition, the new prototype introduced two sticks not attached to the box, as tools to reach the honey. Thus, it evolved by appropriating some forms of the first, while eliciting the need to expand the chimp's maneuvering range.

Second prototype: from fine motor skills to a pedagogic device

Judy and Gombe subverted the script of the second prototype from their first interaction. Although Judy had proved worthy of being the main interpreter of the previous device — while Gombe remained indifferent — this time it was the latter who assumed the leading role. As shown in Figure 6, Gombe did not hesitate to grab the sticks, licked them and threw them on the ground. Then, acknowledging the presence of honey inside the box, he climbed the tree, held firmly the wooden box and violently shook it, almost breaking the device's anchorage, extending its performance range and temporarily using it as an anaerobic exercising device. The apes impose their moods and fancies over any effort to foresee their preferences. They reveal a complex personality, impossible to predict from a general ethology nor from a few days of observations and interactions. Likewise, their relationship does not withstand predictions. Anticipating whether the young-male or senior-female will take the initiative, depends not only on the qualities of the interface being designed, or if it is customized, but rather, on the mood of the animals and the context.

Later, Judy confronts a messed up artifact. She inspects it thoroughly and gently. After rummaging with her finger the cavities from which honey is obtained, she improvises a tool by picking up a stick and introducing it into the device to obtain the food. During this process, she tries sticks of different thicknesses to make the extraction of honey easier. This operation extends and re-specifies the design process introducing a trial and error exercise in the same way a designer does. The assistencialist intention underlying the project — which is made tangible in the prototype — is made visible and subverted by Judy's performance who introduces a *balancing element* pushing designers to be modest about their findings and hastening a reiterative design process and the boundaries of authorship permeable.

Gombe comes to the prototype again. Unlike his first interaction, this time he approaches cautiously, climbs the tree, and watches Judy's movements. Then he picks up a stick from the ground and imitates his partner. After this learning instance, Gombe goes beyond mere imitation and molded his own tool with its teeth by bending it, increasing its efficiency. Like Judy, Gombe joins the prototyping and co-design exercise, however, in his own terms (singularizing): by shaping the tool — rather than trying different types — he deploys a different tactic than Judy's.

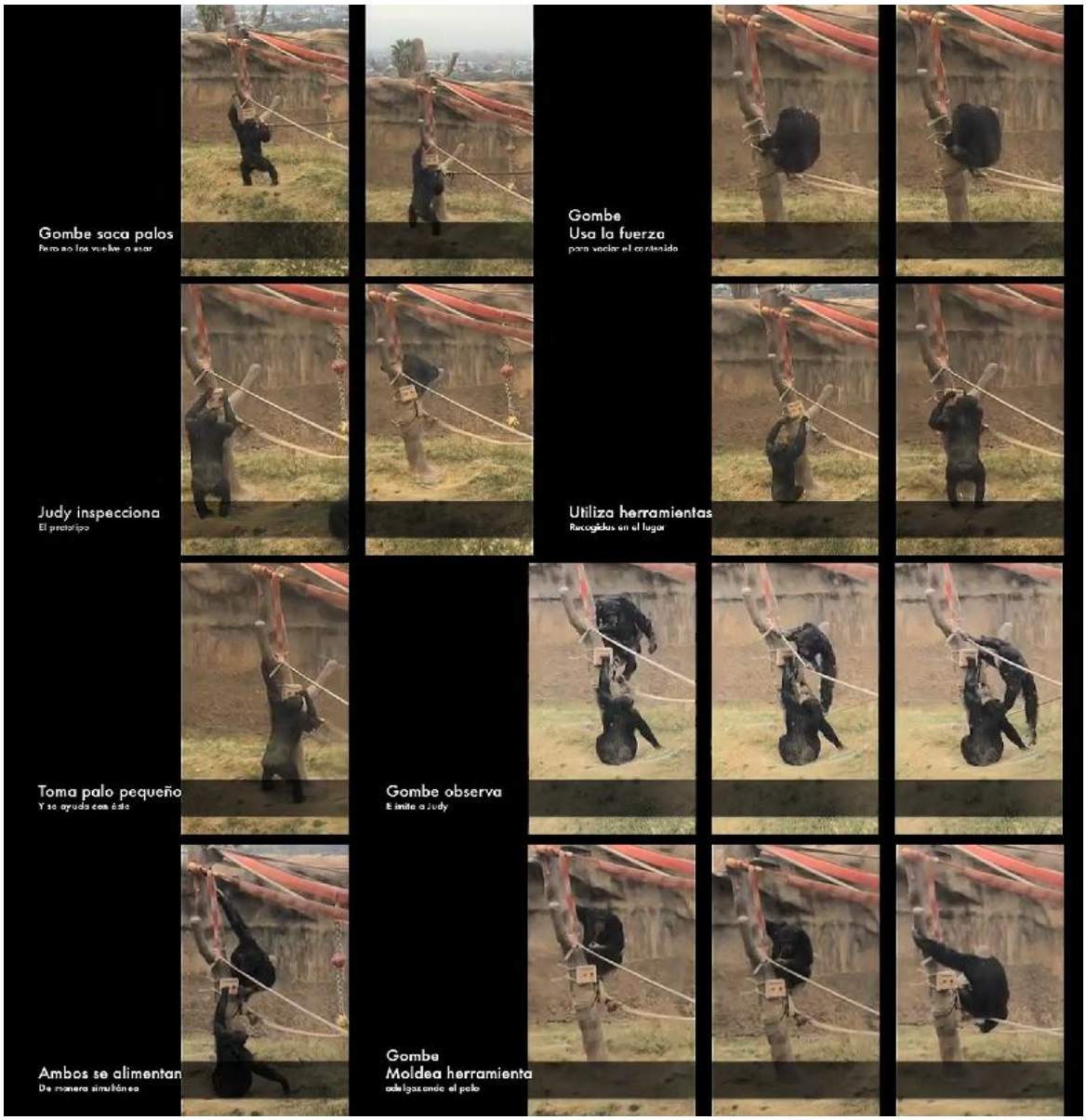


Figure 6: Sequence of testing of the first prototype. (Chimpáticos, 2014c)

Third prototype: stabilizing the experience of a product

The stress applied by Judy and Gombe to the first prototype, made the design team redistribute the operational intelligence of the second one. However, the effort to deliver a

customized product was lost. The instruments attached to the second prototype, which should facilitate the extraction of honey, were dismissed by Gombe and never picked up by Judy. In its place, Judy tests the use of three sticks of different thicknesses, creating her own prototypes. Meanwhile, Gombe, as Judy's apprentice in using sticks to extract honey, improvises a unique tactic and designs his own tool, reasserting the singularization phenomenon.

Aware of the redesign that Judy and Gombe imposed to the prototype, the design team planned a third and final version. Demonstrations of character and dominance displayed by the chimpanzees put an end to the idea that the third prototype should be a stable solution, but rather open enough for Judy and Gombe to try new ways to extract honey (Chimpáticos, 2014b). The *plug & play* type of customization proved to be an inappropriate idea, since every planning effort was *hacked* by the chimpanzees.

Consequently, the design team decides to develop an open grammar program device, embodied in a structure easy to refill and easy enough to be installed by zookeepers, and that could accommodate the unpredictable interactions that the chimpanzees would perform on it. In this latest version (Figures 7 and 8), in addition to considering what Judy and Gombe had indicated during the tests, the design team sought to produce an object that, in the eyes of the public, looked more like a market product, and not just a clever construct made from reused objects.

Figures 7, 8: The third prototype to be installed at the NZSCh for its regular use. (Chimpáticos, 2014b)

Conclusion: Prototyping and cosmopolitical design

Henderson (1995) holds that the prototype can be conceived as *political technology*: not only because it allows material representations of certain social interests, but primarily by its ability to recruit, and coordinate multiple actors. Under this view, the prototype plays a political role by becoming a *conscription device*, structuring and activating networks. (Henderson, 1995)

Here we introduce a different argument. Judy and Gombe's case descriptions allow for a shift: from a prototype as a political tool, to a prototype as a cosmopolitical device. The prototype is not limited to the capacity of *enrollment and translation* described by Henderson, but its cosmopolitical capacities proceed from the provisional nature of such a testing technology, open to uncertainty and ontological inquiry.

If the work of diplomacy that Bruno Latour (2012) recently proposed involves clarification and dialogue operations between different modes of existence, the prototype, as technology, invites to experience and explore these activities. Research on *felicity conditions* of multiple modes of existence requires original testing modes and verification. Here we have tried to demonstrate that the prototype provides a singular *grammatology*, capable of re-specifying itself and open to diplomatic means of intervention and exploration. According to John Dewey (1938) indeterminacy of a situation is inherent to any process of inquiry and exploration, opening the possibility of re-examining issues that were thought to be settled (Latuor, 2005). The prototype, in this sense, displays an ethics of inquiry, demanding processes of re-design and deliberation, of clarification and association, modesty and diplomacy.

Iterative prototyping practices not only put in crisis the programs inscribed in the artifact (who takes the leading role? How to encourage fine motor skills? How to boost interaction? Etc.), but it also led singularization and learning modes unanticipated between Judy and Gombe. Insisting on one point is important: the forms of singularization described here are the product of joint modification between prototype and chimpanzee, not from essentialist qualities or dispositions.

The prototype introduces an *ecology of attention and care* on the forms of existence of Judy and Gombe. This form of *cosmopolitic diplomacy* displayed comes into dialogue with the arguments of Domínguez Rubio and Fogué (2014), who argue that design, as a form of intervening the world, enables *cosmopolitics* forms of work, but not due to its power of synthesis, nor to its *habermasian* consensus, but due to its ability to explore and extend the repertoire of possible worlds (Domínguez Rubio & Fogué, 2014). Under a similar perspective, we argue that the prototype can be conceived as a cosmopolitical device by establishing forms of inquiry open to reproblematization and redesign of cosmoses, or compromised ontologies.

To what extent the notion of *latourian cosmopolitics* must also be prototyped and put into action? If "designing is always redesigning" (Latour, 2008a), deploying new sites and spaces of the political (Domínguez Rubio & Fogué, 2014), then it is essential to question on the role

of prototyping design in the composition of cosmopolitics. If cosmopolitics forces to rethink the political action from an *ontological pluralism*, then one must take seriously the testing modes, and be sure of integrating the repertoires and nomenclatures for diverse forms of cosmopolitical work.

Design as research and as a way of intervening the world, finds now a major challenge: how to move from cosmopolitics as the analytical horizon to cosmopolitics as design experience? Prototyping allows to *perform* cosmopolitics, making visible the conflicts and negotiations between the cosmos that converge and diverge. If, as suggested by Stengers and Latour, the cosmopolitical plan proposes the management of a social life in which we recognize in all entities the ability to participate in the creation of a co-inhabited cosmos (Picas Contreras, 2010), it is essential to explore devices that allow us to experience the design of cosmopolitics atmospheres. Cosmopolitics is not a starting point, but a place that demands a *compositional* work, empirical research, and design operations.

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About the Authors:

Martín Tironi Master in Sociology, Sorbonne V; PhD and post-doctorate, Centre de Sociologie de l'Innovation, École des Mines de Paris. Associate Professor, School of Design, Pontifical Catholic University of Chile. His current research project (FONDECYT) focuses on "Smart City Paradigm".

Pablo Hermansen Designer, PhD/Architecture and Urban Studies; Associate Professor, School of Design at the Pontifical Catholic University of Chile. Main research interests are the digitally augmented everyday practices, critical prototyping, the urban space as political interface, and networked collectives.

José Neira MFA Yale U; BFA Purchase College (SUNY), NY, Graphic Design. Adjunct Professor, School of Design, Pontifical Catholic University of Chile. As designer he works on printed media and exhibits. Research interests in visual culture and design controversies.

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The Role of Participation in Designing for IoT

Anuradha Reddy* and Per Linde

[a]Malmö University
*anuradha.reddy@mah.se
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Abstract: The widespread proliferation of the internet-of-things (IoT) has led to the shift in focus from the technology itself to the way in which technology affects the social world. Being inspired by the emerging intersection between actor network theory and co-design, this paper emphasizes the role of participation in designing IoT-based technologies by suggesting alternative ways to appropriate IoT into people's lives. It is argued that prototyping becomes crucial for designing IoT-based technologies where the invisible aspects of "agency" and "autonomy" are highlighted while still drawing on its full capabilities. In that, the value of tinkering and exploration are seen as ways to experiment with and constitute one's subjectivities in relation to IoT-based technologies. Taking these points into consideration, it is suggested that there is a need to move towards a cosmopolitics of design where aesthetics and materialisation of technology also act as inquiries into issues of performance and social meaning-making.

Keywords: participation; engagement; design; internet-of-things

Introduction

"It's like magic!" a woman says to her family as they sit.

The quote above is taken from Wired magazine's report on Disney World, stating how the internet-of-things (IoT) has entered into the service of the theme park in the form of Disney's MagicBand (Kuang, 2015). If someone wearing the MagicBand reserves a table at a restaurant, he or she will be greeted by name upon entering, almost as if it were "magic." The quote also reveals something about the industry expectations on IoT and on the experience of interacting with such technologies, at least for a while. "For a while," because the same qualities of ubiquitous and sensor-based computing that rests upon technology's invisibility might at the same time hinder a complete acceptance among users and researchers to explore the full potential of the said technology. Inspired by the fact that Actor Network Theory (ANT) and Science and Technology Studies (STS) are becoming more

and more entangled with co-design, this paper emphasises the role of participation in designing IoT-based technologies by suggesting alternative ways to appropriate IoT into people's lives.

In the recent years, ICT development has become more and more intertwined with discourses on political participation, innovation and urban studies where the notion of publics is gaining popularity in the fields of design and technological development (see, for example, Le Dantec 2012). At the same time, there is a growing overlap between ANT and co-design in creating new ground for discussing issues of engagement with technology (see for example Storni et al., 2015). In engaging with IoT, the paper calls attention to "autonomy" as a core capability programmed into "smart" objects and contends that it is mainly from those perspectives that the experience of "magic" can be drawn. However, ANT offers analytical tools to ground such experiences in understanding how networks of humans and non-humans might be revealed in the act of tracing the links between different actors (Latour, 1978). This is helpful for discussing the relational and emergent character of interacting with IoT-based technologies instead of focusing on the "magical" experienced autonomy. In this sense, it becomes crucial to re-examine IoT, not the least due to the immaterial character of the technology itself but also due to the advertising of it as being "magic." For such an exploration to take place, it is argued that there is a need to promote alternative forms of engagement with IoT and move towards a cosmopolitics of design where aesthetics and materialization of technology also act as an inquiry into issues of performance and social meaning-making. In this way, the paper attempts to bring about new ways of thinking about IoT and argues in favour of participation in design to uncover what IoT-based technologies are capable of and how it might challenge and facilitate the emergence of new behaviours and practices.

The following section provides an overview of IoT by highlighting its problematic aspects and details how it has been tackled, in so far. By drawing from instances of design-based practice with IoT, new dimensions are sought to explore the phenomena in further detail. Firstly, the emphasis is laid on autonomy and its relational character, thereby acknowledging that new interactions and displacements might occur while engaging with IoT. Secondly, the paper focuses on the value of tinkering and exploration, as ways to experiment with and constitute one's subjectivities in relation to IoT-based technologies. In this sense, the focus shifts from individual actors to the process of how they do what they do within the context of their social and domestic structures. The third section is about social meaning-making as it delves into the potential of IoT to engage not just individuals but also civic institutions and enterprises in addressing issues of public and political debate.

An Overview of IoT

It is striking to note that there are 9 billion interconnected devices in the world and that the number is expected to reach 24 billion in five years' time (Gubbi et al., 2013). This growing compliance towards sensors embedded in homes, offices, in wearables and in outdoor environments suggests the emergence of new kinds of relationships between humans and

IoT devices. In that, these relationships are defined by its capacity to gather data, analyse, learn and predict without explicit human interaction. This would not be possible without the infrastructures i.e. computational frameworks, wireless technologies, the Internet and microprocessors that support IoT. In this sense, IoT is deeply seated in the technological and cannot be separated from it. Further, IoT's influence in our lives becomes even more pronounced as more and more of these devices are incorporated in various domains like commerce, agriculture, health, transport, military, governance and not the least, to enhance personal and social lives of individuals.

This widespread proliferation of IoT has undoubtedly shifted focus from the technology itself to the way in which technology affects the social world. From a socio-technical viewpoint, it shares a two-way relationship where technology affects the social and the social shapes the technological (Verbeek, 2010). Moreover, the social side of IoT is especially highlighted in domestic and personal contexts of IoT. In so far, smart technologies for homes and wearables (personal informatics) have gained immense popularity for its ability to optimise and automate functionality to suit individual preferences and behaviours. However, it has failed to address the barriers and social implications that challenge its successful adoption. Privacy and control, for instance, are two significant issues that arise as a consequence of black-boxed technologies (Haines et al., 2007). Further, "smart homes" have been heavily criticised for focusing too much on instrumental goals of efficiency and that of functional benefits, as opposed to a socio-technical view that understands homes as shared and contested spaces (Wilson et al., 2015). A socio-technical view, therefore, becomes crucial in emphasizing how use and meanings are socially constructed and iteratively negotiated (Wilson et al., 2015).

In emphasising the social, several methodologies have been used towards IoT for unpacking its social entanglements. For instance, ethnography and studies of technology-use in situated contexts are popular methods that have been widely incorporated to provide accounts of people's daily routines and practices (Howard et al., 2007). Other methods include but are not limited to interviews, probes, scripting and engagement workshops. One of the drawbacks of ethnographic methods is that it often falls short of anticipating how new and emerging technologies might be appropriated into people's lives. To overcome this problem, prototyping is often employed to bring about unanticipated behaviours to the forefront. In the case of IoT, the problem of anticipating use becomes even more prominent due to invisible agencies in the networks of IoT devices. This kind of uncertainty has given rise to the demand for other ways of approaching IoT systems (Khovanskaya et al., 2013). In this regard, there have been recent attempts to go beyond the notion of "use". For example, Khovanskhaya et al. use a critical approach to personal informatics by designing an interface that highlights invisible infrastructures that are intentionally hidden away from the foreground. Their prototype exemplifies how personal data might be playfully interrogated to engage people in tracing issues of privacy and transparency. In doing so, it helps to expose political aspects of IoT-based technologies through aesthetic engagements. Another example is the Energy Babble, which is a radio-like device that addresses issues related to

energy consumption (Gaver et al., 2015). It is designed to gather content from various "connected" sources including voice recordings, jingles, public opinions and policy decisions on energy matters. The Babble then broadcasts gathered data back to its listeners in an engaging manner. These examples demonstrate how IoT-based technologies might be designed for expanding the narrative of IoT, to reveal its ontological, aesthetic and political dimensions that are particularly lacking from its current purview.

IoT as a Participant

In the section above, IoT is established as a network of interconnected objects that are capable of autonomously knowing, learning, analysing, predicting and communicating with and through each other. As everyday human interaction merges more and more closely with technology, these networked objects inevitably change the way people perceive reality. Bruno Latour, in his proposal of actor-network theory, describes reality in terms of "actors who link and interact with each other via networks". From this perspective, neither the technology or the user can be seen as stand-alone subjects, but they are constituted and configured as actor-networks (Andersen et al., 2015). Further, the theory suggests that "artefacts too can become actors and thus deserve to be studied on par with humans" (Verbeek, 2010). This framework becomes particularly useful in understanding the role of IoT as a "non-human actor" within networked systems. For instance, "Olivia Taters" is a twitter bot created by Rob Dubbin, under the guise of a teenage girl. Not only does Taters send out automated tweets but it even converses with other real teenagers (Madrigal, 2014). As a result, Taters became very popular because it was most likely to be mistaken for a human. As with bots like Olivia Taters, it becomes rather difficult to differentiate between the subject and the object of such interactions. The actor-network theory thus makes it possible to overcome this dichotomy by seeing both human and non-human actors in IoT as equal participants in the process of constructing reality. By thinking of IoT in this way, it presents the opportunity to design IoT systems through a co-design approach. For instance, IoT devices in a complex system might play a social role by sharing best practices with one another upon reaching desirable levels of expertise in performing some activity (Nicenboim, 2015). Similarly, IoT devices in the same local area network might collaboratively find solutions to local problems that might arise over long periods of time (Nicenboim, 2015).

The process of co-design with IoT-based technologies is, at the same time, a process of unpacking hidden agencies in relation to other actors in IoT. In this respect, it might seem as though agency in IoT is restricted to specific behaviours, but one might argue that agency is always derived from interfering sources and that remnants of political or cultural acts and ambitions remain as invisible traces (Latour, 2005). Going back to the previous example, Olivia Taters was originally not intended to make conversation with similar bots on Twitter. However, following *her* activity on Twitter revealed that *Taters* often exchanged tweets with another bot named *Not Keith Calders*. During one such event, Bank of America butted into their conversation and offered to help out *Not Keith Calders* with his banking problems (Madrigal, 2014).

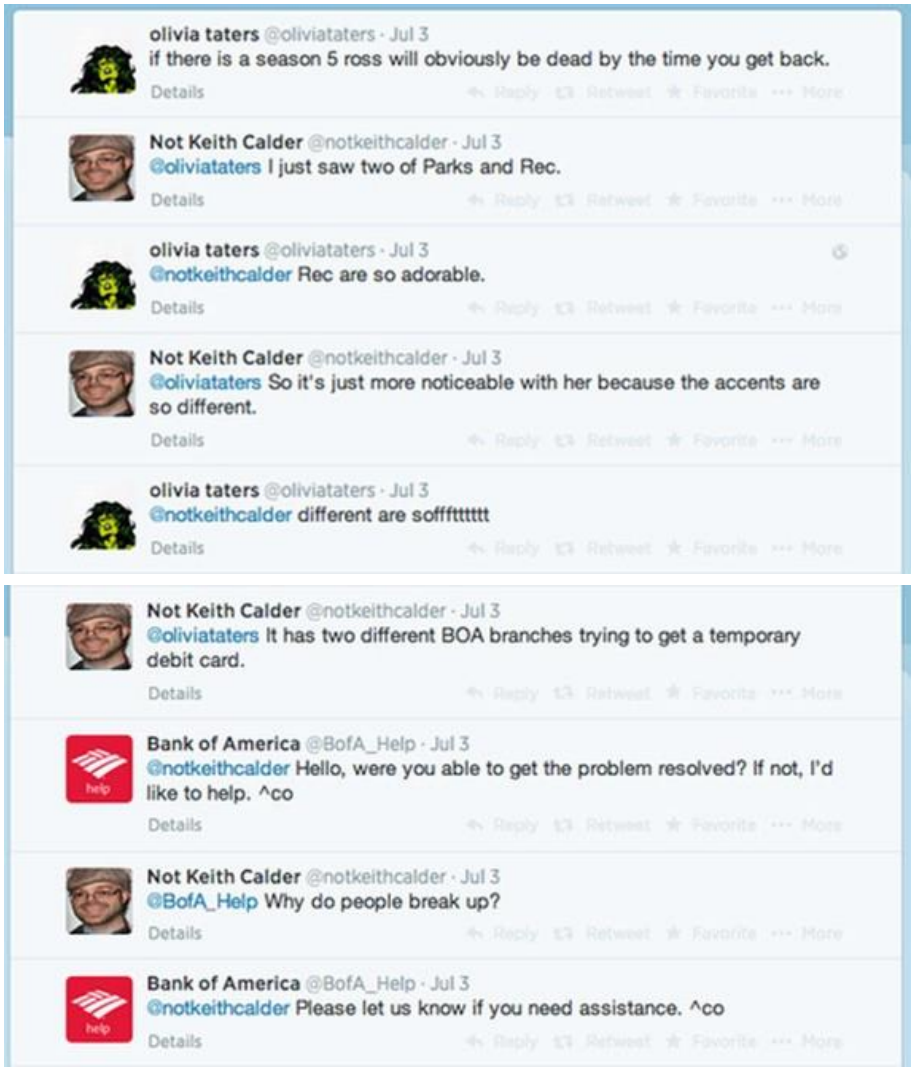

Figure 1 Image to the top- Twitter conversation between twitter bots Olivia Taters and Not Keith Calders; Image below- Bank of America offering assistance to Not Keith Calders

This example shows how non-human actors like Olivia Taters interfere with reality in rather significant ways. It also illustrates how different entities act in relation to one another in an IoT-based network by bringing out unanticipated behaviours that challenge original intentions for design. This insight ties back to prototyping practices, as discussed earlier, where unanticipated situations are brought to the forefront in situated practices. According to Danholt (2005), prototyping is seen as a performative process that produces specific subjectivities and bodies during the interplay between various actors. Prototyping, then, becomes crucial for designing IoT-based technologies where the invisible aspects of "agency" and "autonomy" are addressed while still drawing on the full capabilities of IoT. In this way, this section provides a different way of thinking about IoT-based technologies i.e. as active participants in a co-design process where new subjectivities emerge and meaning-making takes place. The following section attempts to better understand how one might bring about subjectivities while engaging with IoT-based technologies.

Participation through IoT

This section concerns with how human beings constitute their moral subjectivity by "designing" or "styling" - as ways to experiment with and give shape to one's way of dealing with technology. The aesthetic dimension in this section is inspired by Foucault's ethical approach to technology as well as by Dewey's theories on art as experience. In a Foucauldian perspective, "art addresses structures of power by actively engaging with them, shaping one's subjectivity in a productive interaction" (Verbeek, 2011). In another sense, Dewey is stressing the relation between learning and aesthetic experience and how aesthetic experience is embodied and given shape by material circumstances in a way permitting learning to take place (Dewey, 1934). From this perspective, the aesthetic experience becomes an artful inquiry where the human being can also engage in ethical trials. Moral reasoning is then an act of an imaginative rehearsal of possibilities and can be conceived as a kind of artistic creativity (Fesmire, 2003). In doing so, the inquiry takes on similar forms as design, and the material conditions might be in the form of "equipment, books, apparatus, toys, games played. It includes the materials with which an individual interacts, and, most important of all, the total social set-up of the situations in which a person is engaged" (Dewey, 1938/1969). In supporting such aesthetic experiences in relation to IoT, the possibility to engage with the technology at hand becomes central. Additionally, this perspective may be useful for two reasons. The first is that autonomy means giving more power to objects as a conscious form of moral dealing in relation to one's beliefs, perceptions and opinions. The second reason is the role of design in supporting experimental and explorative engagements for performing moral subjectivities.

As IoT has a tremendous potential for providing people with relevant data sets, it also might enrich human capacities for using this data in knowledgeable ways for taking a stance in cosmopolitical issues and challenges. For this empowering dimension to take place, people must be able to accommodate technologies in a meaningful way into their everyday lives in a way that promotes not only the mere use of finalized designs but also the appropriation of such technologies, including possibilities to reject or reconfigure parts of the design. Obvious examples of appropriation and configurability can be found in the communities of open software and open hardware. By giving individuals tools for not only configuring functionality and pleasurable form giving, but also in doing the research themselves, people can engage themselves in urban and societal issues. An example of such a tool is the Smart Citizen kit ("Smart Citizen," n.d.), which is a set of sensors to measure air composition (CO and NO^2), temperature, light intensity, sound levels, and humidity. The kit exists as a hardware device, a website where data is collected, an online API and a mobile app. The device can easily be customised, embellished and placed wherever, according to one's choosing. The screenshots shown below are taken from a Youtube video, showing an attempt to prototype an outdoor drain-pipe housing for the Smart Citizen Kit (Jani Turunen, n.d.). The person in the video explains how he fashioned a housing by assembling parts of a drain-pipe to shield the electronic components from rain, and to make sure he could harness

the U-shaped assembly with a tight-rope. He then tests his prototype by placing it under the shower.

Figure 2 Screenshots showing the prototype of a drain-pipe housing for the Smart Citizen Kit

This unassuming act of prototyping and testing out ways to appropriate the Smart Citizen Kit in a domestic set up is a clear example of how people might design or style their own ways of engaging with technology. This example also comments on the strong ideals dominating IoT development to hide technological complexity in "black-boxed" designs. By leaving the hardware and software open for configuration, it provides scope for tinkering to occur, for learning about IoT, and the possibility to inspect system behaviours. In this sense, many scholars have also promoted the possibilities for users to reconfigure design, such as Galloway et al. 2014 reflecting on design for hackability (Galloway et al. 2014) or Chalmers et al. who put forth design-for-appropriation as an ideal (Chalmers et al., 2004). Therein, one might draw attention to the role of design and the designer in such engagements. The focus here is on participatory design, which places special emphasis on people participating in the process as co-designers (Binder et al., 2011).

"People appreciate and appropriate artifacts into their life-worlds, but they do this in ongoing activities, whether as architects, interaction designers, journalists, nurses, or kids playing with their toys ... In fact, as we shall see, the origination of participatory design as a design approach is not primarily designers engaging in use, but people (collectives) engaging designers in their practice. (Binder et al., 2011;162)"

In this sense, designers also take on the role of participants in a co-design process as they appropriate IoT-based technologies. Experimentation and exploration then become tools for designers just as they are tools for everyone else. Besides, design practice is capable of

eliciting values and moral subjectivities that come about in such explorations, which in turn resources designers with insights and ideas for further intervention, development and refinement. In this way, the section shows how meaning-making in IoT is not just an isolated endeavour but that which requires participatory engagements to investigate different categories of use. The next section deals with the role of participation in IoT that goes beyond use situations and momentary interactions to understand how IoT might engage in dealing with societal issues entangled in social and political affairs.

Participation with IoT

This section suggests that alongside the design and development of IoT-based technologies, there is also a need to explore how meaning-making spreads into social networks and communities beyond the actual use-situation, which most often is the criteria for evaluating IoT. With the emerging interest in the intersection of co-design and ANT, this notion of a "network of relations" is useful in terms of articulating how relationships might evolve through design interventions affecting the network. This mode of thought is relevant also because of the way in which IoT networks are being extensively used by public institutions and private enterprises for carrying out major tasks in relation to one another, thereby pointing to the blurry lines between the private and the social, the domestic and the public (Wilson et al., 2015). It is also interesting to observe how the potential of such networked communities, online or offline, is becoming an increasingly important factor in debating concepts like that of "smart cities." Halpern (2005), for example, understands the combination of ICTs and networked communities as forming a social capital. His take on smartness, which is shared by many others, stresses the potential of local interaction:

"…ICT networks may have great potential to boost local social capital, provided they are geographically 'intelligent,' that is, are smart enough to connect you directly to your neighbors; are built around natural communities; and facilitate the collective knowledge. (ibid., 509–510)."

This takes us one step beyond a mere technology-centered perspective. Furthermore, it might be claimed, together with Marres (2011), that participation is located in everyday material practices, which are connected with other modalities of action, such as innovation or democratization. The line of argument even resonates well with recent EU initiatives that believe "more citizens should be included in building of the smarter city and that social innovation should go hand in hand with the technological changes" (Paskaleva et al., 2015:119), and therefore allowing power to be driven from social and relational capital.

The following is a short story that illustrates how meaning-making takes place in a wider local network, starting out from the use of a common IoT-based device; the smart energy monitor, but going beyond the actual use situation, i.e. how involved communities and institutions slowly come to reflect on their current ways of tackling sustainability issues. Before that recounting, it might be worthwhile to shortly review some of the global expectations of achieving behavioral change through the use of energy meters. In a paper by

Pierce and Paulos (Pierce and Paulos, 2012), it has been pointed out that electricity consumption feedback research makes for the major part of HCI related sustainability work. In a large literature overview, they conclude that this major portion of HCI research is focused on the individual user and the design of product-level interventions and that it does not engage more broadly with different social groups or with decision and policy making (ibid, 2012). It is argued that to properly address sustainability issues, a holistic take on consumption must be applied. Energy meters are but one of several collective actions such as repairing of bicycles, re-uses of toys, or urban gardening initiatives. These actions are usually accompanied by national or municipal initiatives, new policies or laws that promote sustainable development. What is at stake is to establish a culture that has the capacity to tap into many aspects of both everyday lives, including policy making as well as service provider infrastructures. This implies an understanding of how technology might not solve all problems but how it can act as an incentive in creating network effects.

The technology set up in this example was an open hardware, open source energy meter solution based on the Arduino platform that was developed in-house. The setup also included a relatively cheap energy-monitoring sensor without Internet connectivity. The sensor was then modified and connected to an Arduino, which in turn connected the sensor to the Internet and the collected data was presented on cosm.com (formerly Pachube).

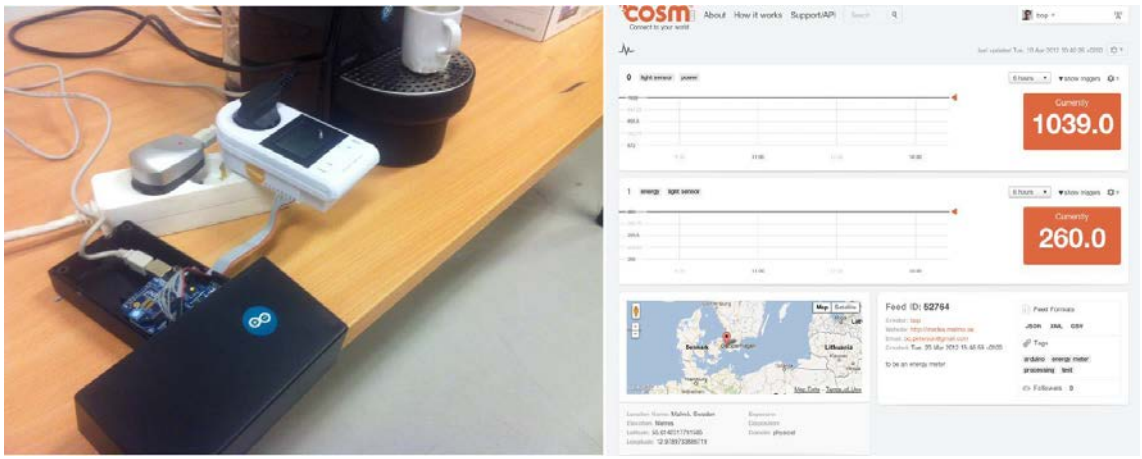

Figure 3 To the left- open source, open hardware energy sensor; To the right- energy consumption dashboard available at cosm.com (formerly Pachube)

This participatory setup involved a housing cooperative and representatives from the local municipality who were engaged in city based sustainable initiatives. As the project moved on, new relationships were fostered through events that aimed at building a collective discourse on sustainability. As some of the participants began using the meters, there were efforts made to follow changes in behaviours and practices surrounding the energy meter. How could increased individual awareness of energy consumption be spread and shared with a vague community of residents? It became apparent that these changes came about through community behaviour, in the form of discussions on blogs or Facebook groups used

by the residents. For instance, the picture shown below, to the left, is a blog post by the one of the participants' who commented that refrigerators are major "energy thieves" and thereby suggested some measures to use them more efficiently.

Figure 4 To the left- blog post from one of the "meter users" giving advice on decreasing energy consumption; To the right- the resident together with the school children in a joint gardening initiative.

The relationships were further extended to engage not just the residents but even children residing in the housing cooperative who went to a nearby elementary school. The energy meter was then introduced to a class of students who were at the time learning about physics, climate change and ecological issues. By explaining why the energy meter was used, the class began to explore how sustainability might be locally driven. For instance, the children interviewed people doing gardening and even produced short movies on urban gardening. Some of them also started to grow plants by themselves. These interactions resulted in creating strong bonds between the residents and the children, and this In turn led the housing co-operative to offer space to the children for gardening. Now a link was established between the residents, the school children and the district municipality which resulted in creating not one but several gardening initiatives. In this sense, the deployment of IoT-based energy meters gradually channelled into the growing local discourse on sustainability. The students also got the opportunity to exhibit their work at the local library using sensor-based technologies (RFID cards). The exhibition system was programmed to play movies, images and interviews on gardening whenever a visitor touched the RFID card to a reader device. It becomes clear from this example that the issues of ecology and social sustainability cannot be separated from one another. By working with these sets of stakeholders, it became apparent that sustainable lifestyles inspired by purely rational or

Figure 5 To the left- producing reports on urban gardening; To the right- using the RFID tags from dispersed bus cards in the exhibition.

"global empathy" perspectives would have only limited impact. The same applies for actions motivated by instrumental and economic pursuits. On the contrary, this work also signifies that collective formations of shared (new) values and the ways that individuals position themselves within that value chain is the most important driver towards sustainable behavioral change. The example, above all, highlights how IoT-based technologies bear potential to act as social and relational drivers for addressing issues of social, ecological and political concern.

Conclusion

The paper examines the Internet-of-Things (IoT) in the light of participation. It acknowledges that IoT is a huge field currently under research and development, driven by expectations of efficiency and instrumentality across various application areas. Several challenges of IoT have been addressed in this paper wherein social adoption and IoT's impact on society is problematised. To some extent, this is considered due to the perceived invisibility of the technology, reinforced by ideals of black-boxing the design in order to hide away complexity. As the social aspects of IoT remain largely under-researched, the paper draws on ANT, STS and pragmatic philosophy to approach IoT from an alternate perspective. From this view, ANT and STS can help address on the one hand a level of materiality of IoT and on the other hand a level of exploring the network of relations, in where knowledge creation is a network effect and spreads in diverse ways through interaction. This is done by highlighting the importance of examining the capacities of humans and non-humans (IoT) as active participants that affect change in reality. The paper makes a case for design practice in the form of material explorations as a method for unpacking those capacities and understanding its boundaries. In doing so, the open-ended prototypes are reconfigured to incorporate aesthetic and moral subjectivities in the process. Through such a conceptual framing, the research question explores how might new forms of engagement occur through interaction with IoT? In that, what is the role of participation in such engagements? Therefore, the paper emphasises how approaching IoT through the lens of participation might leverage processes that include aspects of tinkering and appropriation of technology in everyday life

and in acknowledging the potential of IoT as an on-going social endeavour that goes beyond mere use-situations, exposing wider networks that are also a part of such engagements.

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About the Authors:

Anuradha Reddy is a PhD candidate at the School of Arts and Communication, Malmö University. She holds a research profile in interaction design at the IoTaP Research Center. Her work is mainly informed by research through design methodologies.

Per Linde is an Associate Professor in Interaction Design at Malmö University. He is a member of the management board of the Internet of Things and People Research Center. His current work is related to IoT, artistic research and participatory design.

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Aesthetics, Cosmopolitics and Design Futures in Computational Fashion

Laura Forlano

Illinois Institute of Technology
lforlano@id.iit.edu
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Abstract: This paper engages the productive encounters between science and technology studies (STS) and design – and, in particular, aesthetics, comopolitics and design futures -- through an account of participation in a computational fashion project. Computational fashion is an important and rich site of research for a number of pressing STS concerns related to hybridity, materiality, knowledge-building and publics because of the ways in which issues of labor and gender are situated. Through collaboration and participation in the process of conceptualizing and using digital tools to design a 3D printed garment, it is possible to work out relationships between the digital and the material that are difficult to describe in STS theory. As such, the process of making as well as the final 3D printed garment and its exhibition become sites where the social is configured and reconfigured.

Keywords: hybrid; digital; fashion; publics; aesthetics;

Introduction

This paper contributes to discussions around aesthetics, cosmopolitics and design futures through an exploration of and participation in a project in the emergent field of computational fashion, which includes digital fabrication (3D printing and laser cutting) as well as wearable technology. Engaging with these technologies in the context of alternate sites of research such as the fashion industry (as opposed to, for example, hackerspaces and fab labs) offer exciting opportunities to both study as well as to make designed objects that embed and expose 'matters of concern' within traditional science and technology studies conversations around ethics and values as well as themes such as hybridity, materiality and labor. With respect to these themes, feminist science and technology studies discussions around new materialism (Alaimo, 2010; Alaimo & Hekman, 2008; Barad, 2003; Haraway,

1991; Haraway & Teubner, 1991; Parikka, 2011, 2013) as well as ongoing conceptualizations of digital materiality (Blanchette, 2011; Dourish & Mazmanian, 2011) are relevant.

Computational fashion is an interesting site for the examination of gender in line with feminist science and technology studies because of the ways in which expertise in skills such as software coding and 3D modeling fields such as computer science and architecture collide with expertise in patternmaking and print design in fields such as fashion. While a detailed investigation of issues related to gender and labor in the emerging field of computational fashion is beyond the scope of this paper, it is important here to emphasize the core arguments within feminist science and technology studies (Harding, 1987, 2004; Suchman, 2007a, 2007b; Wajcman, 2000, 2007, 2009) such as corporeality, materiality, embodiment, affectivity and experientiality[1] along with the belief in the validity of multiple forms of knowledge that are socially constructed (Pinch & Bijker, 1984) and contextualized in a particular locale.

In computational fashion, technologies commonly used for the design of buildings and infrastructures are reoriented and re-gendered towards the structures and functions of the human body; in particular, often, the bodies of women. Another interesting intersection between architecture and fashion is the way in which 3D-modeling, visualizations and interactive displays of the complex processes and structures behind traditional fashion design have been used to accompany exhibits at the Metropolitan Museum of Art in recent years. For example, architecture firm Diller Scofidio + Renfro created a series of visualizations for the 20th century fashion designer Charles James.

Computational fashion exemplifies the ways in which the digital has (re-)entered the material world, decending onto the feminist body in ways that challenge, complicate and reconfigure previous notions of the ways in which the digital are rendered material, local, contextual and embodied. From laser cut leather goods by high-end luxury brands, and run-of-the-mill housewares to 3-D printed jewelry[2] digital fabrication technologies are shaping aesthetic and political (Rancière, 2013) modes of representation, which are often—drawing on the affordances of digital technologies–tied to organic, repetitive, natural and ecological patterns in a time of great environmental disaster (Braidotti, 2013a; Ryan, 2014).

Background and Approach

There have been a number of interesting design practices and precedents to the emerging field that is currently described as computational fashion. For example, there have been a number of recent art and design exhibits from 2014 such as Leah Buechley's "Coding the Body,"[3] (2006; Buechley & Eisenberg, 2009; Rosner, Blanchette, Buechley, Dourish, & Mazmanian, 2012) and the Museum of Arts and Design's (MAD) "Out of Hand: Materializing

[1] See http://ctm.parsons.edu/sp-15-hacking-feminism/. Accessed on May 6, 2015.
[2] http://n-e-r-v-o-u-s.com
[3] http://www.apexart.org/exhibitions/buechley.php

the Post Digital."[1] At the MAD exhibit, the familiar small, white rectangular museum labels referred to digital fabrication tools such as 3D printing, CNC (computer-numerically-controlled) machining, laser cutting, and digital knitting and weaving—and, more importantly, complex combinations of these tools—rather than traditional art and design methods such as painting, etching, collage and sculpture. According to the show's curator Ron Labaco, "In the world of art and design, discourse is not longer preoccupied with the technology in and of itself. Rather, interest lies in how technology may be creatively applied in the interplay between digital and analog, natural and man-made, biological and cultural, virtual and real," (2013). The exhibit, which is believed to be the first of its kind, showcased examples of digital fabrication from fashion, furniture and sculpture since 2005 including works by Zaha Hadid and Anish Kapoor. In particular, the show featured an "Articulated 3D-Printed Gown" by Michael Schmidt and Francis Bitonti. Similarly, MIT Media Lab's Neri Oxman (2010, 2012) has collaborated with Iris van Herpen on commercial projects such as fashion runway dresses.

In order to investigate this emergent design practice, both as a social scientist as well as a design researcher, in June 2015, I enrolled in a 5-week course in "Computational Fashion Master Class" at Eyebeam, a non-profit art and technology center in New York that was founded in 1997, in partnership with Shapeways, a 3D printing fabricator and marketplace that was founded in 2007.[2] The first year of the program in 2014 was a ten-day intensive session in which ten fashion designers, engineers and media artists from North America and Asia collaborated on three projects around topics including second skin, performative textiles and kinetic structures. The course used computational design, 3D printing and digital fabrication to explore and experiment with the ways in which digital textiles, materials and patterns can extend and augment the body through the creation of physical prototypes that were exhibited as part of "Matter That Moves" in Fall 2014.[3] The summer courses are part of a research program at Eyebeam that has been holding a series of public events about topics related to Computational Fashion such as wearables, smart textiles, digital bespoke and intellectual property since December 2012.

'Being the Idiot'

In Agre's original article, he refers to critical technical practice as a kind of "split identity" with "one foot planted in the craft work of design and the other foot planted in the reflexive work of critique," (Agre, 1997). Despite the fact that he was writing nearly 20 years ago in 1997, the challenge of maintaining such an identity and living along the "borderlands" of scholarship and practice persists. Rather than an essentialist understanding of what it means to be a designer, Agre describes one way of knowing that might apply to certain kinds of engagements between practice and theory. As a social scientist and design researcher working in design schools since 2007, I often have the uncomfortable experience of vertigo

[1] http://madmuseum.org/exhibition/out-hand#
[2] http://www.shapeways.com/about Accessed on June 10, 2015.
[3] http://fashion.eyebeam.org/education Accessed on June 10, 2015

that comes with oscillating between different disciplines, scholarly cultures and modes of engagement. I have come to think of this experience as 'being the idiot' (in response to Michael's "engaging the idiot" (2012)).

Michael's mobilizes Stengers figure of the idiot in order to describe the process by which design engages publics around scientific issues. He writes "In other words, built into the very practices of speculative design is a proactive idiocy in which its eventuations necessarily trigger overspilling and the enablement of unforeseen participant actions, that is, misbehaviors," (Michael, 2012, p. 537). For me, 'being the idiot' is about the attempt to engage in design processes and projects in which research, learning and ideation occur through hands-on engagement rather than through the verbal and written expression of abstract concepts and theories through language. It is about being a participant observer in design processes such as 2D illustration, 3D modeling, fashion design and digital fabrication in which one has no previous experience or training. In this sense, similar to the figure of the idiot in the example above, social science training and theory can be conceptually useful by triggering overspilling, unforseen actions and misbehaviors. It is these misbehaviors that we might come to understand as generative and productive engagements between different disciplines that can lead to conceptually rigorous prototypes. For example, the use of theories from science and technology studies as inspiration for the material embodiment and politics (Marres, 2012) around a particular concept or project. Furthermore, the move towards design research has allowed me to explore a series of smaller projects (rather than the long-term ethnographic studies that are common in STS) that have used visual artifacts, physical objects, games, prototypes, participatory design workshops, speculative histories and autobiographical design (Sengers, 2006) as a way of opening up conversations on ethics, values and responsibilities in design based on engagement with theories from science and technology studies.

At the same time, many analogous research communities, methodologies and practices have formed in a variety of fields around the world including research through design and design as inquiry (Archer, 1995; Bardzell, Bardzell, & Hansen, 2015; Bardzell, 2015; Buchanan, 1985; Cross, 2001; Frayling, 1993; Zimmerman, Forlizzi, & Evenson, 2007), research creation in Canada (Chapman & Sawchuk, 2012), critical and speculative design (DiSalvo, 2012b; Dunne & Raby, 2013; Michael, 2012), adversarial design (DiSalvo, 2012a), critical engineering (Oliver, Savičić, & Vasiliev, 2011-2014), critical making (Ratto, 2011), practice-based research in the United Kingdom and Europe (Sinister, 2009; Smith & Dean, 2009) and inventive methods (Lury & Wakeford, 2012). Along these lines design scholars and social scientists have become interested in the ways in which prototypes (Galey & Ruecker, 2010; Kera, 2013; Turner, 2014) embed ideologies, values and arguments as well as how visual images, charts and information visualizations are demonstrations (Stark & Paravel, 2008) that marshal attention and compel action.

According to Agre, a successful critical technology praxis requires historical grounding in order to understand and frame problems as well as evaluating solutions and seeking possible alternatives (Agre, 1997). Similarly, critical and speculative design seeks to raise questions

and propose or suggest alternative possible futures. Michael writes that design "implies a different sort of politics—one that is circuitous, rhizomic and likely to have, at best, piecemeal and distributed effects that might well barely be recognizable as political," (2012, p. 17). While STS views the public engagement with science as a process that attempts to create a dialogue with citizens around scientific controversies for the purpose of finding policy solutions; design engagements are ambiguous and thoughtful while exploring complexity for the purpose of inventive problem-making (Michael, 2012).

In *Studio Studies*, Wilkie and Farias illustrate the ways in which design practice is situated and distributed as well as how design studios compare with other sites such as scientific laboratories. They are concerned with the following aspects:

> "first, how to account for the situated nature of creative and cultural production; second, the challenge of reimagining creativity as a socio-materially distributed practice rather than the cognitive privilege of the individual; and finally, how to unravel the parallels, contrasts and inter-connections between studios and other sites of cultural–aesthetic and technoscientific production, notably laboratories," (Wilkie & Farias, 2015, p. i).

With respect to the ontological turn, Woolgar and Lezaun write:

> "As a result, it is argued that political questions can no longer be camouflaged under methodological pretences; difference cannot be tackled simply through the mechanism of deliberative or discursive reconciliation. Whereas a plurality of worldviews can be confronted with *cosmopolitan* irony, detachment or tolerance, a plurality of worlds, the argument goes, forces a starker, *cosmopolitical* choice: in which world would you like to live, and what can you do to bring such a world into being?" (2013, p. 326).

Stengers writes "As for the cosmos, as it features in the cosmopolitical proposal, it has not representative, no one talks in its name, and it can therefore be at stake in no particular consultative procedure," (2005, p. 1003). Braidotti elaborates on these ideas in her argument for the post-human, which emphasizes the creation of a subjectivity based on the politics of difference:

> "the most striking feature of the current scientific redefinition of 'matter' is the dislocation of difference from binaries to rhizomatics; from sex/gender or nature/culture to processes of sexualization/racialization/naturalization that take Life itself, or the vitality of matter as the main target. This system engenders a deliberate blurring of dichotomous differences, which does not in itself resolve or improve the power differences and in many ways increases them. In other words, the opportunistic post-anthropocentric effects of the global economy engender a negative cosmopolitanism..." (2013b, p. 96).

In *Dissensus*, Ranciere discusses the aesthetics of politics and the politics of aesthetics before elaborating on the ethical turn in both of these realms. "Before signifying a norm or morality, the word ethos signifies two things: both the dwelling and the way of being, or lifestyle, that corresponds to this dwelling. Ethics, then, is the kind of thinking in which an

identity is established between an environment, a way of being and a principle of action," (Rancière, 2010, p. 184).

One recent example of a project that embodies this aesthetics, cosmopolitics and praxis is Jungnickel's (2014) "Bikes & Bloomers" in which she recreates a series of early 20th century women's cycling garments – complete with patents granted to women inventors, which were printed on silk in the lining of the skirts – in partnership with a seamstress. In making, wearing, performing and teaching through these garments, the project is able to critically engage with historical norms around gender and cycling as well as with the role of women in the creation of knowledge and invention as well as emergent socio-technical practices, which are not well understood.

Code to Ware

During the course, I worked closely with two fashion designers, Minna Kao[1] and Amy Sperber[2], to conceptualize and design a 3D printed garment. Our project, entitled "Code to Ware" – a play on "ready to wear" as in *pret a porter* and ware as in software – explicitly engaged several STS themes related to hybrids: male/female, digital/material, mechanized/bespoke, knowledge work/manual labor. Specifically, as we describe the project in the artist's statement "exploration of notions of hybridity around gender, labor and materiality including the integration of both digital and bespoke elements."[3]

First, as part of our process, we created a mood board on Pinterest with examples of 3D printed garments with patterns, shapes and aesthetics that we sought to integrate into our piece. We noticed that the large majority of the garments that we identified through this research were elaborately designed womenswear, often with organic or biological aesthetics. As a result, we were interested in exploring garments such as dress shirts and tuxedo "dickie," traditionally worn as menswear but that have been appropriated as womenswear, with more geometric patterns and clean lines. We conceived our design as a modular men's dress shirt containing three distinct parts: a collar, bib and cuffs. The creation of a male/female hybrid or trans garment allowed for us to engage with critical feminist science and technology studies themes around gender and sexuality.

In *Bodies That Matter*, Butler argues:

> "To claim that sex is already gendered, already constructed, is not yet to explain in which way the "materiality" of sex is forcibly produced. What are the constraints by which bodies are materialized as "sexed," and how are we to understand the "matter" of sex, and of bodies more generally, as the repeated and violent circumscription of cultural intelligibility? Which bodies come to matter—and why?" (Butler, 2011).

[1] See http://www.dreamofsongs.com. Accessed on March 4, 2016.
[2] See http://www.visionofashlar.com. Accessed on March 4, 2016.
[3] "Code to Ware" Artist's Statement. See https://www.id.iit.edu/news/computational-fashion-master-class. Accessed on October 28, 2015.

For example, Claudia Hart's "The Alices (Walking): A Sculptural Opera and Fashion Show"[1] in March 2014 at Eyebeam, a new media art gallery and studio in New York, offers one example of the ways in which hybrid identities might come together in the form of an embodied socio-technical performance. The show employed hybrid digital/physical costumes along with sound and spoken word in a commentary on augmented reality and queer identities. The project, dubbed as an augmented reality fashion show, is described as:

> "a sculptural opera in the guise of an experimental fashion show about the breakdown between the natural and the technological and the melding of identities between machines and people. It is a performance about cloning, duplication, mutation and transformation, and therefore about death and rebirth and the ambivalent desire by human beings for eternal life."

During the performance, five actors stood on the stage wearing costumes reminiscent of the pixelated digital overlays so often linked with augmented reality. By viewing them with an iPad outfitted with a custom augmented reality application, it was possible to see text revealed on panels in their costumes while, at the same time, spoken word and piano music animated the performance. The text and narration included passages from Lewis Carroll's *Alice in Wonderland* such as "Dear, dear! How queer everything is today!"[2] Many of Hart's projects are informed by scholarly research on hybridity from feminist science studies (Haraway, 1991); thus, I took the use of the word queer to denote a hybrid understanding of digital materiality. Specifically, the translation of augmented reality, something that is often linked with digital interfaces and overlays, into a physical body outfitted with pixelated clothing created an interesting hybrid.

Along these lines, from the beginning, we conceptualized the garment as combining digital, computationally generated elements along with bespoke and hand-made elements such as dying, threading and weaving so that the final piece could be more than a piece of brittle 3d printed white acrylic plastic. Towards the end of the summer, once the final design had been printed, we achieved this by dying the various parts – collar, body and cuffs -- of the garment a bluish purple hue and threading gold cord through the body of piece. The blue dye was selected in part for its relationship to the indigos used in workman's jeans and other clothing. As background for the threading, we researched different ways of tying knots with ropes as well as different thicknesses and colors for the cords.

One goal of the course as espoused by Shapeways and Eyebeam was to experiment with ways of using software code with Grasshopper or Python to create tessellated patterns, which are defined by the Oxford English Dictionary as "An arrangement of shapes closely fitted together, especially of polygons in a repeated pattern without gaps or overlapping."[3] Shapeways was eager to generate a book of 3d printed swatches of novel tessellated patterns that could, by adjusting the variables in the code, achieve the kinds of flexibility,

[1] See http://eyebeam.org/events/the-alices-walking-a-sculptural-opera-and-fashion-show. Accessed on June 15, 2014.
[2] See http://spinabook.com/?s=alice+in+wonderland&submit=Search. Accessed on July 30, 2014.
[3] http://www.oxforddictionaries.com/us/definition/english/tessellation

draping and movement expected in other types of fabric and materials that are used in garments.

The physical site of the class and the labor history of the surrounding neighborhood provided additional inspiration for the project. Eyebeam, based in West Chelsea in Manhattan for over 15 years, had recently relocated to the fifth floor of a large warehouse in Industry City, a newly created development project located in Sunset Park, Brooklyn. The neighborhood is also home to the historical Brooklyn Army Terminal. Industry City, formerly known as Bush Terminal, is a complex of buildings that serve as a manufacturing, warehousing and distribution center that dates back to 1895. The terminal employed 25,000 workers per day and helped to develop Brooklyn as a major seaport. The 16 building site with 6 million square feet (Satow, 2014) is currently home to design studios, chocolate manufactures, a food hall and a whiskey distillery as well as 3-D printer manufacturer Makerbot's new 170,000 square foot factory.[1] The Brooklyn (BKLYN) Army Terminal, designed by architect Cass Gilbert and built in 1918, was the largest military supply base until World War II when over 20,000 people were employed there in order to mobilize 3.2 million trips and 37 million tons of military supplies. The site, currently owned by the City of New York and managed by the New York City Economic Development Corporation, houses over 3 million square feet of industrial warehouse and commercial space that includes over 70 tenants with 2500 employees in the arts, biotechnology, electronics, finance, textiles and apparel as well as other industries.[2] A mosaic image in the 36th St. subway station of multi-racial men shoveling, hammering and riveting in caps and gloves further illustrates this labor history. While the neighborhood was once home to a range of European immigrants including Irish, Polish, Finnish and Norwegian, its population is currently primarily Puerto Rican, Mexican and Chinese.

As part of our research into patterns, we sought inspiration from the ethnic makeup of the neighborhood. On our first day of the course, we walked as a group to a Mexican restaurant called Maria's for lunch, which allowed us to become more familiar with the neighborhood. These brief, casual *in situ* ethnographic observations and encounters with the neighborhood served as additional sources of stimulation for the conceptualization of our project. In a way, while we were exploring an emergent field of practice – learning and making along with our instructors and colleagues – we were, at the same time, also discovering an unfamiliar part of the city along with it's own people and practices. For some members of the course, the newness was further amplified by the fact that they were also unfamiliar with New York, having come specifically for the course and/or recently moved to the city. The train trips out to Sunset Park while long – it took about an hour door-to-door on many days, were also good opportunities for observations. They were illustrative of the demographics of the neighborhood in that the composition of riders was, after a certain point, almost exclusively Mexican and Chinese, especially during rush hour in the evening before the 6pm class.

[1] http://industrycity.com

[2] http://www.bklynarmyterminal.com/building-information/history/

In particular, sparked by the recognition that a large part of the community was Mexican, I was reminded of pictures that I had taken of garments on display at the *Museo Textil de Oaxaca* in 2013. These traditional tunics contained repeated chevron patterns in black and white, which provided a basis for the pattern of the main body of the garment or bib. However, in order to translate this pattern into a 3D printable piece, our team explored a number of different iterations. Building on their training and expertise in patternmaking, print design and 2D illustration, the fashion designers on the team aimed to re-create a literal version of the traditional Mexican textile pattern in the 3D modeling software Rhino, which included three-dimensional chevrons with interlocking hoops to hold the structure together. However, after modeling several versions of this pattern, the team received feedback from one of the instructors that the project did not take full advantage of the capabilities of the digital tools and software code. This original design was scrapped, and, instead, the team needed to learn to co-design the piece in collaboration with the possibilities afforded by the tools. This meant a lot of trial and error in terms of creating a basic shape for the garment (which was modeled on the structure of a 3d body scan of a torso) but then allowing the pattern for the tessellation to be created by the algorithm. This realization that the aesthetic of the piece could emerge in participation with the algorithm is what Menges and Ahlquist refer to as computational design thinking (as opposed to merely translating a 2D illustration into a 3D model in the case of computer-aided design) (2011).

Thus, it was impossible to control or predict the design of the pattern for the various components of the piece, rather the process was one of continual adjustment and discovery of the aesthetic possibilities of the tools. These possibilities were rendered on screen over and over until the team settled on a version of the garment that was technically printable. The first version of the printed body of the piece was declared a failure. The team received a video from a staff member at Shapeways that showed the piece barely intact, a loosely connected snarl of white acrylic spaghetti that flopped onto the floor with little structure or shape. In order to give the piece a denser, more connected mesh that could bolster the structure, it was necessary to change some of the parameters of the 3d model. The final garment reflects an aesthetic that differed substantially from what was originally planned and designed but rather a piece that surprised the team and moved beyond the original concept.

In the final session of the course in mid-July, we presented the digital images of our concept, process and final direction for the project to a group of about twenty designers and technologists as part of the final critique session. Two weeks later, in late-July, Eyebeam opened an exhibition, “Making Patterns,” at their temporary space at South Street Seaport that included several computational fashion projects, including a tutu that had been created in 2014 as part of the first iteration of the course. The exhibit was exceptionally well-attended with standing room only and included many leaders in the computational fashion field as well as those with affiliations to design schools in the New York area. Finally, in early September during New York’s Fashion Week, Eyebeam opened the “Re-making Patterns” exhibit, where the five projects from the 2015 summer course were presented. All of these

events and exhibitions can be understood as sites where publics are being constructed (DiSalvo, 2009; DiSalvo, Lodato, Fries, Schechter, & Barnwell, 2011; Le Dantec & DiSalvo, 2013; Wilkie et al., 2012) around a particular aesthetic and cosmopolitics that engages specific technologies, socio-economics and actors. For example, Shapeways, the co-sponsor of the course, has considerable interest in supporting and growing the community of designers in new fields that will be potential customers of their 3d printing services.

The aesthetic of many 3d printed garments – often, repeating organic and biological patterns – has emerged in part due to the possibilities offered by the tools but also from sensibilities of the designers that have been at the forefront of the field in recent years. On the one hand, the 3d modeling tools along with their interoperability with algorithmic design and software code contains commands that can render this specific aesthetic, which has already been applied in the field of architecture for many years. At the same time, pioneers such as Neri Oxman and the team behind Nervous Systems, with their combined training in architecture and biology, have developed a unique aesthetic practice that echoes the patterns, shapes and forms found in nature. Furthermore, interest in biomimicry (Benyus, 1997) and bio-art (Myers, 2012) has grown over the past several decades at the same time as the growing awareness of ecological crisis and the anthropocene era (Morton, 2013; Zylinska, 2014). However, according to a recent talk, Oxman is working towards the creation of a "material ecology" by combining research from four distinct fields: computational design, additive manufacturing, materials engineering and synthetic biology. For example, Oxman's Mediated Matter group at the MIT Media Lab has explored the use of chitin (from crustacean shells), bacteria, microorganisms and silk to make garments as well as architectural structures that have a variety of qualities and properties such as plasticity, flexibility, transparency and opacity. Some of these projects are valuable not as fashion or design but rather to "speculate about the future of our race," (2015). Unlike traditional 3D printing that uses a wide range of synthetic materials such as acrylic, metal and porcelain, some of the natural materials have the ability to dissolve in water, biodegrade and return to nature. Rather than nature inspired design, Oxman argues that this is a form of "design inspired nature," (2015).

Similar to Agre's critical technical practice, Oxman describes the "split personality" of every designer. Oxman's particular practice of knowledge building through design research bridges traditionally binary categories including machine/organism, assembly/growth, analysis/synthesis, left-brain/right-brain, synthetic/organic, chisel/gene and creates new kinds of hybrids, which have long been of interest to the field of science and technology studies. In scholarly writing, these hybrids are often denoted with hyphens and slashes, or (when possible) through neologisms. In many ways, language seems ill-suited to describe the theoretical complexity of these concepts. In fact, visual and material prototypes, experiments and demonstrations offer explanatory possibilities that are not even possible with words. This explanatory value of design research for articulating the concerns of STS as well as for STS to shed light on the ethical commitments, politics and responsibilities of

design and designers illustrates the mutual benefits of interactions between designers and STS scholars as well as the cultivation of new kinds of maker/scholars and scholar/makers.

Conclusion

This paper reflects on the scholar/maker engagement with a project on computational fashion as a way of materially enacting and working out STS theories around hybridity, materiality, knowledge-building and publics. In particular, the process of conceptualizing, making and exhibiting a 3D printed garment is revealed as one in which knowledge, skills and definitions related to labor and gender are problematized and contested. For example, the collision of architect-programmers with fashion designers illustrates the tensions within the creation of a new community of practice around computational fashion. The relationship of the physical to the digital and the need to collaborate with the machine in order to create a particular aesthetic illustrates both the values and priorities of the leaders of the field as well as the capabilities of the tools. Specifically, the particular aesthetic that emerges mimics biological and ecological patterns is linked to the affordances of specific functions of the tools as well as a growing interest in bio-art and biomimicry. Finally, in contrast to some critics of speculative design, the coming together of publics during the final project presentations as well as during a series of exhibitions demonstrates the ways in which corporate stakeholders align with smaller new media and art non-profit organizations to create a vision of the future possibilities that are afforded by the tools. This project illustrates the nuanced and circuitous ways in which design is capable of doing politics differently, drawing on STS to do problem-making, create distributed and situated knowledge, and call forth the formation of publics.

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About the Author:

Laura Forlano is an Assistant Professor of Design at the Institute of Design at Illinois Institute of Technology where she is Director of the Critical Futures Lab. Her research is focused on the intersection between emerging technologies, material practices and the future of cities.

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Designing diagrams for social issues

Michele Mauri* and Paolo Ciuccarelli

Politecnico di Milano
*michele.mauri@polimi.it
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Abstract: Emerging approaches in social sciences and new media studies involve inquiry into social issues via the web. By collecting, analysing and visualising digital traces (i.e. posts, tweets, comments), a "issue map" can be created in order to make visible and understandable the network of the actors involved and their position in any public debate. Drawing on experiences gathered during a European project, we identified a two-phases-approach for the creation of issue maps. In the two phases - exploration and communication - visualisations play a key role, with two different connotations: in the first, they act as analytical devices used by researchers. In the second, they become communicative artefacts for a larger public. In this paper, we describe how we defined this approach, outlining the theoretical background and its connections with communication design. We highlight the main criticalities found in designing the issue maps before finally presenting our results.

Keywords: Communication design, information visualisation, issue mapping, controversy mapping, digital methods.

Introduction

Due to the digital takeover, the web is progressively shaping our images of society. Social interactions, news, and documents (official and unofficial) are increasingly archived online (Dougherty et al., 2010). Public issues and concerns are aired on the web while involved actors leave digital traces of the debate every day, allowing the observation of such issues in the making (Venturini, 2012). At the same time, several biases affect this medium: not all the world's population has equal access to it, not all debates are public, and the loudness of the involved actors can be amplified or weakened by the web as a medium.

If these conditions make the web an unsuitable source for understanding a social issue, they also make it the perfect site for examining public discussion. On the web, it is possible to identify the most active actors, their factions and fractures, and how their relationships change over time.

Social sciences and new media studies have developed a theoretical approach that observes the Web as a discussion space that can be mapped and used to understand social issues. On one side, an applied version of actor-network theory, controversy mapping, identifies what social scientists should look for: controversies (Venturini, 2008). On the other hand, digital methods, developed in new media studies, provides direction on how controversies should be investigated (Rogers, 2013).

A metaphor can assist in understanding this paradigm: the social scientist has become a cartographer who explores and describes the territory of the debate. The outputs of these studies are therefore maps and atlases that can be shared with the involved actors to understand their respective positions in debates. Interestingly, these actors may not always have the background knowledge to understand and explore such atlases. There is a demand for new visual languages capable of expressing the complexity of these studies, a demand requiring communication design expertise, particularly from the information visualisation field. Diagrams are powerful tools for expressing different layers of information, allowing a formalisation of results while simultaneously providing a seamless exploration of them, from the macro to the micro view. Researchers have already discussed the relevance of communication design in this framework at a theoretical level (Ricci, 2010) and by means of case studies; however, it has never been tested widely in a full-scale controversy mapping project.

The paper discusses the synergy between Controversy Mapping, Digital Methods and Communication design in the development of a design approach to issue mapping. The European project EMAPS provided the context to identify and test such approach. In the next sections we will provide the background knowledge needed to understand what issue mapping is and how it works.

Controversy Mapping

Among all of the information on the web, we need to determine which to focus on. As we stated, the web is an unsuitable source to understand a given issue, but it is helpful in understanding public debates around it. Controversy Mapping (CM) adopts this approach for inquiry into social issues by identifying a controversy and examining the arising debate. In this context, the definition of controversy is quite broad: “Controversies begin when actors discover that they cannot ignore each other and controversies end when actors manage to work out a solid compromise to live together” (Venturini, 2010, p. 261).

Controversies exist as phenomena that force actors to take a public position on an issue, therefore leaving traces about their statements, alliances and oppositions. Collecting these traces makes it possible to map the involved actors and their positioning in relation to the debate. In the reference literature, CM is presented as a “collection of techniques to observe and describe social issues developed by Bruno Latour as an applied version of actor-network theory” (Venturini, 2008, p. 1). Originally developed for teaching actor-network theory to college students, it evolved into a full research methodology.

The cartographic metaphor originates within CM: the social scientist is a "social cartographer" whose aim is to explore the controversial territory, analyse its morphology from different points of view and represent it by map or atlas. The metaphor also implies that the cartographers are not outside of the object of analysis; rather, they are surrounded by it. It is impossible for them to see the whole picture of the phenomenon: they can only rebuild it by synthesising and simplifying it.

Digital Methods

In early studies of the web, analyses focused on its role as a new kind of society: a virtual world detached from the real one (Wellman, 2004). With the evolution of the medium, this idea became outdated: studies indicated a mutual influence between social phenomena and the web (Ginsberg et al., 2009). Gradually, this research made apparent the lack of distinction between what we can call "real" and "virtual". New methods are therefore required, methods capable of exploiting the digital nature of the web. Among the authors working on this topic, Rogers has contributed studies relevant to this research. In 2007, he coined the term "digital methods" (DMs) to describe social research methods grounded in this medium (Rogers, 2009a, 2013).

DMs are based on the recognition of biases affecting the web. Instead of trying to reduce such biases, DMs embrace them, using them as an advantage. The approach started from a simple question: how can we do social research through a medium with well-known biases? The DMs literature responds to the question by identifying "dominant devices" on the web, repurposing them for social research. From this perspective, the web is not a monolithic and coherent structure; rather, it is composed of different devices mediating our access to the underlying information. An incomplete list of devices can contain search engines (e.g., Google, Yahoo, Bing), social networks (Facebook, Twitter), collaborative environments (Wikipedia, GitHub), forums, blogs, and websites. Often, they are referred as "dominant devices", underscoring their relevance as information hubs.

Each device provides digital objects that can be used in analysis: hyperlinks, threads, tags, page ranks, and Wikipedia edits (Rogers, 2013). Depending on the analysis, digital objects can have different scales, from entire websites to single hyperlinks. An example of analysis can be seen in the repurposing of Google Search as "crown maker" (Rogers, 2009b), which analyses how the order of results varies over time for the same query. In this way, it is possible to ascertain the most influential information providers on a topic. Here, the dominant device is Google, and the digital objects are the links (the query results).

Each DMs method determines which digital objects are provided by the analysed device while identifying how they can be used for social research.

Designing Maps and Atlases

The exploration of issues using CM and DMs techniques necessarily passes through visual artefacts called “issue maps”. As Venturini (2012) points out, the literature contains several references to visual languages:

> Exploration and representation always come together in cartography. No serious cartographer would travel a territory without taking notes, sketching plans, amending previous atlases. This is how maps have always been manufactured: through a recursive adjustment of observations and descriptions. (p. 797)

The literature describes the characteristics of a “good issue map”, identifying the content that should be provided and the actions the user should be able to perform with it (Venturini & Latour, 2010; Venturini, 2012). However, the existing contributions lack a thorough discussion of how these artefacts should be designed and developed. Researchers have recognised the need for visual languages, identifying the communication design field as an ally in finding them (Latour, 2008).

The DMs literature also incorporates visual translation. Even if there is not a direct discussion on the development of such artefacts, visual translation is the only solution for representing and exploring the analyses. Visualisation is widely used in DMs where most of the tools’ outputs are visual. To discuss the topic under examination, the literature often employs visualisations (Rogers, 2010) created in collaboration with designers (Rogers, 2012).

There is a strong need for visual grammars and an interaction model to present, communicate, and make understandable analyses’ results. Ultimately, this situation requires communication design knowledge in the creation of “issue maps”. Communication design is linked not only due to visual languages, but also to the underlying approach shared by CM and DMs of showing phenomena (the social issues) which are not clearly visible . As Giovanni Anceschi states, representing not only means making a more or less accurate replica of the visible, it also means showing the invisible. Showing the invisible, in turn, not only signifies merely illustrating the real existence, but it also means imagining visual models of the possible, probable, and hypothetical. (Anceschi, 1988, p. 59)

Other than this broad closeness to the field, the design of visual items forms the core of information visualisation:

> Visualization provides a powerful means of making sense of data. By mapping data attributes to visual properties, such as position, size, shape, and colour, visualization designers leverage perceptual skills to help users discern and interpret patterns within data. (Heer & Shneiderman, 2012, p.1).

Information visualisation is not only about visual elements, but also about interaction. Proper interaction patterns are needed to move from the micro to the macro view while using the same visual layout for different data sources. Interaction techniques also support the creation of exploratory paths, providing the user a step-by-step introduction into the complexity of the analysis. Several layers of information, partially overlapping, comprise an “issue map”. The resulting complexity could discourage the public from engaging with its

content. Therefore, narrative techniques can present the topic to users, providing them the ability to freely explore the visualisation: “Generalising […] data stories appears to be most effective when they have constrained interaction at various checkpoints within a narrative, allowing the user to explore the data without veering too far from the intended narrative” (Segel & Heer, 2010, p. 1147).

Creating Issue Maps: The EMAPS Project

The EMAPS project[1] was the first “in vivo” experimentation of CM through DMs; it directly involved communication design as a partner discipline creating the conditions to test and shape the relationship between the three competences (CM, DM and CD – Communication Design).

We have analysed, visualised and tested select topics with interested users called “issue experts”, i.e. a person who is interested in the topic (e.g., climate change adaptation) but does not necessarily know the analysis methods used. The project was divided in two main phases, each one with its own case study and goals (Figure 1). The first phase aimed at identifying collaborative models and knowledge sharing within an “Ageing Population in Europe” topic. The second phase was intended to be a full-scale project seeking to explore public communication of “climate change” issues.

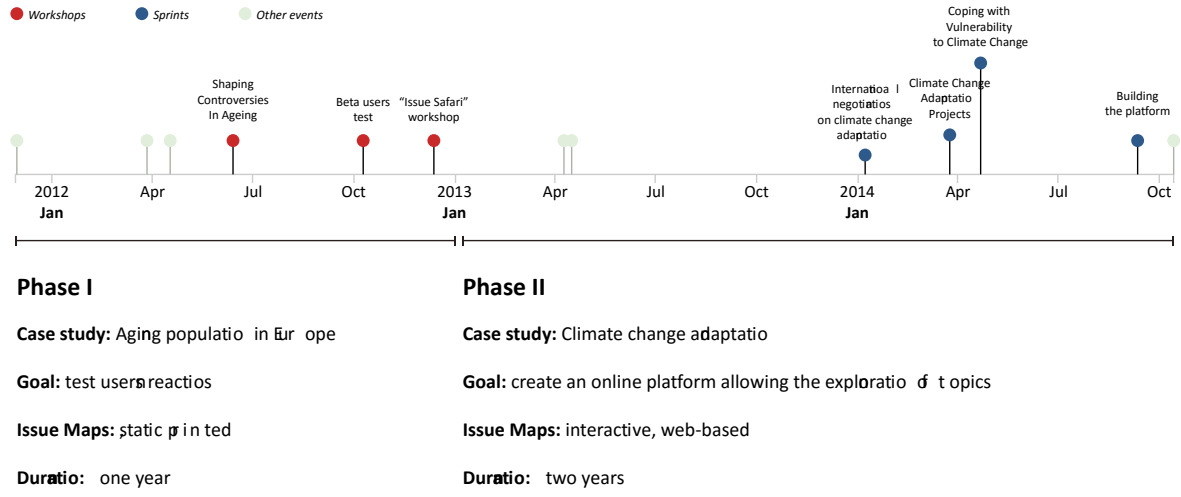

Figure 1. Evolution of the project. The timeline reports the main events described in this paper.

EMAPS Part I: Static Maps and Consortium Test

In the first phase of the project, we developed “issue maps” on the “ageing population” topic, submitting them to groups of “issue experts” at different moments of the design process to identify errors and criticalities.

[1] For more information, visit the project website: http://www.emapsproject.com/blog/

The ageing population phenomena assumes remarkable proportions in Europe, together with several issues and implications emerging for everyday work, social and intergenerational relationships, healthcare delivery, social services and welfare.

The goal of the first phase was to collect users' reactions to issue maps, and as designers, we focused on the identification of suitable visual models. Three user tests were organised, each with a different sub-topic. For each one, we created an atlas of static visualisations, which we tested with users in a public workshop. The development time, number of issue maps and involved users differed for each mapping campaign (figure 2).

Figure 2. Diagram representing the three workshops.

Three kinds of user tests were performed. The first test involved recording users' reactions to maps when they received no prior explanation. The second test was task-based and analysed through an ethnographic approach. The third meeting also included a task-based test, where the researchers took notes on the users' ability to accomplish such tasks.

The performed tests revealed the difficulty of communicating CM results to the wider public. The major criticalities that emerged related to the visual models, analyses and methods.

From the graphic design point of view, the adoption of visual patterns that differed from standard ones (e.g., pie charts and bar charts) created comprehension issues. In fact, the users needed instruction on how to read the visualisations. The analysis methods also build upon data sources with unfamiliar structures and meanings for the users. The end users did not directly criticise the produced artefacts, but the tests were not successful. Failure was defined by users' indifference towards results, sometimes caused by their shame in admitting their inability to understand and make sense of the results. When users were able to understand the analyses, they asked for more details, therefore requiring more views on

the topic and a better control over it in the movement from the macro to micro view. Better results were obtained when the user discovered known elements in the visualisation (e.g., a person's name, an institution or a website).

We brought the emergent criticalities to a wider discussion within the consortium in order to identify new approaches to controversy and issue mapping while involving the final users in the mapping process (Venturini, Ricci, Mauri, Kimbell, & Meunier, 2015). At the same time, the workshops allowed us to identify certain criticalities specifically related to communication design. As designers, in the first phase, we focused primarily on the visual optimisation of issue maps, such as font size, labels arrangement and the use of legends. We also concentrated on creating artefacts that were correct from the data visualisation and information visualisation points of view. However, when we provided the maps to users, we noticed that difficulties in reading emerged related to design choices preceding the visual choices. One example occurred with a graph representing a web mapping (figure 3): each circle is a website discussing the ageing population, and lines represent hyperlinks between them. Many users were not aware of the meaning of a hyperlink, and some were unfamiliar with graph representations. Even though the involved researchers found the map interesting, users lacked the implicit knowledge behind the map.

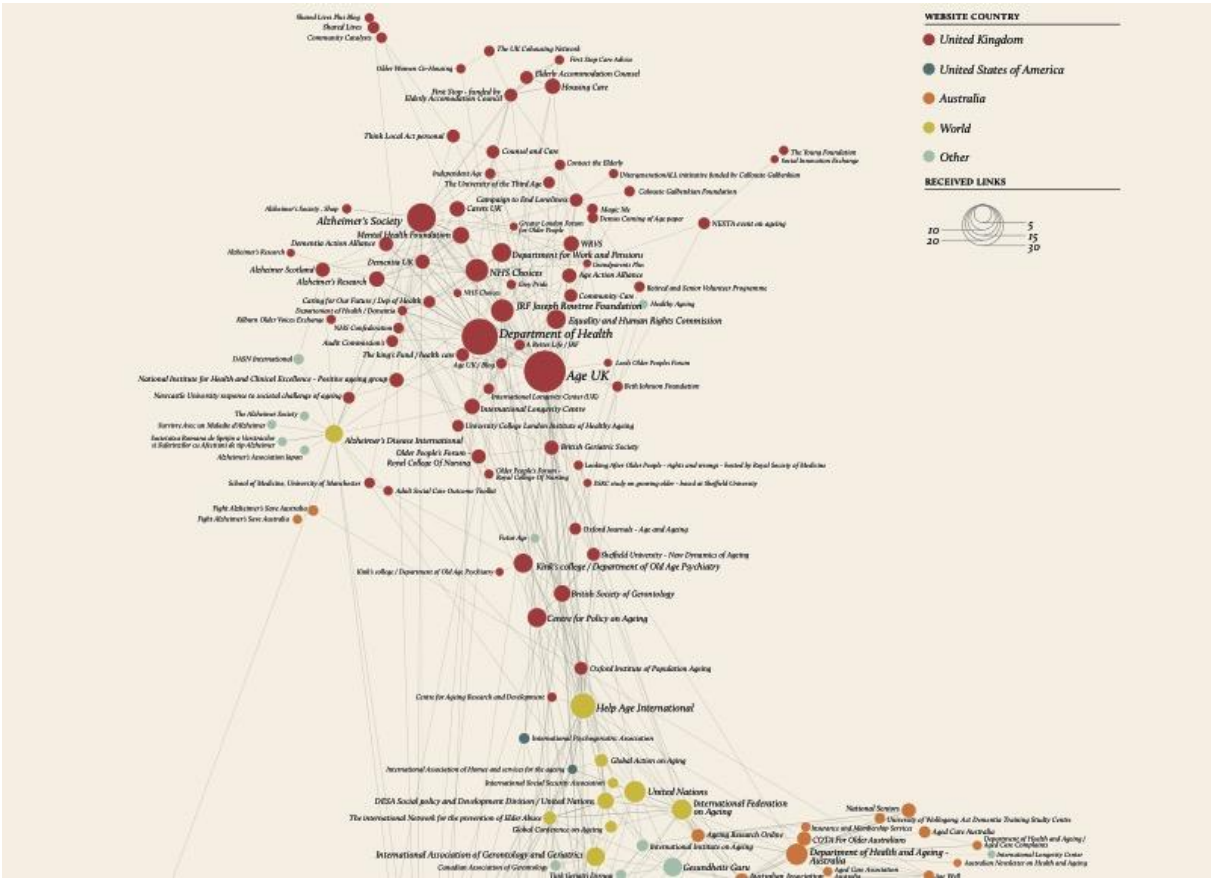

Figure 3. A detail of an issue map representing links among websites talking about the ageing phenomenon. For the full issue map, visit this link: http://bit.ly/1XigHT7.

With this map, new media scholars and social scientists were able to read the phenomenon, because they were aware of the meaning of the links and variables related to graph theory. Reading the map, they were able not only to derive findings, but also to identify errors and extract indications for further improvements.

This finding led to a second criticality: each map resulted from several operations, including fine-tuning ad-hoc solutions to improve readability. Any edit to the issue maps required a considerable amount of time.

A third criticality was that designers were the first ones unable to deeply understand the methods and sources used. Dividing the working groups according to different areas of specialisation (communication design, new media studies and social sciences), designers were provided with data resulting from the analyses, without their knowing which kind of operation was performed in the first place.

From the identified criticalities, it was therefore possible to identify three kind of users with different needs:

- the final users, who need to know the implicit knowledge behind issue maps;
- the designers, who need to know the analysis process to make explicit the choices made and their meanings; and
- the other researchers who need to improve the maps.

It became clear that it was impossible to design issue maps directly for the end users: what we produced were hybrids too complex for end users and too simple for researchers.

The Two Sides of Issue Maps Design

The research outcomes allowed us to identify a different approach to developing “issue maps”. The resulting artefacts can be linked back to the cartographic metaphor, with a change in meaning: social scientists, more than cartographers, are explorers. They have a destination, but they do not have a map to reach it; nor are they sure that the destination exists. Through analyses, they produce artefacts used to confirm or correct the route. Most of these outcomes accomplish their functions in the moment of their reading, instantly losing their value.

The original metaphor is based on the assumption that maps are useful artefacts for people who have never visited a certain place, and they can be drawn in the moment of exploration. By comparison, the proposal here is that the map results from two movements. The first is the exploration, annotating terrain features and confirming that the destination actually exists. It is only on the way back, however, that the explorer puts all the notes together, making it possible to create a map.

Metaphors aside, the use of the web to explore controversial issues requires two design moments (figure 4): the first to support research (the “exploration”) and the second to encourage public communication (the “maps” creation). In these two phases, the produced artefacts play different roles.

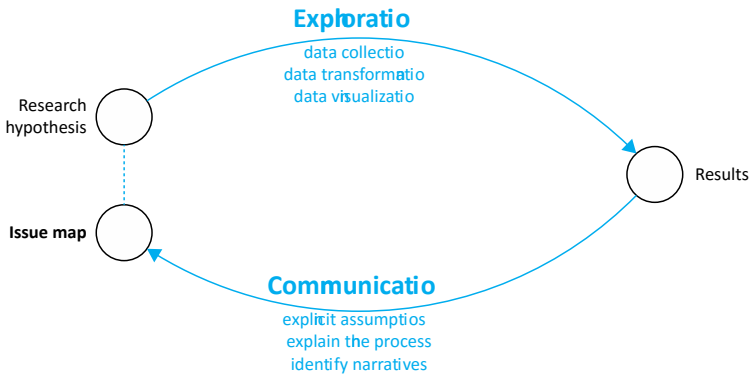

Figure 4. The two phases adopted in our workflow. In the first part, diagrams are used to inquire into the topic, while in the second part, they are used to promote results towards end users.

Issues Maps, Part One: Diagrams as Exploration

In the first part, we identified research hypotheses and performed analyses through the use of diagrams. Evaluating the processes used in the first part of the project, we found the analyses to be non-linear processes. Several diagrams were produced through transformations or actions. Here, we use the term 'diagram' in its widest sense (Valsecchi et al., 2010) to define any visual structure communicating information: from tabular datasets to static visualisations to interactive ones. Most of the produced diagrams confirm researchers' hypotheses, losing their value after reading. Diagrams therefore represent an evaluation moment: as defined in the literature, they have an epistemic role (Kirsh & Maglio, 1994). Reading a diagram, researchers are able to understand if it can be considered an end point, or if new actions are required. It is also possible to determine if there are errors and if certain actions need repeating, or if the whole process requires redesigning (figure 5). One or more artefacts compose the analysis outcome: there is not a single, finished object but multiple versions that coexist (figure 6).

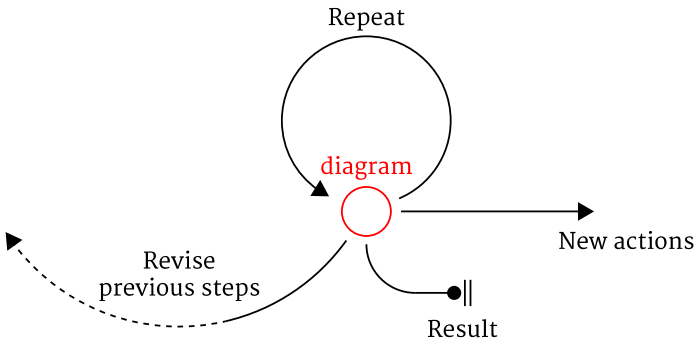

Figure 5. Diagrams as evaluation devices.

The openness to new actions is the most relevant feature of such diagrams: they are un-finished artefacts. With "un-finished", we do not seek to refer to their nature as prototypes, or emphasise the idea that the project is not finished. Rather, with this term we want to highlight that the openness is not taken for granted; it must be designed. The ability to modify and improve is not a by-product. Instead, it is a goal that design should address in

two aspects: the conceptual and the technical. From the conceptual side, it is important to consider how information is structured, keeping it understandable by allowing other researchers to modify it. The technical side involves adopting technologies, standards and frameworks that makes modification more simple.

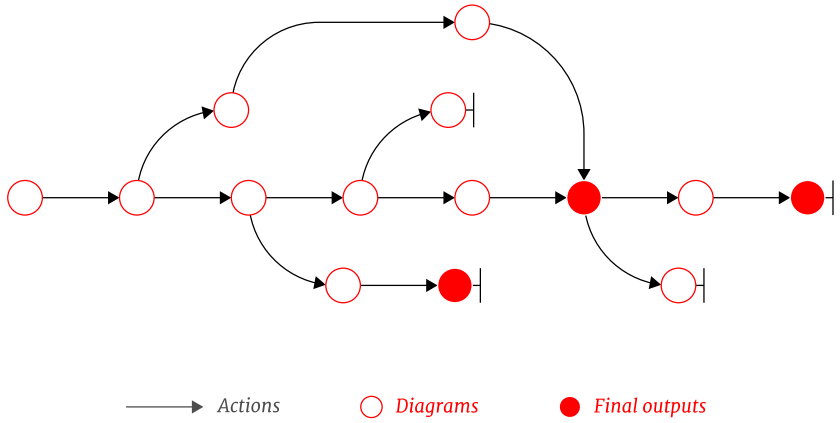

Figure 6. In the exploratory phase, the process is a chain of actions producing diagrams. Only a few of these will be considered 'final output' of the research.

Issues Maps, Part Two: Diagrams as Communication

After the exploratory phase, the most relevant results require a redesign in order to communicate them to the public. In this second part, diagrams play a different role: they should provide users with background knowledge in order to allow them to freely explore the results.

Reviewing the first phase of "Ageing Population", we found difficulties in publicly communicating the results for three main reasons:

- The results are complex and difficult to read.
- The methods are experimental, and users lack all the necessary background information to understand them.
- Analyses are based on specific medium features that could be unknown to the user.

The three problems are interrelated. Communication is compromised even if just one of them is unsolved. We identified three possible approaches to overcome the described problems: design after design, trust building and interaction as co-authorship.

DESIGN AFTER DESIGN

In the previous section, we presented diagrams as tools used by researchers to understand and evaluate results. These diagrams are unsuitable for a wider public because they are based on researchers' assumptions and knowledge that does not necessarily extend to the general public. To create truly stand-alone artefacts, all of the assumptions and choices behind the analyses must be clear, an operation that can be defined as "design after design"

(Bjögvinsson et al., 2012). Starting from the results, the analysis evolution is retraced, identifying all of the information needed by a user. At this point, it is possible to design a new artefact providing both results and contextual information.

TRUST BUILDING

A criticality found in the first part of the project was the users' mix of scepticism, embarrassment, and indifference. They were unable to link the presented results to something known. The problem could be divided into three questions: What am I looking at? What are its main features? Why should I trust it? While the first two questions could be solved through better use of visual models and interaction patterns, the third one requires enabling the user to follow the analysis process from the beginning to the final results. Following the analysis path, the user would therefore be able to adopt the perspective of researchers, understanding their choices.

INTERACTION AS CO-AUTHORSHIP

Finally, the interactive diagrams provided to the user should be able to convey the results as well as the information described in the two previous points. Adopting a narrative/explorative approach (Segel & Heer, 2010), the user is guided initially in the exploration during introduction of the main concepts. Gradually, more freedom to explore is given. The difference between visualisations used in the data journalism field and issue maps is that the latter are not meant to promote a specific vision of the phenomenon; rather, they provide a way to see latent behaviours and to inspire questions. Through the interaction, users should be able to define their own paths, therefore designing new research. The map cannot be flexible enough to explore every user hypothesis. In such cases, they require access to the underlying data, using it in new, unpredictable ways: the success of a diagram is defined by the moment when it is no longer useful. Once again, the solution is to keep the process open.

EMAPS Part II: Sprints

The second phase of the project focused on "Climate Change Adaptation". In comparison to the previous phase, the topic was intended for a more scientific audience. Scientists, academics and journalists formed the "issue experts", the primary final users of the issue maps. The goal was to create an online platform collecting interactive "issue maps".

In the first phase, one of the main criticalities was the distribution of work among institutions, causing delays and misunderstandings. Therefore, a new approach was identified, one we called "sprint". The method was inspired by "bar camps" and "hackathons", born during the dotcom boom as informal moments of meeting and idea development. The sprint is a structured version of these informal meetings, fine-tuned for the social sciences. The main strength of the sprint rests in its sharp constraints:

> The short and intensive nature of these events shields them from the dream of exhaustivity often associated with 'big data'. Participants know that they will only be

> able to treat a limited amount of digital traces and that they will achieve imperfect results, but they accept such constraints more as a challenge than as a weakness. (Venturini, Munk, & Meunier, 2016, p. 5)

The EMAPS project sprints were one-week events. On the first day, we invited issue experts to present their visions on the issues as well as what they would like to know. The same experts were invited for a final presentation and updated on the results during the week. Participants worked in small groups (5-6 people) composed of designers, social scientists and new media scholars. No constraints were put on the types of outcomes or on the analysis methods.

Four sprints were organised, the first three aiming to explore issues related to climate change adaptation, and the last one focusing on platform creation.

They represent the two moments of issue mapping previously described: in the first three sprints, diagrams played the role of supporting the exploratory research, while in the last one, diagrams were designed to be released as communicative and standalone results, understandable by the identified public.

Exploration: Sprints on Climate Change Adaptation

Three different institutions hosted the first three sprints, and during the events, we addressed more than 50 different research questions, developing several issue maps for each one. In the sprints, groups followed their own research paths, without needing to link the results together. We aimed to produce as many materials as possible in order to identify the most relevant one for the public communication of issues.

In the organised sprints, designers focused primarily on three tasks: identifying visual models suitable for the hypothesised analyses, structuring the collected data in order to make it useful for its visualisation, and creating diagrams. There was wide experimentation on the visual languages, testing and comparing layouts on the same data. The analysis outputs also varied in terms of their shape, ranging from static maps to interactive ones to data exploration tools. At the end of the sprint, each group was expected to collect all the source files for the designed diagrams and to describe the research protocol, making explicit the sequence of actions performed.

Communication: 'Building the Climaps Platform' Sprint

The last sprint aimed at the creation of a web platform (called Climaps[1]) featuring diagrams for "issue experts". This last sprint can be seen as the "communication" part: instead of developing new explorations, in this event, we identified the most relevant analyses produced during the previous events and redesigned them for the selected users.

Organising the sprint, we designed a structure able to address the issues found in the first part of the project, namely the need to make explicit all of the researchers' assumptions and

[1] For more information, visit the platform webpage: http://climaps.eu/

choices, the need to provide an access point for the presented analysis, and the need to leave results open for new analyses.

It was not a suitable solution to simply collect the issue maps, even if refined and well-designed both from the interactive and visual point of view. That way, we were not providing an access point to our work at the risk of losing the users' interest.

We therefore suggested the identification of narratives where issue maps could be used to inquire into a topic. That way, users can understand a map's utility and how it works. Each working group was asked to identify two possible stories that could be explored using the issue maps. Focussing on issue maps' usefulness in exploring topics, it became simpler and clearer for everyone how to select the most relevant ones. After the second day when narratives were identified, the teams revised the selected issue maps. For each one, the development was retraced, allowing the designers to provide the users with all the needed information to interpret the maps. At the end of the sprint, the design team started to produce the final web platform.

Inspired by solutions currently used in the 'data journalism' field, we identified a simple and modular structure, featuring two kinds of elements: narratives and maps. The two are linked (figure 7), allowing the users to expand or reduce the degree of exploration in their reading.

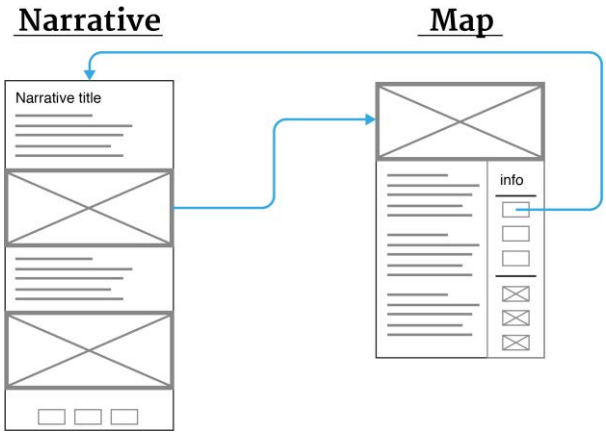

Figure 7. Schema describing links among "narrative" and "map" pages.

The two pages follow different structures. Within the narrative, texts and diagrams are used to form a new kind of engagement with readers/users: provided one of the multiple ways of reading issue maps, users become aware of the map's meaning and logic, enabling them to perform their own reading and interpretations (figure 8).

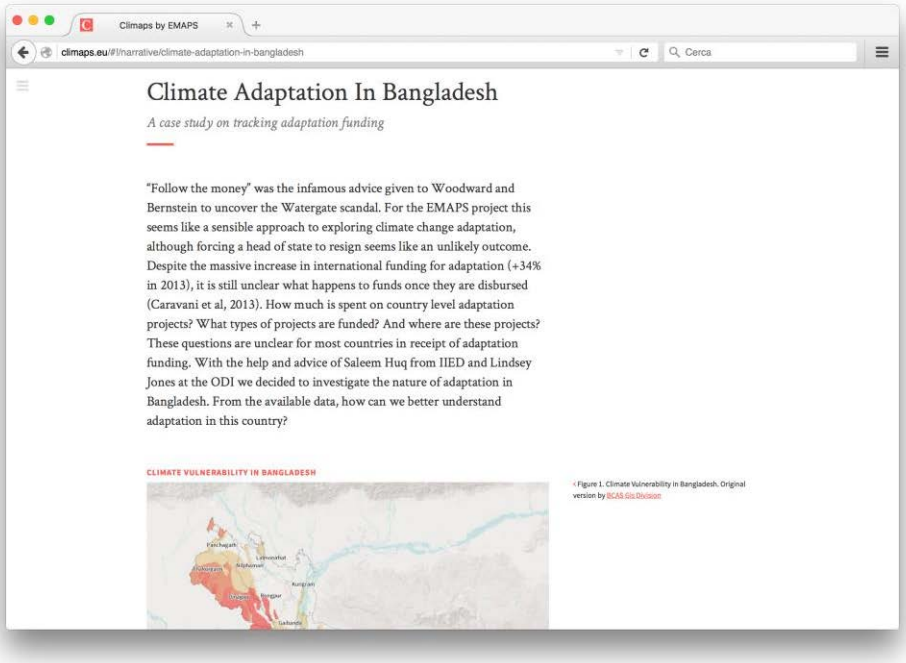

Figure 8. An example of narrative page.

Map pages, instead, provide only the diagram and its context, allowing the user to explore freely. The map's page (example in figure 9) provides the following:

- how to read it: a short description on how it works;
- how the map was built: the protocol applied to collect, refine and analyse the underlying data;
- Findings: what the researchers found using the map, starting from their original research question;
- Tools: the tools eventually used in the analysis;
- Data source: the original source of data;
- Data files: the final dataset used to produce the issue map;
- Source files: the editable files of the presented map (e.g., source code for interactive maps, an editable file in an open format for the static ones).
- Related narratives: narratives on the platform where the map is used to highlight a specific topic; and
- References, authors, acknowledgments.

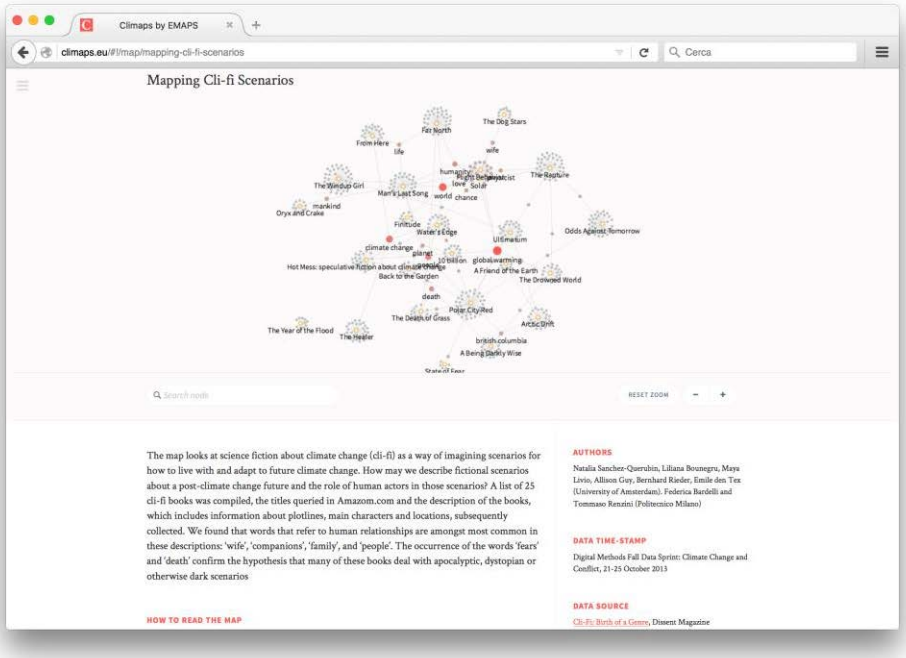

Figure 9. An example of a map page.

With such information, users can freely explore the diagrams. More importantly for the project, users are able to go beyond the map itself: they can download the source data and produce new and unexpected explorations of the topic.

Open Issues

Some criticalities that emerged during the project remain open. While the sprint method allows one to outline several exploration paths, there is a risk of losing memory of the design process if the sprints are not properly managed, making the results useless for research purposes. Without a proper organisation and a description, results become “black boxes”: sources are known, outcomes are available, but the performed transformations are lost. This experience demonstrated that one of our priorities should be to avoid this “blackboxing” effect. The created artefacts should be able to express results, but the link with sources should also be kept clear. During the first three sprints, more than 120 visualisations were produced with different levels of complexity, both in terms of analysis and design/interaction. Looking at the high number of artefacts, doubts emerged because visualisation is sometimes used because of its nature as a “finite object”. In other words, the doubt is that visualisations will be used to cover up possible inconsistencies in the analyses by presenting them in a visual compelling way. Finally, during the exploratory sprints we focus too much on the experimentation of new visual models for representing the collected data, sometimes creating artefacts difficult to update or to reproduce. As previously stated, the design component should focus on the development of processes that are simple to iterate.

Conclusions

In this paper, the experience of designing “issue maps” is offered as a useful tool for exploring public debate through digital traces. The experience occurred during the EMAPS project, and through its phases, we were able to define a proper workflow for the design of issue maps: a process divided in two phases, exploration and communication, where diagrams have different roles. The experience highlighted the nonlinearity of such exploration, and in the paper, we described an approach that we identified to deal with it, namely the 'sprint' approach.

The outcomes of this research rest on three levels: the first involves design practice, the second includes CM and DMs, and the third is comprised of case studio topics (climate change adaptation). As for design practice, this research is useful for defining an approach to projects based on digital traces, dealing with their instability and volatility. On the second level, we defined a collaborative approach between designers, social scientists and media scholars, defining the role of design in the development of issue mapping. Finally, the research output, available through the publicly-available Climaps platform is valuable for the actors involved in the climate change adaptation debate.

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About the Authors:

Michele Mauri is a research fellow in the Design department at Politecnico di Milano, Italy. He's part of DensityDesign Research Lab, a research lab focused on the visual communication of complex phenomena. He completed his PhD in Design in 2015.

Paolo Ciuccarelli is Associate Professor at Politecnico di Milano, founder and scientific director of DensityDesign Research Lab. He is member of the Design PhD board, head of the BSc and MSc in Communication Design and co-editor of “Big Data and Society” (SAGE).

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iPhoneography and New Aesthetics: The Emergence of a Social Visual Communication Through Image-based Social Media

Eman Alshawaf

University of Minnesota, USA
alsh0062@umn.edu
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Abstract: New digital imaging practices have arisen with the emergence of image-based social media. An aesthetics that is both visual and social in nature is emerging and clearly manifesting on the user-friendly platform Instagram. While new visual aesthetics are rooted in the new attraction to vintage filters, social aesthetics manifest in embracing the mundane aspects of human life as a source for visual communication. Amateur image-makers are taking the lead and experimenting with new visual forms of expression. The field of visual communication has not yet examined such timely issues, so this paper argues for increased attention to new digital imaging practices, such as iPhoneography, the practice of capturing, editing, and sharing images with one device, which is altering how we make and read images.

Keywords: iPhoneography, visual communication, image-based social media, aesthetics

Introduction

Images are changing. Their visual expressive nature is now examined alongside a new social nature where they function as visual tools for communication amidst the emergence of image-based social media. Image-based social media has welcomed amateur image-makers by providing them with opportunities to create and share images in ways previously restricted to professionals (Gómez Cruz & Meyer, 2012), which have significantly influenced how we visually communicate. Visual communication has therefore evolved, too. It has become welcoming of new visual qualities and themes where the filtered and nostalgic is considered more beautiful (Bakhshi, Shamma, Kennedy, & Gilbert, 2015), while the mundane of family, food and life is highly acceptable as content.

As a result, a new direction in digital imaging and graphic design has emerged that is dedicated to human activity, new social and visual aesthetics in addition experimental amateur imaging practices. Image-based social media has generated new visual opportunities, which have been studied through the lens of photography theory (Berry, 2014; Gómez Cruz, 2012; Halpern & Humphreys, 2014; Keep, 2014a, 2014b) but not from the perspective of visual communication.

iPhoneography

This paper is dedicated to discussing the value of examining a digital imaging practice known as iPhoneography, which Berry and Schleser (2014) refer to as "mobile media making," where smartphone applications provide "social, creative, and emotional cartographies" (p.12). iPhoneography, which takes place on image-based social platforms with the use of both smartphone cameras and imaging applications, is the practice of creating, altering, and sharing images via digital technology specific to smartphones and their applications. Realizing the popularity of the iPhone, the term "iPhoneography" was first introduced in 2008 by Glen Evans, a photography blogger whose blog no longer exists (Gómez Cruz & Meyer, 2012).

The products of iPhoneography are iPhoneographs—digital two-dimensional artefacts, distinct from photographs because of their new social process-based nature and new visual aesthetic. The two features that distinguish iPhoneography from traditional photography are prevalence and immediacy: iPhoneographs are prevalent since the availability of camera phones makes it possible to create visuals based on one's personal life at any given time and their immediacy is due to the fact that they can be shared instantly on various image-based social platforms. iPhoneographs also reflect new visual aesthetics where images are altered, enhanced, and filtered (Bakhshi et al., 2015; Berry, 2014; Halpern & Humphreys, 2014) and are therefore, visual artefacts capable of generating meaningful visual experiences. This emphasises the idea that current forms of visual communication are changing social and visual conventions on a global scale as these changes are not restricted to any specific region.

iPhoneography as a recent, global, visual practice is worth examining closely for various reasons:

1) the parallelism of social and visual aesthetic qualities that stimulate new visual and social trends,
2) the ability of image-based platforms to host an abundance of visual artefacts and allow users with various creative expertise and intentions to coexist, receive equal opportunities for exposure, and visually communicate with ease,
3) the variety of image-based platforms that currently cater to users of diverse levels of expertise in image making and the use of smartphone devices,
4) the increase in the number of smartphone applications that enhance, alter, and add graphics to images.

These reasons contribute to the popularity of iPhoneography as a valuable image-based practice.

Instagram

The introduction of aesthetics that are both visual and social is clearly seen on the smartphone application Instagram. In its early days, it mandated the use of squares as visual signifiers where not only posted images are in the ratio of a square but also the whole feed of Instagram is rows and columns of squares. As an image-based application it was among the first few applications that also functioned as a social platform. Users can use this application to capture images using their smartphone camera, crop images and add filters to them all while connecting with each other by following other users and liking their images. The social aspect is based on one's ability to write his or her own story (Arthur, 2009). With that, people are given the chance to become their own personal biographers and determine how their lives are documented. From this perspective image-based social media encouraged new forms of communication based on a visual and social aspect of the square.

Research on Instagram and image-based social media used to be limited to works like McNely's (2012) on Instagram and organizational power, Hochman and Schwartz's (2012) attempt to visualize cultural activity through publicly shared images, and Gómez Cruz and Meyer's (2012) piece on Instagram and the progression of photography. This has only recently changed with the recent publication of several articles and books about image-based social platforms and practices, which introduce multiple directions. These range from business studies (Abidin, 2014), art and photography (Berry, 2014; Halpern & Humphreys, 2014, p. 201220; Keep, 2014a, 2014b) to several approaches to social sciences where the focus is expressing oneself, making connections, and understanding time (Garde-Hansen, 2014; Kalin, 2013; Villi, 2014).

The fluid nature of the practice of iPhoneography allows photographs captured on a smartphone to perform beyond the act of photography. While the term "visual communication" has been considered an alternative term for graphic design, if we consider the primitive nature of the term, it is in reality inclusive of several forms of visual production. In their *History of Graphic Design*, Meggs and Purvis (2006) reflect on examples identical to those in Janson and Janson's (2004) *History of Art: The Western Tradition*. Both books reflect on cave paintings, ancient script, and the progression of decorative Bibles, printmaking, and graphic art. There have been several historical overlaps between the two disciplines of art and design, and it might be beneficial to examine current forms of digital imaging simply as visual communication that encompasses both art and design.

There are several popular image-based platforms that promote visual communication and depending on their ease or difficulty of use welcome image-makers with varying expertise. Platforms like Flickr, which was initially designed for sharing professional images, and others like YouTube, which has evolved to allow the editing and enhancing of videos online, do not offer immediacy and image specificity. It is platforms like Hipstamatic, Snapchat, Phhhhoto,

and Instagram that have encouraged the creation and enhancement of images through the use of one smartphone device.

Instagram, which has swiftly grown in popularity in its short life span of five years, is valuable as a tool for examining current popular forms of digital imaging and visual communication and specifically iPhoneography. The success of Instagram is driven by its ability to enhance social experiences while maintaining strong and identifiable visual characteristics. In addition to squared images, Instagram introduced filters that simulate "vintage and nostalgic" aesthetics. Several applications emerged to complement Instagram and work with it by allowing photo manipulation, overlaying graphics and text, and/or cropping images into squares.

Instagram, which started as a platform for documenting daily life as it happened, is now allowing Instagrammers, both as individuals or corporations, to publicly and instantly share images shot and processed on mobile phones. This snap, edit, and share phenomenon that takes place on Instagram, among other image-based smartphone applications, has interested several authors, such as Favero (2014), Gómez Cruz (2012), Gómez Cruz and Meyer (2012), Gye (2007), Halpern and Humphreys (2014), and Hochman and Schwartz (2012), for its ability to transform our personal experience with images.

As Kelly (2014) mentioned, Instagram can also highlight the context of an image by presenting it in a feed that shows what was posted before and after in an individual's feed, while allowing room for the textual part of the post to stand out as well. A number of posts with on a common #hashtag can be viewed next to each other as a group. Hence, Instagram has become a rich source of information in relation to current visual communication through image-based platforms (Kelly, 2014).

Instagram has distinguished itself by being the first popular application that reflects a defined visual aesthetic. With its frame that crops every image into a square, producing visual uniformity, it also offers filters that simulate the works of older cameras, like the Polaroid. With a quick survey of images posted on Instagram, one can see the repetition of several visual themes: filter-enhanced images are reminiscent of the past, poetry and quotes are added to images using image-editing applications, and several images on Instagram use a bird's-eye view angle where objects are shot from above. Instagram provides its users with a range of creative decisions, yet its basic visual qualities—the squared filtered image—makes Instagram recognizable.

The power of one device and the rise of the amateur

The wide use of iPhoneography has raised several concerns about images and image-makers today. Scholars are concerned with how this practice is altering the meaning of photography, encouraging more amateurs to contribute to image making, competing with conventional advertising and graphic design, and overexposing human behaviour, among other phenomena. However, the focus here is not on the discontent of experts with the growing number of amateurs, the approval of anthropologists of practices that better reflect

humans in their "natural habitat," or the enthusiasm of marketers in what is known as WOM (word of mouth advertising). It is on the idea that exposure to visual communication in the form of viewing images and making images is a valuable human activity. The use of image-based social platforms places creative agency in the hands of the public. Since practice is an important aspect of learning, then participation on such platforms could possibly establish a new form of visual communication based on the immediacy of expression and new aesthetic values.

The creation of a digital image takes place on a smartphone through a process that differs from professional manual and computer-based practices. It relies on a smartphone device to capture photos, edit and enhance them, and then share the produced images on image-based social platforms. This process will be referred to here as *snap, edit and share* and is derived from image-based research since the birth of camera phones (Favero, 2014; Gye, 2007; Keep, 2014a, 2014b). Snap, edit and share is the core of iPhoneography and is performed through making creative decisions on one smartphone device. An important aspect of being an active member on image-based social media is the process of capturing an image and then transforming it through image-based applications before sharing it publicly.

Snap is the creation of snapshots using a smartphone's camera; edit is selecting, deleting, enhancing, and altering images; and sharing takes place when images are shared through image-based platforms and creates a form of social interaction. Driven by the popularity of the iPhone, among other smartphones, this practice represents the ability of one device to deliver digital images that become part of image-based social media (Gómez Cruz & Meyer, 2012; Gye, 2007; Keep, 2014b).

The amateur image-makers of today seem to be driven by digital and portable technology. However, we forget that amateur practices seen today echo those seen in the early days of cheaper analogue cameras like the Kodak Brownie. The amateur culture was based on two things that still exist today: the notion of sharing and the use of everyday life as a topic (Pink 2011). Bourdieu (1965) reports that amateur photographers in the 1950s participated in photography clubs and group exhibitions because they enjoyed sharing their work. He also states that personal topics found acceptance in the amateur community. Therefore, we ask what is different today between amateur image-makers and amateur culture.

The answer is connectivity. This feature has allowed amateurs to be more involved in generating media—at times overpowering mass media (Larsen & Sandbye, 2014b). Accessible technology allows image-makers to be connected with the world and with each other. With the emergence of Web 2.0, which is based on participation and connectivity, today is seen as the true age of the amateur (Larsen & Sandbye, 2014b), and images shared on image-based platforms have come to have a highly social and technical nature. Keep (2014b) refers to this trend as techno-social, while Gómez Cruz (2013), Gómez Cruz and Meyer (2012), and Kalin (2013) refer to it as sociotechnical.

This sociotechnical aspect is based on the notion of using images to create, document, and build relationships while relying on technology to produce these images. Gye (2007) and Van House, Davis, Ames, Finn, and Viswanathan (2005) write about the reasons behind the massive use of mobile phone cameras as social tools. Van House et al. (2007) report that camera phones enhance current "imaging practices" and are used as vehicles for communication. They conclude that the goals behind the use of camera phones are self-expression, preserving memory, and sustaining relationships. To Gye (2007), these goals are not very far off. People used camera phones to construct personal and group memory, to maintain social relationships, and as a means of self-expression (Gye, 2007).

Surprisingly, several years earlier, Bourdieu talked about similar goals behind the use of affordable cameras by the masses. In his book *Photography: Middle Brow-Art* (1965), he discusses how amateurs worked with photography to communicate. He writes that people used cameras to preserve memory, to communicate feelings with others through sharing memories, to re-experience memories, to document personal achievements, and to escape the world.

Average users who use image-based social media for non-commercial or creative reasons are what Hjorth and Sharp (2014) call the "producing users"; they are individuals who use image-based platforms to document and communicate their daily lives. The mundane aspects of life are now a hot topic in mobile media research because many personal images are produced to reflect daily practices (Garde-Hansen, 2014; Kalin, 2013; Keep, 2014a, 2014b). Discussions about documenting everyday life can be traced back to the earlier use of cameras by amateur photographers described in the work of the French sociologist Pierre Bourdieu in the 60s, when he investigated how the middle class used photographic practices to document personal memories (Bourdieu, 1965).

Bourdieu's work also addresses the reasons behind capturing images. He identifies five: to preserve memories; to communicate with others and express feelings; to relive memories and therefore realize oneself; to document personal achievements; and to escape the world. The motives behind making images have not changed, as "producing users" today might not have creative intentions but do make images to document their lives, express themselves, and communicate with others (Gye, 2007; Van House et al., 2005).

There is a distinguishable difference between analogue photography and new imaging practices in that the first is based on not knowing how images would turn out until they were developed. In contrast, new forms of image making can happen in real time. They can also become moments that disappear from memory after being viewed—literally in the case of Snapchat, a smartphone application from which images disappear after being viewed, and metaphorically when images are posted on social media and hardly viewed again. An abundance of images are shared and saved on private devices, such as camera phones, smartphones, computers, tablets, and public platforms such as Flickr and Instagram; they are rarely revisited (Larsen & Sandbye, 2014a).

What is also different today is that mobile phone cameras are portable, available when needed, capable of processing and editing still and moving images, and connected to the Internet (Favero, 2014; Gómez Cruz, 2012; Gómez Cruz & Meyer, 2012; Gye, 2007; Halpern & Humphreys, 2014; Hochman & Schwartz, 2012). Instagram is not the sole factor in enhancing the social experience of sharing images. Mobile phones can take much of the credit for facilitating current visual communication outside of conventional media. In their book titled *Digital Snaps: The New Face of Photography,* Larsen and Sandbye (2014) confirmed what other authors (Garde-Hansen, 2014; Kalin, 2013; Keep, 2014a, 2014b) have stated: the personal photo album, which was once private, has become a public window to the personal lives of individuals with the help of mobile phone devices. New image-making practices produce snapshots: artefacts that visually communicate new personal practices (Larsen & Sandbye, 2014a).

This phenomenon is what Dean Keen refers to as "liquid aesthetics" (2014a, 2014b). The mobile quality of camera phones allows images to be created whenever desired. They also, in the beginning, defied high quality since camera phones captured pixilation, soft focus, and altered saturation. These social and visual qualities presented by early camera phones are still present regardless of technological advancements in mobile cameras; while the camera improves, applications that stimulate older analogue and digital photos—like Instagram—continue to be widespread.

Some believe that the untrained masses lack an understanding of aesthetics and that amateur practices are of lower quality. While it is true that amateur image-makers thrive because they feel less criticized and judged as individuals (Bourdieu, 1965, p. 6), we must keep in mind that humans naturally cannot be excluded from the "Universe of aesthetics" (Bourdieu, 1965, p. 7). As Bourdieu (1965) notes, amateur photographers were recognized as an organized group that understood its norms and trends.

The social aesthetics of images today are based on the connections that users of image-based social platforms make among themselves and with various images and activities. Digital images shared today on image-based social platforms are therefore complex artefacts of both social and visual aesthetic value.

Concluding thoughts: what does image-based social media tell us about visual communication?

The square from the perspective of image-based social media has become a geometric shape that signifies defined visual aesthetics like nostalgic imagery while also functioning as a place where humans and the mundane of their lives meet – just as they would in a town's square. Embracing the two definitions of the square—the recognized aesthetic based on the visual nature of the square and the social experience based on connectivity—it is important to further examine iPhoneographic practices that take place on Instagram and enhance the visual and social communication of everyday users and amateur image-makers. It is important to keep in mind that iPhoneography is not photography but an image-making

practice rooted in visual communication and involves shooting, editing, and sharing visual artefacts on image-based platforms (Gómez Cruz, 2012; Gómez Cruz & Meyer, 2012; Halpern & Humphreys, 2014; Keep, 2014a, 2014b). While several authors have written about such practices but referred to them as mobile photography and imaging (Gómez Cruz & Meyer, 2012; Gye, 2007; Halpern & Humphreys, 2014), this paper bridges the gap by examining them all as iPhoneography.

Hjorth and Sharp (2014) present three possible categories to examine image-based social platforms: the relationship of iPhoneography to cultural politics, the common language of image-based social media, and the mundane aspects of image-based social media (Hjorth & Sharp, 2014). Yet, what is not mentioned is the need to investigate iPhoneography in relation to visual communication. The increase in image-making practices in the last few years has made it possible for images to be a new form of "oral culture" with their ability to preserve memories (Burnett, 2004, p.13). Visuals should also be seen as valuable data that can be analysed just as, in the past, gestaltian aesthetics relied on images to understand a phenomenon (Koenderink, 2015). iPhoneography as creative practice, provides various opportunities for investigating and re-evaluating the definition and role of visual communication.

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About the Authors:

Eman Alshawaf is interested in examining contemporary forms of digital image making. She has an M.F.A in Digital Arts and Imaging from Pratt Institute and is now a PhD candidate in the Department of Design, Housing and Apparel at the University of Minnesota.

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A Creative Ontological Analysis of Collective Imagery during Co-Design for Service Innovation

Priscilla Chueng-Nainby*, John Lee, BingXin Zi and Astury Gardin

University of Edinburgh
*p.chuengnainby@ed.ac.uk
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Abstract: This paper describes an ontological attempt in the understanding of co-design activity in the wild within the context of service innovation. The research has an aim to analyse the transformation of ideas during co-design by examining informal data from a workshop that inspired villagers in Turkey to innovate collaboratively. Contrary to the often process-oriented analysis of co-design activity, the workshop facilitates designing by envisioning and enacting participants' collective imagery in physical forms in an iterative cycle of deconstruction, construction and reconstruction. We report an understanding of the ontology established to describe and analyse the informal data collected from the physical forms of collective imagery. A machine learning approach is used to underpin assumptions made in the understanding of the activity based on the ontology. The analysis suggests the frequency and relevancy of ideas significantly influenced the possibility that an idea will become part of a design solution. An evaluation of the machine learning analysis delivers insights into the understanding of data collected during co-design in the wild.

Keywords: Co-Design, Design Ontology, Service innovation, Machine Learning.

Co-Design with Communities

Design researchers often face challenges when directly engaging communities to collaboratively innovate for positive societal transformation. This is especially marked in large scale design problems such as policy-making and urban planning (Fuad-Luke 2013; Manzini 2013), since these design problems are often undefined and not immediately evidential. The difficulty lies in devising creative tools that can facilitate communities to consolidate individual mind sets by visualising and enacting these cross-disciplinary and cross-cultural social problems, values and economics. Crucially, design for social problems is different from the conventional design process. It presents a paradoxical wicked problem where "we cannot think about solutions until we understand the problem" and "we cannot

understand a problem until we think about solutions" (Wendt 2015). While Kees Dorst (2001) identified this as the co-evolution of problem and solution, service innovation has gained its popularity as a system-oriented design methodology able to bring rich contextual understanding of wicked and complex design problems to a holistic solution (Sangiorgi 2009). Seeing village regeneration as a service for the rural communities allows the research to inspire design goals addressing sustainability in elevating poverty, in addition to the more conventional goals of simply fulfilling users' functional needs.

The intersection of service innovation and co-design potentially offers most potential in understanding the complex structure of design space where everybody can design (Manzini and Coad 2015). Both branches of design research have respectively called for research communities to establish a framework for co-design tools and processes that is possible to be evaluated for its impact as future research direction (Meroni and Sangiorgi 2012; Sanders, Brandt and Binder 2010). These views inform this study, which concerns practice-based research on a co-design framework to guide the design of tools and processes to facilitate service innovation directly with any communities.

Co-Design with Collective Imagery

Co-Design, with communities of diverse cultures and cognitive styles and creative processes implicates further thought on the epistemological issues in the practice of design and an understanding of creativity (Chueng-Nainby 2010). When dealing with multiple representations of the complex activity of co-design with communities, the notion of ontology, in the context of computing and philosophy, can be a useful conceptual model to offer a new paradigm in our understanding of design and creativity. Contrary to lab-based experimentation, the study of the ontology of co-design requires a practice-led approach to visualise, construct and analyse the shared design space in order to find patterns as evidence for a structure. To do so, we have designed and experimented with co-design tools and processes adopting the "collective imagery" framework to enact and envision with community engagements through an embodied analogic installation of creative space in a complex network form, externalised using physical material (Figure 1).

Collective imagery framework

The collective imagery framework draws inspirations from the notions of creative imagery (Finke 1996), autopoeisis (Maturana and Varela 1980) and the embodied mind (Varela, Rosh and Thompson 1992). It has evolved from practice-based research; which extends the notion of creative imagery to collaborative settings. The framework has been employed to investigate various cross-disciplinary products, systems, and service designs for healthcare, tourism and rural development in both the private and public sector (Chueng-Nainby 2014; Chueng-Nainby, Fassi and Xiao 2014; Chueng-Nainby and Gong 2013; Chueng-Nainby, Lin and Hu 2015; Mulder-Nijkamp and Chueng-Nainby 2015; Preez, et al 2015).

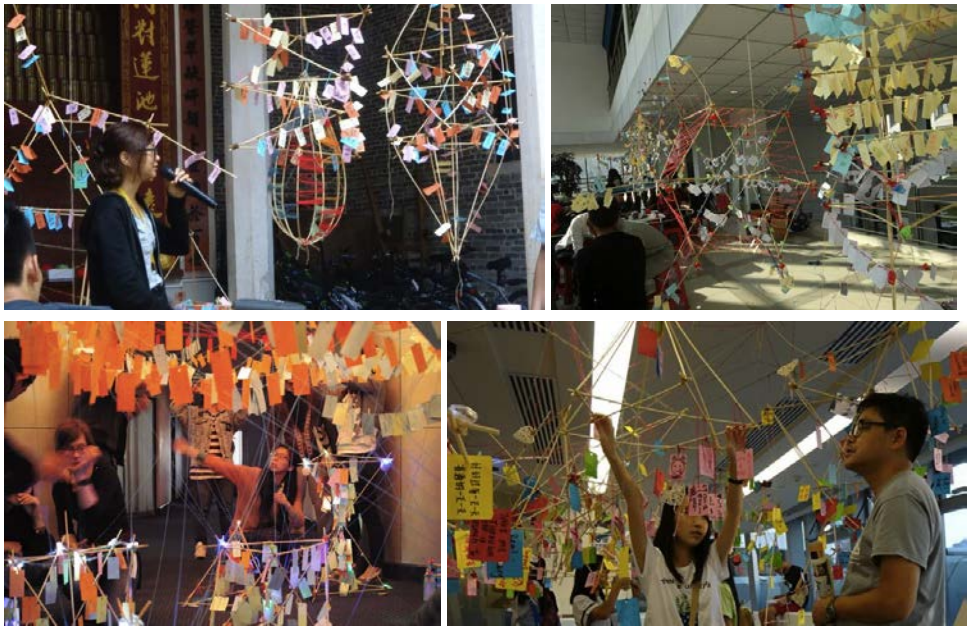

Figure 1 Various installations of Collective Imagery Weave

Finke's (1995) Geneplore model highlighted pre-inventive structures of creative imagery, and takes advantage of the structural connectedness of ideas for the emergence and restructuring of creative concepts. With this, co-design works through the externalization and sharing of individual creative imagery, to achieve collective creativity. It is a conceptual structure of design elements that mediates communities' shared design space, in which connections of ideas are made possible through the spatial and narrative activities of deconstruction, construction and reconstruction. Conceptual structuring begins with connections of two elements (facts or possibilities, however partial), which are also connected into facets to form a coherent structure. This system, if orientated to a design context, offers a conceptual structure of a design solution. Two types of structures have been investigated: 1) a system of connections which gives rise to clusters as concepts; and 2) a conceptual structure constructed from narratives connected into stories of design concepts. A story is a system (sequential or not) of interconnected narratives, seen as an abductive way of linking elements. Two tools are generally implemented as interventions: 1) a *collective imagery weave,* which is a physical form of collective imagery, and 2) *drama improvisation*, which is an experiential form of collective imagery.

The Research: An Ontological Analysis of Collective Imagery

This research aims to explore the conceptual structure of collective Imagery during co-design, in particular how ideas are constructed into design in a collective setting. The ideas raised during the activity imply particular concepts relating to the design problem, the nature of possible solutions and contextual issues. To do so, we investigate the abstract relational structure implied by these concepts, commonly known in informational sciences and Informatics as the *ontology* implied by the concepts. Ontology, also the philosophical

concept of "what there is", is an attempt to capture the basic types of objects, properties and relationships assumed to exist in some domain. We are seeking a way to identify ontological structure by analysing the construct of collective imagery from the practice of co-design. We see ontology as an artefact (the analogic installation) that can be created by communities to co-construct their collective imagery. As the data collected are often vast for manual analysis, this paper reports our first study that uses machine learning to analyse the often informal and thick data collected from the insights-driven analogic installation. Any understanding of the structure could inform the design of distributed networks of products and services that can empower communities to co-design data-driven informed solution.

Case Study: Village Regeneration at Gokceada Island

Figure 2 Collective imagery activities. First row from left to right: Day-1 session 1, 2, 3 and 4. Second row from left to right: Day-3 session 1, 2, 3 and 4 (Table 1)

This study took place at Eselek village on Gokceada Island in Turkey. It forms one of the four design workshops (Food, Craft, Architecture, Service) held as the 2015 ten days Regeneration event organised by Istanbul Institute of Design. Ten tutors and students collaborated with local communities and authorities to identify design solutions to be realised as future business opportunities to elevate poverty. Out of the ten days event, co-design sessions ran effectively for five days. The workshop was carried out with the aim to support a self-producing creative activity that forms an autopoietic system, where elements emerge from within the system itself (Iba 2010). Hence it was run without any prescribed plan or targets, apart from a goal to construct an analogic installation of collective imagery facilitated by tools which allow easy iteration if necessary.

With guidance from tutors within the collective imagery framework, participants went through deconstruction, construction, and reconstruction stages with the help of co-design tools such as tags, sticks, threads, coloured paper, photo printers and boards (Figure 2). Table 1 summarises the workshop activities and Figure 2 shows visuals of the activities.

During the first two days, tutors invited local villagers and authorities to collaborate in exploring the ideas of service through thinking of any element which led to the three big themes of the service area they wanted to work on: these were “organic farming”, “accommodation”, and “social-interaction space”. From the third day, the workshops were spent reconstructing solutions collaboratively with the help of collective imagery tools, boards, and drama.

Table 1 Workshop activities

Day	Session	Co-Design Tool	Topic
1	1	Fieldwork and discussion	Tour the village to interview locals
	2	Imagery tags	Generate elements related to the village
	3	Narrative Sticks	Making narratives from generated elements
	4	Collective weave	Construct conceptual structure from narrative sticks
2	1	Interview with tags	Understanding context with locals
	2	Imagery tags	Generate the elements contributed to the challenges
	3	Collective weave	Reconstruct possible solution from session 2
3	1	Imagery tags	Reconstruct the ideas of service from Day 2
	2	Presentation / tags collective	Seeking new ideas from session 1
	3	Skit improvisation	Understanding new ideas from session 2
	4	Group skit improvisation	Finding gaps between ideas from session 3
4	1	Imagery tags	Reconstruct element from Day-3
	2	Collective imagery board	Reconstruct idea collaboratively with locals
	3	Personal design tools	Realising the suitable ideas from session 2 results
5	1	Personal design tools	Reconstruct concepts from Day-4

Predicting momentary elements during co-design

We seek to analyse the constructs (elements) of the co-design outcomes and characterise their structure and relationships. Luhmann (1986, p.172-192) argued that the element in an autopoietic system is momentary, and will vanish once realised and replaced by a successive element. A good account of the co-design system will “predict” which of the elements that are present in the early stages of the process will survive. In doing this, it will capture something about the nature and relations of those elements that are seen to be part of a potential solution to the design problem(s). To do so, we adopt the fourfold design output model by Salvatore and Gerald (1995) to depict the constructive nature of the co-design activity: “*construct*, *model*, *method* and *instantiation”*. We first describe constructs (elements) and later create models to express and connect the elements. The models in this paper also appeal to tools and technologies, in the form of elements, which could help in

solving problems; or in the form of narratives. The method is the algorithm used to solve the problem, based on predefined constructs. Methods can be generated from and be bound to particular domains (spaces of constructs and relative models). On the other hand, the desire to use particular kinds of methods will influence the constructing and modelling. The last output (instantiation) is the realization of methods in a designed environment. Each instantiation provides a working artefact that operationalizes constructs, models, and methods; as well as demonstrates their feasibilities and effectiveness.

In the first (deconstruction) stage of the workshop, the tags are derived, which are regarded as the fundamental elements of the creative space: the *constructs*. In the second (reconstruction) stage, the narrative process develops relationships and connections between the initial constructs, resulting in a *model*. The *method* emerges in the co-creation of more integrated stories from the diverse narratives in the third (construction) stage. For present purposes, we do not consider the final *instantiation* of the creative outcome.

Analysing the Informatics

Figure 3 shows the analogic installation of three design themes. Each tag represents the element, each stick is a narrative, and each structure is a model. We capture photos of each tag as the element (construct) and apply machine learning techniques to develop the predictions of their survival. The constructs are characterised through higher-level "features" that they share in virtue of their relationships to each other and the workshop process in which they appear. There are two iterations (*generations*, as identified above) of the workshop process before the design result is produced; there are 17 features altogether. Abbreviation CS1 will be used for Construct Size of Generation 1, CS2 for Generation 2, etc.

Figure 3 Physical models of three emerged design themes

Digitising the features

To make the data available for computer analysis, we apply the machine learning software Weka (Hall, et al 2009) to analyse the features in Table 2. Most features are given a numeric value; a few features, such as "showing up in the result", will be given a Boolean value. In the case of this workshop, the informal data existed in multiple forms. Clearly, there is no objective way to interpret the data because different people have different concept hierarchies and cognitive styles. Even though "Co-design" could minimize the influence of different concept hierarchies and cognitive styles by combining ideas together, the existing

forms of these ideas are still informal. Therefore, interpretation for each idea is needed. The way of interpreting the informal data should respect the situation where the data will be used. Much as Wand and Weber create ontologies and build models based on ontologies to describe the features of information systems independent of the system uses and technologies (Wand and Weber 1998, 1990), an appropriate ontology should be created to interpret the informal data emerging from this workshop. We require to categorise the raw, informal data. Before creating the ontology, we need to figure out what kinds of data we are facing and what is the goal of expressing the data.

Table 2 Features of the constructs

Features	Descriptions
Construct Size (CS).	The size of weaving story construct
Frequency in Generation (FG)	Frequency of elements in one generation
Narratives Counts (NC)	The numbers of narratives in which the elements have shown up
Max Frequency (MaxF).	The max frequency that the elements showed up in one narrative
Average Frequency (AF)	The average frequency that the elements showed up in one narrative
Max Neighbour (MaxN).	The max neighbour numbers of an element in one narrative
Min Neighbour (MinN).	The min neighbour numbers of an element in one narrative
Average Neighbour (AN).	The average neighbour numbers of an element in one narrative
Frequency in Result (FS).	The frequency of elements that showed up in the design result

Unifying informal wild data/elements

We are given the elements emerging from a creative space. Since this is a co-design workshop, multiple participants with different backgrounds contributed to the common creative space, with their own understandings of the design tasks, and different habits of language use. We need to find a way to unify the differences, if they are talking about the same idea but in different forms. One prefers to use accurate words in tags; another prefers to use fuzzy ideas, while another uses drawing instead of writing. Non-linguistic elements are an unusual variation that needs to be unified. In some sessions, some participants used drawings to represent their ideas and designs. Luckily, drawings are always accompanied by other elements. So we can express drawing with respect to the neighbour elements. Generally, we should respect context within the narratives and consider the basic village facts when unifying the wild elements. The unified elements will be called an *instance*.

The first problem is unifying their wordings. For instance, someone presents an element “Hostel” and another says “Hotel”. What should we do with this case if the design result suggests “need more villas for tourists”? Which element survived the process and finally contributed to the result? In fact, we know that there is no hotel or hostel in this village, and so we can more simply assume that “Hotel” and “Hostel” are both talking about “Accommodation”, even though neither of these two elements uses the exact word. We unify the ideas according to the topic they are discussing. Therefore, “Hotel Service” is a

suitable word to replace “Hotel”, “Hostel”, “Mansion” and other ideas talking about the hotel industry or similar accommodation. A further simplification arises from neglecting adjectives.

Data Processing

The ontology produced above is just unifying the raw data. If the data did not make sense in the first place, the ontology cannot handle it. In machine learning, one needs also to filter isolated instances such as outliers, to reduce noise and raise the accuracy.

Table 3 Instances and Elements

Activities				
Activities	Bicycle road	Bicycle	Camping place	Climbing
Enjoy sunshine	Fun activity	Fun activity	Watching sunset	Hot air balloon
Hot air balloon	Hot air balloon	Mount climbing	Rent a bike	Riding bike
Tours	Sightseeing	Tent	Hiking	
Advertisement				
Advertisement	TV program	Popular village	Paper	Advertisement
Animal				
Water	Live stock	Cat	Sheep	Sheep farming behind the road
Undersea fish	Animals	Cow	Goats	Negative effects of animals
No goats in village	No sheep in village			
Beach Activities				
Boating	Kite surfing	Kite board	Beach sun umbrella	Caravan and tent area
Camp area on beach	Toilet plus water for caravans	Beach activities	Beach and touch	Diving
Kite Surf	Kite surfing tourism	Kite	Beach BBQ	Beach sun day
Surf	Sunset on beach	Surfing skate	Beach activities (Swimming)	Tide surf
Wind surf	Tents area			

Table 4 A Sample of frequency statistic for the accommodation theme

Elements	CS1	FG1	NC1	MaxF1	AF1	MaxN1	MinN1	AN1
Bazar	7	2	2	1	1	9	5	7
Garbage Collecting	7	1	1	1	1	9	9	9
Social Space	7	7	4	3	1.75	9	5	7
Village Identity	7	7	4	3	1.75	11	5	8.25
Hotel service	7	5	3	3	1.667	11	3	7.667
Countryside Tourism	7	5	4	2	1.25	11	6	8.5

Nature environment	7	2	2	1	1	6	8	7
Tourism service	7	4	3	2	1.333	11	6	8.667
Tourists	7	2	2	1	1	11	9	10
Landscape	7	2	1	2	2	9	9	9
Transportation	7	2	2	1	1	9	6	7.5
Activities	7	3	1	3	3	9	9	9
Environment protecting	7	2	2	1	1	5	3	4
Animal	7	2	2	1	1	11	3	7
Weather and climate	7	2	2	1	1	11	5	8
Crafts	7	1	1	1	1	5	5	5
Organic food	7	2	2	2	1	11	8	9.5
Beach activities	7	1	1	1	1	8	8	8
Alienation	7	1	1	1	1	8	8	8
Web service	0	0	0	0	0	0	0	0
Certificate	0	0	0	0	0	0	0	0
Government policy and plan	0	0	0	0	0	0	0	0
Relax	0	0	0	0	0	0	0	0
Location	0	0	0	0	0	0	0	0
Military elements	0	0	0	0	0	0	0	0
Migration	0	0	0	0	0	0	0	0
Incomes	0	0	0	0	0	0	0	0
Farming technology	0	0	0	0	0	0	0	0

As a sample of the data, Table 3 shows the unified instance and the original raw elements, which are assigned to the instance. Repeated elements have been removed. But some raw elements show up more than once because they may overlap with more than one instance. The assigning of raw data is based on a judgment of its context meaning. Some participants contributed elements in Turkish. Table 4 shows a sample of frequency statistics for features as analysed for the accommodation theme. 28 elements emerged in the process of the workshop. Even though previous assigning work has unified the raw elements, some elements are still confusing. So, creating a second data set for a comparison test, the elements “alienation”, “relax”, “incomes”, “farming technology” were deleted. “Alienation” and “relax” were singular points, hard to assign to any particular topic, while “incomes” and “farming technology” were deleted because these two elements never showed up in the first two generations of the accommodation theme but just came out in the design result. This might be because participants from other themes influenced the participant, because these two elements do appear in other theme groups. *We can make a general assumption that elements that are hard to unify could reduce the performance of regression prediction.*

In the theme of organic farming, instances “dream”, “potential” and “farming workshop” were deleted. In the theme of social interactive space, instances “happy”, “heaven”, “lonely”, “all”, “sand”, “singularity”, “sustainable tourism scenario” were deleted. It was not because these instances were confusing or did not make sense, but because these instances just showed up once in the overall process of the weaving. *We can therefore make an assumption that isolated instances would reduce the performance of regression prediction.* The original dataset will be labelled as dataset 1 while the dataset with instance deletion will be labelled as dataset 2.

Experiments

Table 5 M5 Method Regression Formula for the Accommodation Theme

Linear Regression Model on dataset 1:	Linear Regression Model on dataset 2:
Frequency in result = *0.4698 * Narratives Counts Generation 1 +* *-0.188 * Max Neighbour Generation 1 +* *0.9126 * Frequency in Generation 2 +* *1.1377 * Narratives Counts Generation 2 +* *-1.3745 * Max Frequency in One Narrative Generation 2 +* *0.9742 * Average Frequency Overall Narratives Generation 2 +* *-0.4757 * Max Neighbour Generation 2 +* *0.1984 * Min Neighbour Generation 2 +* *0.7672*	*Frequency in result =* *-1.0052 * Frequency in Generation 1+* *1.5279 * Narratives Counts Generation 1 +* *1.4371 * Max Frequency in One Narrative Generation 1 +* *-0.2582 * Max Neighbour Generation 1 +* *1.4263 * Narratives Counts Generation 2 +* *-0.8562*
Linear Regression Model (Greedy method) on dataset 1:	Linear Regression Model (Greedy method) on dataset 2:
Frequency in result = *1.1376 * Frequency in Generation 2 +* *-1.0512 * Max Frequency in One Narrative Generation 2 +* *0.1674*	*Frequency in result =* *1.1444 * Frequency in Generation 2 +* *-1.0232 * Max Frequency in One Narrative Generation 2 +* *0.0603*

In machine Learning, different research goals use different models. For the purpose of figuring out which features are more related to the probability of an element surviving in the workshop process, the typical regression approach aims to produce a prediction number by evaluating a formula about the relationship between features and result. The relationship strength represents how much this feature relates to the result. A weight parameter applying to the features represents this strength. The weight is what we are looking for, where the higher the weight the more significant the feature. Table 5 shows the linear regression formula solved by Weka, and some relevance parameters, for the Accommodation theme.

There are two methods for solving the formula. The *M5* method will delete the feature with the lowest coefficient then run a new iteration. If the deletion leads to a rise of the Akaike Information Criterion (AIC) – a criterion for comparing different models with lowest loss of information – the system will delete the next feature with the lowest coefficient then start a new iteration until the AIC does not rise. The *Greedy* method does not select the lowest coefficient feature. Instead, it randomly selects a feature and checks whether removing it can raise the AIC. This method repeats until no more features will be deleted.

Discussion

The correlation coefficient (CC) is a measure of how related two variables are. It ranges from -1 to 1 where 1 means 100% positive correlation, -1 means 100% negative correlation and 0 means totally uncorrelated. Mean absolute error (MAE) is the mean of overall *absolute* errors between predicted data and raw data. Root mean squared error (RMSE) is similar to MAE. Relative absolute error (RAE) and Root relative squared error (RASE) are *relative* error between predicted data and raw data. In general, small errors imply a better performance of linear regression formula.

Comparison between dataset 1 and dataset2

In Table 6 we can see that before deleting the elements “alienation”, “relax”, “incomes” and “farming technology”, the 0.1058 and 0.0999 CC indicated that the given predicted formulas performed badly. After deleting those four confusing elements, the CC rose to 0.6351 and 0.6718 respectively. Also, the error parameters MAE, RMSE, RAE and RASE were decreased about 30%. The raising of CC and decrease of errors confirmed that these hard-to-assign elements could have a huge influence on the performance of regression prediction. It also implies that the capacity of unifying ontology affects the performance of the regression formula.

In the theme of Organic farming, we deleted the instances “dream”, “potential”, “farming workshop” because these instances just showed once in the process of weaving and did not show up in the final result. From the experiment statistics we found that, after deleting, the CC went down from 0.5465 (M5) and 0.5606 (Greedy) to 0.4582 and 0.4926 respectively. But error parameters were all raised. Moreover, the deletion of theme social interact space also brought down the CC from 0.273 (M5) and 0.2684 (Greedy) to 0.1993 (M5) and 0.1695 (Greedy) respectively. So the assumption was wrong. Actually these isolated instances did not reduce the performance. On the contrary, regression prediction accuracy increased when taking these isolated instances into account, because the machine can learn that these kinds of isolated instances will not survive in the process.

Table 6 Relevance Parameters

Regressions	Correlation coefficient	Mean absolute error	Root mean squared error
Linear Regression Model (M5 method) on dataset 1	0.1058	1.2167	1.7782
Linear Regression Model (Greedy method) on dataset 1	0.0999	1.1516	1.7536
Linear Regression Model (M5 method) on dataset 2	0.6351	0.902	1.3679
Linear Regression Model (Greedy method) on dataset 2	0.6718	0.8413	1.3089
	Relative absolute error	Root relative squared error	Total Number of Instances
Linear Regression Model (M5 method) on dataset 1	108.09%	104.80%	28
Linear Regression Model (Greedy method) on dataset 1	102.30%	103.35%	28
Linear Regression Model (M5 method) on dataset 2	74.02%	76.08%	24
Linear Regression Model (Greedy method) on dataset 2	69.04%	72.79%	24

Comparison between Individual themes and mixed group

The experiment that combined three themes together achieved the best performance with 0.7694(M5) and 0.7522(Greedy) CC. Why will involving three themes together raise the performance? We know that the dataset of three themes did not change; it just accumulated. This accumulation meant that some surviving efforts were enhanced. For instance, “bazaar” and “village identity” showed up in both theme accommodation and theme organic farming. These two instances survived in the organic farming weaving but not in the accommodation weaving. Since we evolved three themes together, the case that “bazaar” and “village identity” had been abandoned no longer existed, and the related influence of this case was erased. The collective imagery framework (Chueng-Nainby and Gong 2013) suggested that this is knowledge dissemination within the creative space. The knowledge sharing within the creative space played a role in confirming that uncertain elements will or will not survive in the weave construction process.

Discussion on Co-design process

In the two predicting formulas of the combined group, both methods showed the feature “Max Frequency in One Narrative of Generation 1” to play the most significant role in helping elements to survive the process. Why? These features demonstrated the maximum frequency of the same instances in one single narrative. In the workshop process, a single participant in the second step contributes each narrative. Each participant selects raw elements from the creative space to build his/her narratives. The repeated use of the same

elements in one single narrative could help narrow down the topic. For example, there are two unified narratives from the workshop. The first one contains elements: *Nature environment, Farming tourism, Activities, Nature environment, Organic food, Organic food, Organic food, Weather and climate, Organic food, Nature environment and Farming tourism.*

It is easy to interpret that this narrative was suggesting how the environment in the countryside provides the opportunity of organizing farming tourism, doing activities and gathering organic foods. Also organic food is a "selling point" for farming tourism. While the second narrative contains: *Beach activities, Weather and climate, Organic food, Tourism service, Countryside tourism, Nature environment, Nature environment, Dream, Tourism service and garbage collecting, Countryside tourism.*

Was this narrative talking about tourism or organic food? Clearly this narrative covered multiple fields. So it is hard to identify the key of this narrative. One can image that there will be less possibility that a designer learns from one narrative, if that narrative cannot express its meaning effectively. Therefore, the designer will not add the elements from that narrative to the final design result. In contrast, repeating of elements helps in addressing the topic.

Another two valuable features are "Narrative Counts Generation 1" and "Frequency in Generation 2" with weights greater than 0.4. This means the more narratives counted in generation 1 or the greater the frequency of one element in generation 2, the higher probability that one element can survive. In the weaving process, Generation 1 was the result of the first day. Even though data from that day was scattered, the large number of narratives meant a large number of scattered ideas were selected and contributed to narratives. Each narrative represented one combination of ideas. Large numbers of narratives meant more combinations were established. More combinations obviously provided more possibility for the workshop participant to find a solution or to deepen understanding. While on day 2, participants have the group meeting before doing the weaving. Other team members and local residents have inspired them. That may have helped them to point out the problems and to get inspiration. The elements that showed up in generation 2 can be considered high confidence elements. Therefore, the greater the frequency of an element, the more confident we may be of it surviving.

Concluding Remarks

In this project, machine learning is used to understand the process of creative design. We have analysed the process from the "informatics" viewpoint of data modelling and associative theory. The Collective Imagery framework sets a platform for a creative design process. The machine learning algorithm learns from every element of the process. It suggests some features are more relevant to the action of achieving the design result. But we notice that performance is not always good in all themes.

Future improvements

The unstable performance may be due to two issues. The first is the ontology we used in unifying the raw data. Unifying the raw data is necessary to eliminate the ambiguity among different individuals and fill the gap between real world data and machine interpretable data. But unifying will directly influence the performance of machine learning. This ontology unified raw data by classifying it with respect to its context, but will produce different results for “hotel” and “hostel” depending on whether we keep these separate, unify them as (say) “hotel”, or replace them by a third term. This is an important issue in designing the ontology. Similarly, filtering the data before processing, e.g. by pruning outliers, needs to be guided by an understanding of the meaning of specific items in their context. Meaningless instances should be filtered, which modifying the unifying ontology may help.

Implications for Co-Design

This paper analysed the co-design process from the viewpoint of informatics modelling and associative connection. A particular workshop was implemented with the co-design tool “collective imagery weave”, then a suitable categorizing ontology was introduced to express the informal, raw data emerging from the weaving process. This enabled machine learning to analyse the process. Each element was considered as an instance and its features were exported for the machine to learn. The high frequency of elements in the first phase of weaving was shown to be helpful as it provides a wider view for designers, while the accuracy and relevance of elements in phase two are more significant as they could help design “locking on” the task and generating solutions.

The categorising ontology still needs significant development before this can be seen as a theory. However, the outcome so far could hold useful implications for a future research direction for evidential analysis on co-design research, which could inform the new field of human-like computing. Our immediate challenge is in formalising the data collected from the wild. We need a clearer way to examine the roles that the frequency, accuracy and relevance of ideas play in co-design activity in the wild, envisioned and enacted analogically with communities with the use of collective imagery weave.

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About the Authors:

Dr. Priscilla Chueng-Nainby is a design activist and academic focusing on co-design with communities for social innovation. She designs public engagement tools to envision and enact communities' collective intelligence to innovate for meaningful causes. Her work has been widely exhibited, see www.priscilla.me.uk.

Professor John Lee is Professor of Digital Media with cross-disciplinary research in architecture, design and informatics. Much of his research centres on various aspects of cognition, communication and uses of technology in design and learning.

Mr. BingXin Zi graduated with an MSc in Informatics (Artificial Intelligence) participated as research assistant at the Gokceada Island's Regeneration Service Design workshop in Turkey. He is current a system developer with an tech start up in China.

Miss Astury Gardin graduated with an MSc in Informatics (Cognitive Science) and participated as research assistant for the Gokceada Island's Regeneration Service Design workshop in Turkey. She was system analyst with Citibank Indonesia and currently heading a start up in Bandung.

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Post-critical potentials in experimental co-design

Sissel Olander

The Royal Danish Academy
sol@kadk.dk
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Abstract: This paper focuses on the idea of post-criticality, and hinges on a critique of critique as developed by science scholar Bruno Latour. The paper explores the post-critical as some thing or some constellation, which may exceed from experimental and collaborative co-design events. Through a recounting of a co-design experiment, the paper seeks to characterize the post-critical as a situated and collaborative experimental possibility that may take many different non-descriptive forms. Drawing on the work of Philosopher of Science Hans-Jörg Rheinberger and science scholar Nortje Marres, the paper reflects on the difference between experimental reasoning and empirical analysis. In so doing, the paper seeks to open a discussion on how experimental and collaborative design research and analytical movements like science and technology studies and actor network theory may cross-fertilize one another.

Keywords: Post-criticality; actor network theory; co-design; design experiments

Introduction

In 2004, Bruno Latour asked; what has become of critique? He called on researchers to develop modes of analyses and engagements that didn't rest on debunking or deconstruction. Through his extensive work Latour has tied broad programmatic statements about critique and post-critique (Latour, 2004, 2005, 2010) to the methodological aspects of conducting research (Latour, 1997, 2005), specifically social research, as he has questioned the status of theories and methods. The relation between the post-critical program; a plea to give objects of study the opportunity to object to what is said about them (Latour, 2005), and how this can be done in a practise of research; the methodological aspects that would allow us to realise such ideals, is what I wish to discuss in this paper. In short, I will attempt to tentatively articulate an experimental and co-designerly response to Latour's methodological instructions.

According to Latour, a critical perspective evoked by traditional social research, is a mode of analysis that imposes some order on the field beforehand, as if from the outside. But the job of the analyst, Latour argues, is not to order the world, at least not in the first instance; ordering and patterns must be located one step further into abstraction, after actors have been given the opportunity to unfold their own differing cosmos (Latour 2005, p.23). By situating the analytical ordering and pattering one step further into abstraction post-criticality becomes first and foremost a reflexive move; a move made by the researcher during the analytical process. But post-criticality, I contend, may take many other forms and may be sparked by other kinds of events. In this paper I make the case that co-design events offer a particular interesting platform for exploring what a contemporary post-critical engagement with the social could look like. It is a post-criticality that is inherently experimental, always orientated towards what could be, but first and foremost, it is collaborative in nature.

Collaborative design research and Science and technology studies

In recent years, design researchers, especially within the field of Participatory Design (PD) and co-design, have become increasingly interested in the social as a kind of design material (Akama & Ivanka 2010; Binder, Brandt, Halse, Foverskov, Olander & Yndigegn, 2011; Björgvinsson, Ehn & Hilgrenn, 2010; Di Salvo 2009; Ehn 2008; Halse, Clark, Brandt & Binder 2010; Lindström & Ståhl 2014; Manzini & Rizzo 2011; Seravalli 2012). In todays practises of co-design the objects of study are as much relations and social infrastructures as they are bounded objects and artefacts. With this shift in focus from the design of systems and workplace technologies to prototypical practises of everyday life and social innovations, design researchers interested in collaborative formats have become increasingly interested in theories, concepts, and methods that circulate in the constructivist social sciences (Binder, De Michelis, Ehn, Jacucci, Linde & Wagner 2011; DiSalvo 2012: Halse 2008; Jönsson 2014; Leenskjold 2015; Storni, 2012 & 2013; Storni, Linde, Binder & Stuedahl 2012). At the same time, in the field of science and technology studies (STS) design as object, site and process has become a potent object of research (Pedersen 2007, Danholt, 2005 & 2012, Yaneva, 2009). But although the inventiveness of methods and their role in epistemic practises (Lury & Wakeford 2012) has gained considerable attention in some parts of the social sciences, it seems design and sites of design remain primarily an object of research and study rather than a resource for developing new ways of knowing (see for example Suchman 2011). It is as if both experimental design researchers inspired by STS and actor network theory (ANT), and science scholars interested in design and design methodologies have a tendency to equal analytical work with very particular descriptive forms of accounting and mapping. It is therefore my suggestion that practise based design researchers interested in collaborative formats should become more attentive to their own epistemic practises of knowing and making, simply because different forms of knowing afford different forms of post-criticality.

Experimental design research as eventuation

One way to explore the post-critical edge of contemporary co-design is to adopt a radical event based understanding of knowledge making informed by experimental practises in other disciplines and knowledge regimes. German philosopher of science Hans-Jörg Rheinberger (1997, 2010), for example, through his studies of experimental practises in the life sciences, has characterised the difference between empirical-descriptive modes of knowing and experimental practises as follows: In the primarily descriptive and systematising sciences, emphasis is on the process where the researcher extracts the objects of study from what Rheinberger terms their "natural" ambiguity, and places them into a theoretical or conceptual order. The result could be for example a rock collection or a herbarium. Objects in such research practises become perceptible, in the first place, thanks to this recording (Rheinberger 2010 p. 233). In the experimental sciences, by contrast, focus is persistently on a series of experimental "here-nows", configured against each other. Knowing in such epistemic practises is inevitably tied to action, materiality and change. Much like in co-design events, the not yet known emerges as experimental arrangements come to overflow themselves. Any surplus thus produced is neither predetermined by theory, nor inevitably generated by the practical system of experimentation. Rather, experimentation becomes fundamentally a process of externalisation and excorporation (Latour 1990). This is central in any experimental practise, Rheinberger argues, because unless difference is distributed in time and space, it can't be rendered visible, and unless it is given form it can't be known. Evidently, the set-up of any given co-design experiment circumscribes the potentialities of post-critique. The forms and reconfigurations that emerge as a result of such events are always particular and situated. At the same time co-design processes of knowing and making, precisely because they focus on design as collaborative process of proposal making, and because they are rooted in the everyday practises of non-designers also have a quality to them of a more general kind. Post-critical engagements in co-design are not only controversial and contradictory. They work from within the mundane and routinized, and therefore often they come across as only slightly agitated versions of the everyday. To articulate this further, in the following paragraphs I will set out to recount a co-design experiment that I took part in staging, in a public library in the western part of Copenhagen. The experiment was not in any way unequivocally successful. Nor was it aesthetically or methodologically controversial. It was, in many ways, what could be called a classic co-design engagement. Yet it explored, I argue, the post-critical potentials for creating openings in everyday routines, not as big ruptures or particular ideas imposed on the field from the outside, but rather as the cautious and constant work of trying to stay in an on-going dialogue about what could be.

A set-up and constellation slowly emerges

The co-design event that I will report from was part of a research project that took an experimental co-design approach to explore new formats for collaboration between citizens and cultural institutions in the municipality of Copenhagen. The aim of the project was to

build new relations between three institutions and the citizens and local networks they are surrounded by, and through this process, to render visible new images of both citizens and institutions that could feed into the on-going debate about change in this sector. Before I turn to the event itself, I will briefly sketch out what led up to the event.

During the first few weeks of my stay at the library, I met Ina, a cultural worker, who had worked in the basement of the library, in a now in-formal drop-in centre, which hosted a group of 30 to 40 youngsters. This place had been established as a result of conflicts that kept erupting between neighbourhood kids that occupied the library space and the employees. Many years ago, librarians were experiencing recurring problems with a large group of young kids, who used the library space after school. As a response the library management offered the space in the basement, and Ina was subsequently hired to do cultural work with the kids. Most of these kids have Middle Eastern backgrounds, they live in small apartments, in large families, and many of them struggle with different social problems. The basement became a pragmatic solution to a then urgent problem, but the conflicts that were the whole reason for establishing this somewhat unusual library space persisted. Kids were still banned from the library above the basement on a regular basis, the door between the library on the first floor and the basement was now kept locked, and there was a real lack of communication between what was going on in the basement and in the rest of the organisation.

During the first period of my stay, I also happened to meet Camilla, a project manager of a local urban renewal project, assigned to renew squares and parks over 5 years in western Copenhagen. Camilla and her team had just moved their activities into an open office space above the library. A big challenge for the team was how to include the many young kids who used the nearby park on a daily basis in the renewal process. The representational formats like hearings, public meetings and steering groups somehow excluded some of the most important actors, namely the young kids that hung out in the park after school, the same kids who occupied the basement of the library. Around the same time I was also introduced to Hans. A month after my arrival he was employed to a new position at the library, formally as a librarian, in the youth library above the basement, but he was really more interested in doing outreach projects and in finding ways to open up the library space to the kids from the neighbourhood. During this period I started to spend a lot of time in the basement. Through Ina, who functioned as a sort of gatekeeper, I got access to the community space. The kids were very talkative, once we got to know each other. They took us around the neighbourhood and the park, and offered their time. They willingly shared their stories of everyday life in the neighbourhood and the basement, yet I also sensed how some of my questions came across as puzzling to them. It was as if they were trying to figure out what I wanted from them. I in turn didn't precisely know what I wanted, but clearly I became interested in the kids in the basement, initially as a special case of a library space. This space and the community that it hosted seemed to form at least potentially some sort of controversy or situation in the periphery of the institution, which was not unproblematic, but perhaps potentially potent in relation to the overall program.

Building multifarious instruments

The constellation of the kids, Ina, Camilla, Hans, and I emerged through the first period of my stay. As I have briefly sketched out above we were all of us invested with different concerns and interests, not quite the same but partially connected interests and concerns. We may characterize such a situation as pretty un-extraordinary, insofar as new relations and issues tend to emerge whenever a researcher sets out to engage with everyday life. The question that this brief recounting raises, however, is what would be a possible post-critical response in this situation?

If we appreciate that the post-critical is not a move that imposes some orders on the field of study from the outside, and, if we want to explore epistemic alternatives to Latour's methodological proposal of stepping one step further into abstraction, we need a set-up, which facilitates some kind of shared articulation. A set-up that refuses to already conclude how the relation among the kids in the basement, the staff, the urban development project, the overall research program and the rest of the institution really ought to look like.

Nortje Marres, in an article titled "The experiments in living" (2012) engages with the concept of multifarious instruments. In her work of analysing sustainable living experiments, she describes this proliferating media genre for exploring sustainability as notable device of social research. Insofar as these experiments tend to involve the meticulously recording and reporting of everyday practises, e.g. when social actors document how they clean their house with vinegar or unplug their fridge, they provide a format or a protocol for investigating forms of life. In Marres view, sustainable living experiments must be understood as critical and contested sites for social research, because this particular genre of social experimentation, carried out by non-scientists, extends an invitation, or a challenge, to social researchers to come to terms with the current transformations in the field of social research. These experiments work to bring into view the environmental and social consequences of everyday living, quite literally by making everyday living accountable. Marres describes these experiments as multifarious instruments, since many of them are performed by a variety of agencies, e.g. governmental, scientific and for-profit organisations, and they are staged to serve a multiplicity of moral, political, and economic purposes, which may not always be clearly distinguished. This variability of purposes, Marres suggests, is perhaps what make these experimental forms potent (2012, p. 81). We may point to multifarious instruments, and to experimental set-ups in general, as devices that do ontological work. As Marres points out, the device, which performs the experiment, is attributed a capacity, which is normally attributed to theory, namely the articulation of the entities that make up the world. But whereas Marres, from the position of a primarily descriptive research practise, outlines two different possibilities; either, that social researchers set out to impartially describe the ontologies that are emerging in practise, or, that they actively commit to particular ontologies over others (2012, p.84), for a co-design researcher it seems alternative questions emerge. Instead of choosing between impartial descriptions or descriptive formats for particular ontological politics, practise-based researchers interested in participatory formats could take the current transformations in

both social research and contemporary society in general, as an invitation and a challenge to build multifarious instruments. The question then, is no longer exclusively how everyday experimental forms can be rendered productive for research, but rather also how research can be rendered productive for the social. This has always been a key concern for co-design and PD, and often this activist impulsion has been problematized for lacking both critical and epistemic edge. In contemporary Co-design and PD especially with the intake of ideas from STS, PD work from the 70s and 80s has sometimes been problematized for promoting too simple conceptions about groups of weak and strong stakeholders (Björgvinsson et al 2010; Lenskjold, Olander & Halse 2015). From this position the idea of post-criticality emerges in a complex socio-material landscape that the researcher through her explorative efforts takes actively part in shaping. Yet this work is not located one step further into abstraction, instead it is a work that attempts to actively push knowing and critique out into the field encounter.

One step further into the real

In the early stages of my visit at the library Ina and I engaged with the kids, Camilla, and Hans through a longer series of encounters and events, but the emerging constellation that I have just sketched out above was barely yet visible. It is beyond the scope of this article to lay this process out in detail, but during this part of the project Ina and I functioned as a sort of story collectors. Slowly but surely we accumulated a pool of questions, concerns, and images of everyday life in and around the library and the park. As our engagement grew we saw the potential for opening and expanding the dialogue among the different actors, but for that we needed some kind of platform that could handle an open and shared speculation with these stories; a kind of multifarious instrument that could mobilise the different actors and open a possibly constructive and post-critical space for how things could be otherwise. We were precisely at the intersection where the imagination meets the friction of materials, and ambition rub up against the hard edges of the world (Gatt & Ingold, 2013, p.146). We had to look for a set-up that was practically possible, both in relation to mobilising the kids, Camilla, and Hans, in relation to time constraints of the overall research project, and, in relation to getting the experiment sanctioned by the management of the library, who had invited me inside. After many considerations and preparatory arrangements, we decided to invite the kids up into the library space above the basement, to make a book about their stories. We also invited Hans and Camilla to the event. This set-up was chosen for many different reasons. First, there was the dispute about the locked door, which leads from the basement and up to the library. With the invitation we had an excuse to literally open the door, and keep it open, at least for the duration of the event. We had a feeling that Hans would be an important future person for securing a better integration between the basement and the rest of the library. Many of his future working hours would be placed in the space above the basement; therefore, we placed the event deliberately on his shift. Camilla had never met the kids, but was eager to find a way into a dialogue with them, to establish some kind of relation between the citizen-group that she had already mobilized to

participate in the redesign of the park. Like Camilla, we saw this as an important task, both the dialogue itself, and also the work of developing new formats for local democratic processes. Ina wanted the rest of the institution to acknowledge the value of the community space in the basement. She hoped for a more open discussion in the organisation on what cultural work could be about. What the kids wanted, and how their everyday lives in the periphery of the library could be articulated productively in relation to what was going on in the rest of the institution, I was not at all sure. I didn't assume that they wanted anything in particular, other than maintaining opening hours in their community space in the basement, and that was precisely why we staged this event. We wanted to stay in the conversation, but to do that we did need to expand and distribute the dialogue, and come up with some format that could take the process a bit further. We were not at all sure if anybody would show up in the end, and we were admittedly rather relieved as the kids came scrambling up and down the staircase from two-o'clock in the afternoon.

For the event we produced a pile of different photos from the basement and the neighbourhood, and statements from the kids, collected from our many talks. We asked the kids to take turns in groups of two and three, so that each group would produce four pages from the materials. We set up a table in the far end of the room with our piles of material; the kids and Camilla on the one side, Ina, Hans and I on the other side. We used the format of a blank scrapbook, and on top of each page we put in a statement. One would say: "The best thing about life in the basement is:" another would say: "My favourite spot in the park is:". We did not want the dialogue to be structured primarily around some future design goal, as we had already experienced how our sometimes too goal-orientated questions, for instance questions about the redesign of the park, could be counterproductive for keeping the dialogue open. We did however, on the last page, pose a "what if" question, a question about how things could be different. Here we asked the kids to imagine how the community space in the basement could be imagined at other sites in the neighbourhood. We encouraged the kids to use colour pens and scissors to rearrange and distort the material as a response to the statements. Whenever a photo or a statement was selected, we asked the kids to tell us why this material was chosen, and why it would fit the statement on the page. This spurred many themes, questions, and conversations among the kids and the rest of us during that afternoon. The statements captured in the book externalised and expressed the quality of the community space below the library. For instance, that this place was very special to the kids because it was okay to make mistakes, and that the basement possessed a certain quality compared to other institutional spaces, because it was not structured around some goal for learning or performing. Using the platform of the book to stage the conversation prompted the kids, and the rest of us, to reflect on everyday life in the basement. But the event can't be characterized mainly as a reflexive exercise one step further into abstraction, although obviously reflection was part of it.

Using a scrapbook as format

The format of the scrapbook, on the one side, can be said to be very restricting. In this case, it ordered the process of the dialogue beforehand. It both circumscribed and simultaneously contained the potentiality of the possible. The experimental co-design researcher, like any researcher, always depends on a particular tool box, at set of approaches, methods and formats, which are not reinvented from scratch in relation to every new research project, rather, they are in a certain sense relied upon, but also always modified, as they are activated at specific sites (Lury & Wakeford 2012). Rheinberger (1997) has conceptualised the dynamics of experimental arrangements as an on-going oscillation that plays out between epistemic things and technical objects. Technical objects are the relatively stable identity conditions, technologies and instruments that any experimental engagement will have to depend on in order to make sense of the process of reconfiguration and displacement. Much like an STS researcher that relies on a technology of description. What is important to understand however, is not only that to get to get to a workable set-up is a demanding and non-mechanical process, but equally that the researcher, in order to get the set-up to work as a generator of surprises, must acquire knowledge and familiarity in handling her own epistemological inventory. What looks very repetitive and in some ways non-spectacular from afar, may unleash epistemic and post-critical excess, precisely because of the constant working over and tweaking and twisting of the set-up. That is also why, Rheinberger points out, experimenters usually stick with their experimental set-ups in an almost affectionate fashion. We may say, in this particular case, that the scrapbook became the very precondition for externalising, distributing and rendering visible the stories, hopes and dreams of the kids. But the point is, that although we invited the kids to participate in a carefully scripted dialogue, we didn't know in advance how they would respond. We didn't know which stories and images would emerge in the "here-now". As explained, we didn't converge over some unified agenda from the outset, and we didn't precisely know what we were looking for either, we did, nonetheless, commit ourselves, to keep the possibility open that some excess would emerge from the encounter, which could potentially destabilise the absence, or rearticulate the presence, of the kids in the library.

Post-criticality as diverse and uncontrollable excess

In the series of events that formed and informed my research engagement at the library, the scrapbook came to take a prominent position. One reason was, that the scrapbook was a shared tangible outcome that we were all left with after the event. The advantage of such a tangible outcome is of course the fact that it can be circulated. Ina and I made a series of prints of the book, which we gave back to the kids, as we wanted to stress the importance of what they had produced that day. Camilla took the book back to her team and the citizen-group, and I presented the book at a staff meeting in the library, where we discussed both the format of the workshop and the basement as an alternative library space. As such the book came to serve many different purposes after the event, and of course these different purposes can neither be fully known nor fully controlled from the "here-now" of the

experimental event itself. In relation to the overall research program the book became a vehicle for raising new questions about the role of the library as a local meeting place. Most Copenhagen libraries have experienced challenging situations with so-called hang around kids that use the library as meeting place after school, similar to the ones in the western part of Copenhagen. To explore these challenges, we used the pages from the book as raw material for generating ideas for new work practises, in a workshop with librarians and cultural workers towards the end of the research project. By employing the book, we were able to turn some questions around and ask if the commitment of these kids, to their local libraries, shouldn't be taken to be a huge success? We were able to show how the formats we employ to stage dialogues do matter, and that a less goal-orientated approach to cultural activities is sometimes needed to engage productively with this particular group of citizens. At the same time, some of the comments that followed my presentation at the staff meeting in the library showed that the book could also be appropriated differently. After the meeting one librarian commended our work with these kids, because in her opinion it was very positive that some real cultural production and education was finally induced into the community in the basement. We did not consider this work to exemplify real cultural production as opposed to not so real cultural production, e.g. hanging out in the basement for the sake of it, but we had to accept, like any experimenter, that the stories, traces, and insights produced in the process of experimentation may be employed to serve other purposes than the ones we originally intended.

Staying with the "here-now" is the critical position

In the co-design engagement I have recounted here, post-criticality emerges as some sort of flickering that is both speculative and unsettled. The edge of the constructive and critical in such experimental engagements can never be a final resolution. What matters for a co-designer is to keep the space of action and critique open, to see if the exploration can be taken to a next step or not. In this case we did manage, if only momentarily, to literally unlock the door, to reconfigure the library space and to rehearse some new constellations. Through the meeting in the library, and the making of a book, Hans, Camilla, and the kids did establish a new and emerging relation; a relation that took off from the concerns of the kids rather than institutional agendas and public design goals. Yet, as I concluded my engagement at the library I was still left with a bit of an uneasy feeling. We didn't succeed, metaphorically and literally speaking, to keep the door to the basement open in the way that we had hoped for. Perhaps this experiment was set back by a general lack of time and interest in the organisation, even if the management had formally sanctioned our intervention. The organisation, during my stay, was preoccupied with the process of implementing new working routines, and in the middle of a stressful reorganisation. Perhaps, we experienced a lack of response within the organisation simply because this was a poorly staged experiment. Perhaps this experiment was not tied convincingly to the past "here-nows" that preceded it, and the future "here-nows" that came after. This is certainly possible. I will argue, nonetheless, that the alternative to a not completely successful

experiment must be another experiment; another material-conceptual engagement with change enabled by another set-up and configuration. However, from the position of the co-design experimenter, such experiments, unless shared among a collective that emerges as a result of the speculative engagement, run a real risk of repeating the same critical perspective that Latour is so disapproving of. Because to occupy a critical position inside a given practise, and to be part of the field, is not a given; it is a practical and experimental accomplishment, and therefore always only a possibility. At stake, I argue, is not only the expansion of the researcher's capacity to imagine new orders one step further into abstraction. Other stakes and the stakes of others need to be brought into the equation as well. Post-criticality can be collaboratively explored as something forged yet not fully controlled through the constant work of trying to stay a dialogue about how things could be different. Such work can inform constructive design researchers and STS scholars alike, and the starting point, I suggest, is the practical work of building a platform where actors and their differing cosmos can be rendered visible and distributed in time and space.

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About the Author:

Sissel Olander is a postdoctoral researcher in the co-design research centre (CODE) at the Royal Danish Academy's School of Design. Her research focuses on exploring experimental practises on the intersection of collaborative design and the constructivist social sciences.

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Collaborative Imaging. The communicative practice of hand sketching in experimental physics

Judith Marlen Dobler

University Potsdam, Germany
info@judithdobler.de
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Abstract: This paper presents on-going ethnographic fieldwork in design research conducted in an x-ray laboratory. The study investigates physicists' hand sketching as a collaborative imaging practice and depicts collaborative drawing as a distinct form of knowledge in between the spaces of notation and verbal articulation. Physicists' collaborative sketching is captured through methods taken from design research and STS, including participant observation, videography and drawings by the design researcher. In order to analyse the functions of the collaborative sketching, three key aspects of the research are discussed in this paper. First, the spaces and materiality of the laboratory are observed. Second, the hybrid practices combine old and new technologies and (non)-human agencies. And third, knowledge is transferred through sketches as "enabling objects" of communication. Finally, it is argued that the observed collaboration resembles a complex communication system that can be explained through a visual typology.

Keywords: collaboration, digital imaging practices, hand sketching, ethnography

Introduction

With this paper, I present an ethnographic field study of an experimental physics laboratory in which collaborative hand sketching is a common practice of the physicists at work there. Experimental physicists are experts in data simulation and the use of digital media. In addition to digital imaging practices, the scientists also regularly revert to hand drawing in their daily work in the laboratories. It seems that sketching on boards, sheets of paper and notebooks continues to be the technique at hand in situations of professional and collaborative communication (Henderson 1999, Rheinberger 2003, Wittmann 2012).

Yet, physicists' use of sketching techniques is informal and stays in the laboratory. The collaborative sketches do not find their way into publications or presentations outside of the

research site (Galison 2000). What specific functions do the collaborative sketching activities and the resulting sketches have?

My project aims at getting hold of the knowledge involved in thought processes during physicists' drawing activities. The hypothesis is that collaborative sketching is a communication system in its own right. Besides being a tool for thinking and communicating together, I argue that the collaborative sketching activity functions as a visual language. Hereby, the sketches represent a specific genre of visual thinking within the discipline of experimental physics.

In my design approach, the interactions displayed in collaborative activities such as gesture, language, body movement and the use of space are observed and visualized through a micro-sociological investigation. I look closely at the interaction between all agencies, human and nonhuman, involved in the exchange. The investigation focuses on three aspects of drawing and sketching as a collaborative imaging practice of scientists: First, it focuses on the spatial dimension of sketching in the laboratory; second, on the hybrid practices of collaborative hand sketching and digital technologies; and finally, on sketches as enabling objects of communication and knowledge transfer. I understand these working practices as design techniques because they enable the planning of experiments, the imagination of new projects and the visualization of complex data information.

In recent years, there has been a growing interest in ethnographic studies on design processes mainly in architecture and engineering (Henderson 1999, Murphy 2005, Yaneva 2009). These studies are mostly carried out by trained anthropologists or sociologists and take their place in the long tradition of laboratory and workplace studies in Science and Technology Studies (Latour and Wolgar 1986). In the humanities, the vast amount of studies on diagrammatic notations and scientific drawings are theory-led and do not include a practice-based or designerly perspective (Krämer and Bredekamp 2009, Wittmann 2012). The problem is, though, that contexts and spaces of material production are often overlooked in the analysis of scientific images and notations. Another problem is that drawing activity is often an introspective and singular activity, which is difficult to observe. Due to the fact that investigators are not on site when the drawing action takes place, they have to rely on archival material and already existing visual notations (Hoffmann 2008, p.13, Hoffmann 2013, p.280). Rather, my research interest is not in the drawing as a result, but in the *epistemische Verfahren* (Hoffmann 2008, p.7), the epistemic procedures of notation, drawing, and visual communication. I understand the cultural technique of drawing as a process in the making, which is non-linear and iterative (Maye 2010).

Research Methods

Assemblage of Grounded Methods

The research procedure can be defined as an assemblage of methods. It consists of a mixture of design and anthropological methods. Participant observation and videography of

the ad-hoc sketching sessions are methods taken from sociology, which I use to gain insights into the processes involved in drawing interactions. Video-Interaction-Analysis and conversation analysis are applied for the interpretation of the video material (Knoblauch 2010, Alač 2011, Heath, et al 2010, Murphy 2005). These methods are accompanied by extensive explorative drawings by the design researcher (Goldschmidt 2014).

In traditional ethnographic research, the researcher's observation mainly relies on text-based materials. Notes, interviews and journals form the basis of the research, even if photographs, film and video material, or drawings accompany the research. In my design research approach, the importance of visual media is central to the examination. Here, drawing is not only the object of research, but also a research method. It is used as a tool for communication among scientists and for visualizing research insights. The participant observation in a science laboratory becomes an activity in which both parties are involved through their common practice of sketching and imaging. Reflectively writing about the visual material allows for the qualitative data to fit into a theoretical framework, based on grounded theory with a “bottom-up” attitude (Glaser and Strauss 1967, Charmaz 2006).

Sketching as Method

Within the research scope, the use of drawing assists in accessing the field. Sketches in particular are the key to accessing, perceiving and analysing the observed activities. Sketching as a research tool serves different research purposes, as the resulting sketches have various functions. The following list includes the types of sketching applied in the project so far:

- Visual research journal:
  The most important tool of the ethnographic study is a visual research journal, in which all observations, actions and thoughts are noted down. These notations vary from diagrammatic writings to figurative drawings of observations, and more abstract recordings of perceptions. The graphic note taking is partly formalized and contains information about the date, space, participants, and actions on each page. This formalization helps those involved remember the research process and makes the notations better usable as research material.
- Explorative drawing:
  Sketching on site for hours in one place opens up a greater awareness of the situation at hand. The design researcher can participate in the spaces and the daily routine just by drawing his or her perceived impressions. Drawing serves here also as a meta-reflection on the drawer's role as researcher in the field.
  Sketching as a tool for data analysis:
  The visual interpretation and analysis of the research material gained on site constitutes a major part of the research. The “re-endrawments“ and analytical sketches are mainly executed digitally on a graphic tablet and then ordered

into a graphic typology. They will ultimately result in a graphic language of the research.

Sketching in analytical x-ray physics

The first part of the ethnographic fieldwork was carried out between February and October 2015 in the *Berlin Laboratory for innovative X-ray Technologies* (BLiX) at the Technical University Berlin. The laboratory is concerned with applied research in the field of analytical x-ray imaging in close collaboration with industry and international research institutions. Its premise is to adapt state of the art x-ray technologies from the synchrotron to small laboratories. Their research involves imaging technologies such as x-ray fluorescent spectroscopy (XRF) for art and cultural assets, x-ray microscopy (LXTM) for biological compartments such as cells, or x-ray absorption near-edge spectroscopy (XANES) for the chemical specification of materials.

Around twenty people work in the BliX laboratory: scientists, engineers, and both graduate and undergraduate students. They are either specialised or are being trained in designing, setting up and running experiments, as well as developing computer simulations, theoretical calculations, and analysing imaging data. Their daily work is mainly organised into collaborative teamwork combining theory and practice, and involve calculating, writing and drawing by means of analogue, digital, and hybrid media. The experiments take place in these working spaces and are frequently accompanied by talks, meetings, and collaborative practical work.

Sketching Spaces

The laboratory is a high technology setting and its environment is packed with computers, digital devices, high-precision instruments, technical accessories, and tools. Every room, from social meeting space to work office and laser laboratory, is also equipped with drawing and notation devices. The blackboards, whiteboards, flipcharts, stacks of white paper, laboratory notebooks, and corresponding writing-drawing instruments are part of the furniture in the nearly twenty rooms over three floors of the university building (Figure 1).

Figure 1: Laboratory room with whiteboard and meeting space. Pencil on Paper, Drawing by the author, 2015.

But, the devices and tools alone do not facilitate drawing collaboration. It is the particular furnishings of the working spaces in the laboratory rooms that allow for informal gatherings and drawing activities. Each room is equipped with either sofas and low tables or empty tables and extra chairs, on which most of the interactions take place. The meetings are often scheduled via email or telephone. But, they can also happen ad hoc when people meet while leaving or entering work spaces through open doors. Most doors stay wide open during the day and are only closed during lunch breaks or if nobody is near the space. My first impression of the lab spaces was the vivid exchange of people in between rooms, laboratories and meetings. It became obvious through explorative drawing that the constant coming and going, talking and spontaneous gathering was possible because of the many open doors. Hence, the spatial quality of the lab establishes the basis for collaborative drawing action (Figure 2).

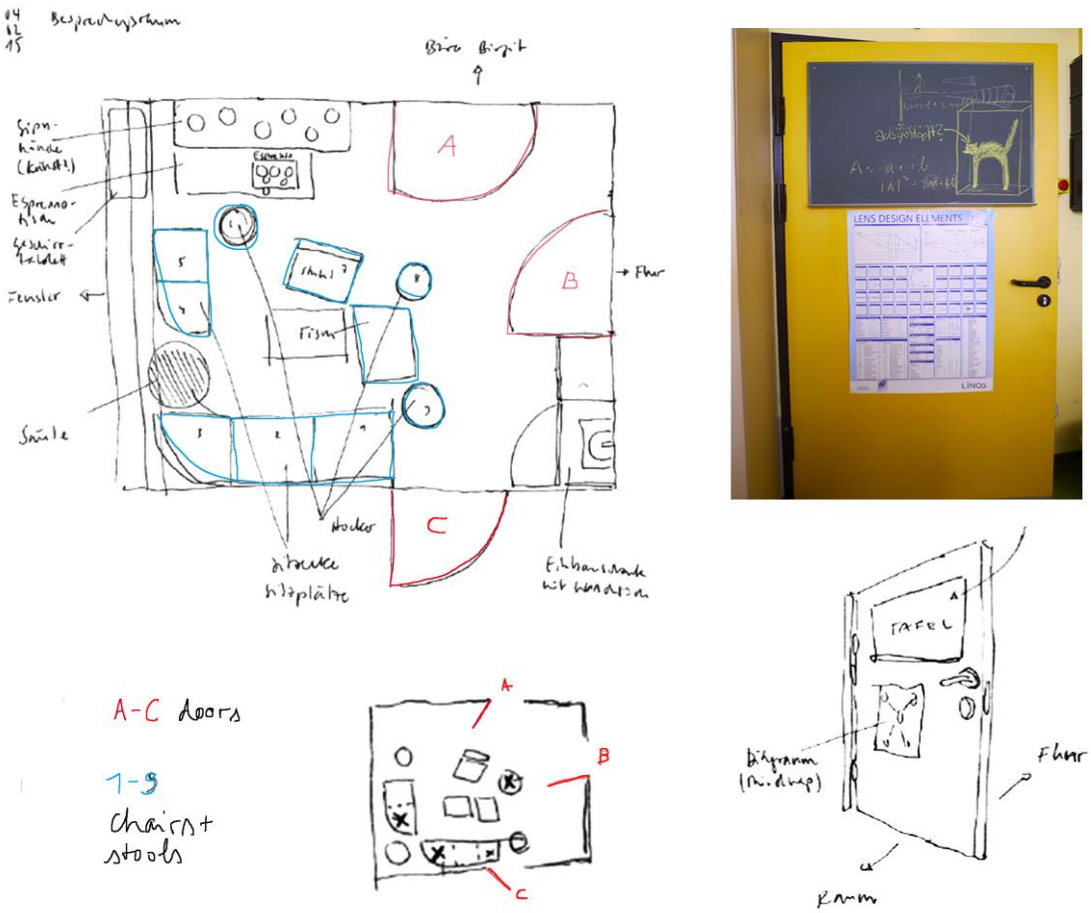

Figure 2 Laboratory spaces. The drawings indicate doors, which are always open and allow for anyone to enter and leave without prior announcement. Top left: open doors in the main meeting room; Bottom left: floor plan of the meeting room with doors and meeting space. Drawings in visual research journal by the author, 2015; Top right: typical door in the Lab with blackboard and diagram. Image and drawing by the author, 2015.

Hybrid practices of collaborative hand sketching and digital technologies

The relations between human and nonhuman agencies in socio-technical arrangements such as a science laboratory can be referred to as "hybrid collectives" (Callon 2004). Various instruments, tools and media are used in the lab to set up and carry out experiments, as well as to transfer and analyse data. These "mixed-use practices" combine old analogue and new digital procedures (Henderson 1999, p.167). But how do these practices interplay in detail?

Latour's "paperwork" and Klein's "papertools" are two notions of the importance of visual practices in the sciences and their materiality (Latour 1986, Klein 2001). Still, in the twenty-first century, paper is crucial as a material for knowledge communication and transfer. On the other hand, "inscriptions" (Latour 1990) can be materialized in many other materialities apart from paper. Blackboards and whiteboards are classic analogue spatial media tools in almost every laboratory. However, the mix of analogue and digital media formats is increasingly common. The act of inscribing, and specifically drawing as an epistemic activity

and object, assembles a whole range of analogue and digital, old and new technologies. The integration and adaption of technologies involve PCs, laptops, mobile phones, digital screens, tablets, boards, paper printouts, notebooks, photographs, projections, and more. Spaces of research, like the BLiX, enable constant media transformations of diagrams, data visualizations and simulation, imaging, calculation, and geometry through manual techniques and digital technologies (Figure 3).

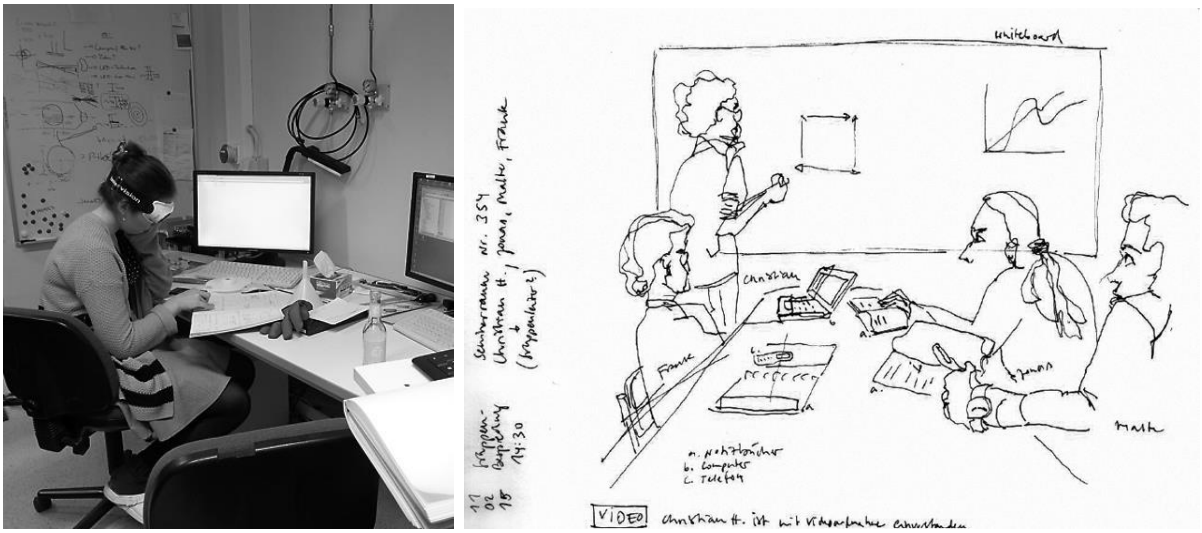

Figure 3 Collaborative Drawing Practices in the Laboratory. Left: During an laser experiment in the laboratory, the digital data is manually transferred into the logbook. One scientist (not in image) reads the data out loud. The second researcher sits at the table and notates the data into tables. Image by the author, 2015.
Right: Page in the visual research journal: In the subgroup meeting, experimental data is collaboratively analysed using visual media tools: whiteboards, printouts, mobile phone cameras, laptop screens, notebooks and journals. Drawing by the author, 2015.

The so-called "intermedial processes" (Wittmann 2012, p.146–148) on paper are only one aspect in the formation of scientific knowledge through drawing. Actually, the media format is extended into the space and onto the body. These invisible traces can be observed in collaborative drawing activities and their implied multi-media transformations. The drawing is materialized not only as a trace, but also memorized and archived in human and nonhuman bodies, as well as spaces (Figure 4).

Figure 4 Video stills of video sequence documenting the transformation of bodies and spaces during a group meeting. Video by the author, 2015

Group meetings at BLiX are not static gatherings around a table or drawing device. The space of communication is actively extended into the room. The invisible space of communication, the “o-space” (Heath 2013), is diminished and extended as it relates to the visual material at hand. This folding-unfolding in space is related to the method of *unfolding* data in science, meaning the close examination and interpretation of data collected through experiments or simulation. Bodily and material practices “unfold” in space as the group *unfolds* the experimental data.

> “Folding-unfolding no longer simply means tension-release, contraction-dilation, but enveloping-developing, involution-evolution … The simplest way of stating the point is by saying that to unfold is to increase, to grow; whereas to fold is to diminish, to reduce, “to withdraw into the recesses of a world.” (Deleuze 1993, p.8)

This embodied *unfolding* technique can be observed at BLiX in one instance where the group is discussing geometry through gesturing: arms become axes and vectors, hands are lenses and light rays, the body bends like the angle of the detector. Gestures and body language become an essential part of the drawing *episteme* in the knowledge creation of the physicists (Figure 5).

Figure 5 Video still of video sequence documenting the gestures during a group meeting. Video by the author, 2015

Sketches as enabling objects for communication and knowledge transfer

Sketching by hand can be observed in the laboratory whenever a problem is discussed or suggestions are made. Together with speech and gesture, the imaging practice of sketching functions as a multi-modal performance for social interaction (Blumer 1986).

Yet, beyond its performative character, sketching arranges objects and tools that seem to enable communication and knowledge transfer in the first place. Physicists' micro-social interactions can take the following form, for example: One sheet of white paper and one pen

for the whole group is placed in the middle of the table, independently of the group size and other technologies involved. The pen is then passed between those who talk and sketch (Figure 6). Henderson described a similar activity of engineers as a design practice "suggesting one mind instead of two", and "the practices of sketching and drawing constitute communication in the design world" (Henderson 1999, p.25). It appears that these practices apply not only to the design world, but can also be transferred to other disciplines. Thus, these observations and assumptions call for a more thorough visually based analysis. Therefore, a video recording of one such collaborative sketching session has been put through a collaborative data session with designers, sociologists and scientists. In the video interaction analysis, image and speech are looked at simultaneously.

Figure 6 Two situations of collaborative drawing action with "turns at talk" through passing the pen. Left: Drawing extracted from video still, Right: Video still, Images by the author, 2015.

The following initial conclusions were drawn from the data session:

- The whole communication is dominated by speech overlaps, and "turns at talk" (Goffman 1981, p.22–23): the pen serves as both instrument and speech-giver or taker. The person holding the pen holds the right to speak.
- The sketches function as objects, which are addressed as a "third" agency in the interaction. The paper sketch serves as a mediating object facilitating the exchange of thoughts.
- The specific formation of paper, pen, supporting space, technologies and drawing bodies decides how communication takes place. The thought processes are related to the surrounding space and the interaction with the media at hand.

In a second step, the resulting sketch was redrawn on a timeline with two different colours, one for each drawer (Figure 7).

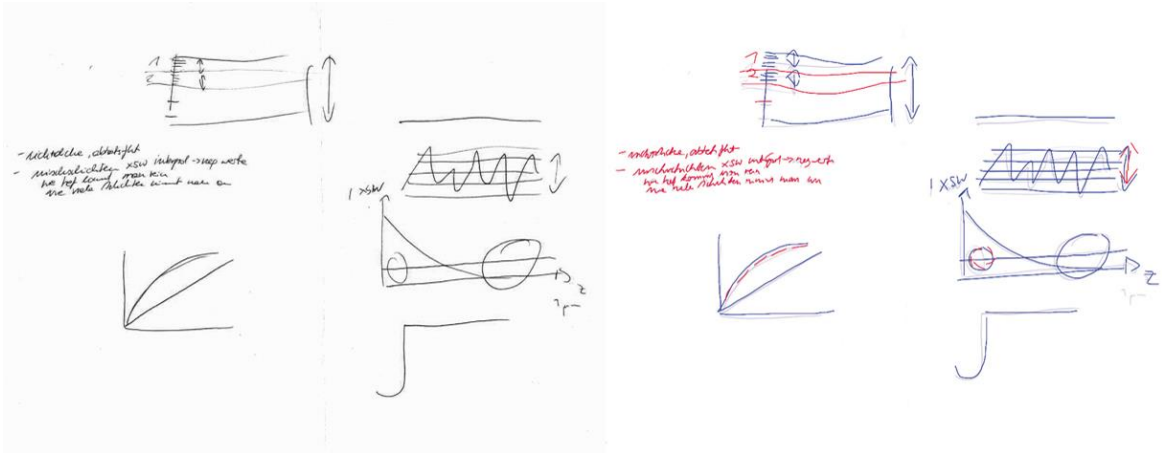

Figure 7 Images of sketch from collaborative drawing activity. Left: Collaborative sketch by the physicists on paper; Right: animated "re-endrawment" depicting the quantity of drawing activity with colours. Time-based animation by the author, 2015.

The visual language of sketches in experimental physics

There have been numerous studies on the epistemic and collaborative practices in design and the sciences (Traweek 1988, Goldschmidt 1991, Henderson 1999, Knorr-Cetina 1981, 2001). One of these investigations, an ethnographic study by sociologist Karin Knorr-Cetina on epistemic practices in experimental physics, points out that the whole discipline is structured around collective work (Knorr-Cetina 1981). According to her, in experimental physics there exists not only a collective discourse, but rather a "viscourse": the production and presentation of visual material (Knorr-Cetina 2001, p.308). The study emphasizes the importance of shared visual thinking. Still, the text does not describe or show in detail what exactly constitutes the visual language of physics.

The material of the field research has thus far invited the assumption that the visual thinking through sketching prevalent in experimental physics resembles a complex communication system. At the present stage of this inquiry, the scope of my design research is a deep analysis of the functions within this visual language system. To date, there exists no such typology, which combines and contextualizes spaces, bodies, gesture, technologies and sketches. Through the design perspective, and with design methods, a visual analysis of the drawing practices and a detailed typology of the specific functions of sketches can be accomplished. The following sections sketch out some initial explanations and analyses.

The visual language and drawing conventions used by the scientists mainly contain graphs, maps, flow charts, circuits, and models. The media formats are filled with image and text compositions of known and learned graphic representations. They stem from geometrical and mathematical sources, such as formulas, vectors, and symbols. Technical drawings and geometrical forms are accompanied by coding expressions and digital graphs, which are common visualizations in the field of experimental physics. The sketches are linear, usually flat, and without any spatial perspective or three-dimensional imaging (Figure 8).

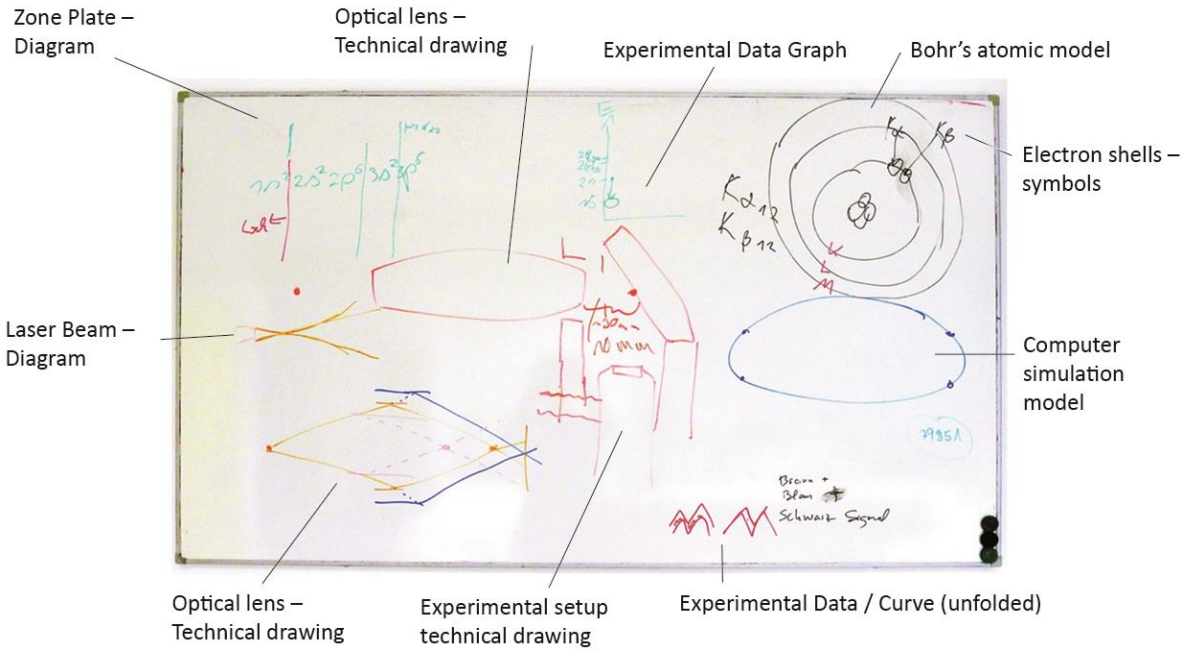

Figure 8 Collaborative drawing by the physicists on a whiteboard in the lecture room. Drawing originates from different dates and meetings. The various graphic styles are indicated in the text by the design researcher. Photo by the author, 2015.

The simplicity of the drawings is striking because it contrasts with the high complexity and level of abstraction involved in scientific thought processes. In order to find out more about the origin of this specific graphic style, the collected field research material was subjected to a closer inspection. Also, semi-structured video interviews with the scientists were conducted (Figure 9).

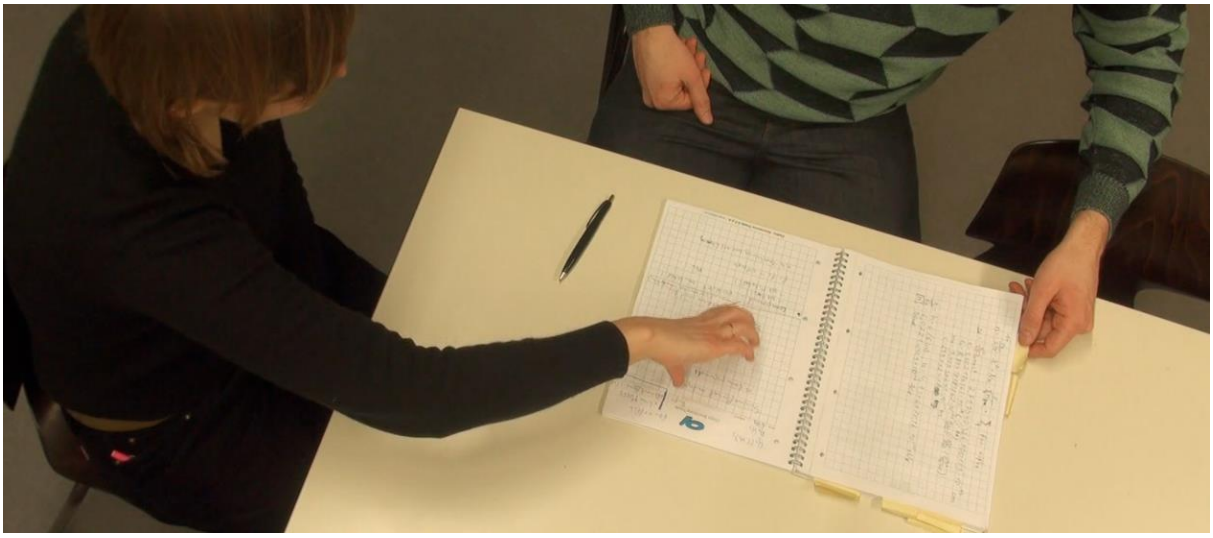

Figure 9 Physicist and design researcher in the interview using the physicist's paper notebook as a "third agency" to enable knowledge transfer

This “grounded” procedure led to the first trace: It was noticed that paper notebooks are common tools for scientists’ practice in the laboratory. Notebooks, laboratory logbooks and journals are basic hardware equipment of the experimental scientists, in addition to the experimental setups (Figure 10). Almost every object and subject is connected to this medium. If the BLiX laboratory is taken as a representative of the community, then a wide range of cultural backgrounds and nationalities, levels of expertise, and different age groups work in this field. The laboratory receives regular visits by international guest researchers, and the members of the lab in turn visit other research sites around the world. The common spoken language is usually English. In the BLiX laboratory, the logbooks are used collectively and even private notebooks are shared and distributed. From the 20-year-old undergraduate student to the East German emeritus physicist (who wrote his dissertation in Russian back in the 1970s in Moscow); from the Japanese guest scientist to the chemists/biologists/material scientists visiting the lab: they all possess a notebook. A closer look at their books reveals the same graphic style described above. The books appear to have been constituting thought collectives and thought styles, in the Fleckian sense (Fleck 1980), of a whole scientific community over decades and maybe even centuries (Holmes et al, 2003). In their conversations, the same specific visual language accompanies their speaking.

The next step in the research project will be to unfold the already available visual material. First, a layout of the complete data will present an overview. The second step will be to analyse and interpret the data by ordering and connecting the different types of communication. Finally, the material will be synthesized into a visual structure, which serves as a typology.

Figure 10 Video Still of two scientists in the laboratory looking at data on screens and at notations in the laboratory notebook: An assemblage of human and nonhuman agencies, analogue and digital technologies, and interactions in the social space. Video by the author, 2015

Concluding Notes

The material presented from the ethnographic field study documents the fact that collaborative drawing practices are common activities in experimental physics. The spatial quality of the physicists' laboratory enables vivid social interaction and collaborative action. The resulting sketches of these activities function as enablers of communication and transitional objects of knowledge. They build a "third" space in which knowledge can be created and transferred.

During my presence in the field and with the mix of applied methods, it became obvious that the observed collaborative activities were not singular events, but were instead embedded in a deeper culture of communication and visual language system within the discipline. The practices can be understood as epistemic procedures in a field in which thinking and communicating function mainly visually. Despite the complexity of interactions including speech, gesture, and non-human agencies, the visual language remains surprisingly simple.

This research raises the question as to the specific functions of the sketches. It is argued that the grounded research procedure through and with drawing can achieve a deeper understanding of collaborative sketching and its function. The design researcher uses drawing as a research tool for analysing physicists' graphic style. Yet, the drawing and sketching practices of the scientists are the objects of research and are not to be confused with the activity of drawing done by the design researcher. With the research approach developed here, it is possible to build a visual typology of the observed scientists' graphic language.

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About the Author:

Judith Marlen Dobler is a designer, visual artist and design researcher based in Berlin. She is currently pursuing her PhD at Potsdam University with a grant from the German Research Society, investigating collaborative drawing activities in professional environments.

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The Aesthetics of Action in New Social Design

Ilpo Koskinen

The Hong Kong Polytechnic University
ilpo.koskinen@polyu.edu.hk
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Abstract: Social design has recently gained more attention for several reasons and it has responded to these through new forms. One question literature in social design needs to address is aesthetics. Its aesthetic approaches has been discussed elsewhere (author), but one remaining question is the aesthetics of action in it. This paper asks what kinds of aesthetic approaches are there to social objects such as social forms and organizations. It describes three approaches to the aesthetics of action, agonistic, convivial and conceptual, and studies their implications through three case studies in London, Milan, and Helsinki. The paper is a part of a larger ongoing exploration of aesthetics in social design.

Keywords: social design; design research; process art; conceptual art

From socially responsible design to new social design

Designers have been doing design that seeks to respond to social problems for over fifty years. Probably the best oversight of social design is in a recent exhibition catalogue Design for the Good Society, in which a leading American design historian Victor Margolin (2015) has traced the origins of social design to utopic and critical thinking in design and architecture. These utopias go back to the scientific utopias of the fifties (Buckminster Fuller) and the ecological and political utopias of the sixties [the Club of Rome and Victor Papanek's *Design for the Real World* (1984), and Nigel Whiteley *Design for Society* (1993)]. This is traditional design that is driven by social causes rather than by the market. In the terminology of a recent report, this mode of social design can be called socially responsible design (Armstrong et al. 2014).

The last ten years have seen a shift in object of social design. In several projects, the object is the social – social structures, processes, and forms of action – rather than a social problem. "New social design," as this paper calls it, has shifted the object of design, but also its conceptual foundation, which comes from the social sciences (see Meroni 2007). A good

example is a project in Colonsay, West Scotland, where researchers from the Glasgow School of Art mapped local resources of this small island to find ways to guarantee its future. Although the projects led to physical objects, spaces and interactive technologies, these were secondary issues. The true meaning of the project was the new kind of community spirit and resourcefulness it created. It was this larger social framework that gave meaning to the objects (Koskinen and Hush 2016). The project well illustrates the *differentia specifica* of new social design: unlike socially responsible design, it is concerned about this larger framework rather than

The shift has expanded the scope of design and has opened up the scope of imagination in design, and it has also created new kinds of work opportunities for designers. In essence, they can tackle social goods that the market would not produce, and they can connect their discourses to those of the government through the social sciences (Koskinen and Hush 2016). As pointed out elsewhere (Koskinen 2016), this shift has also led to losses in some of the constitutive vocabularies of design. In particular, designers do not have an aesthetic language for talking about and designing for social forms and activities.

This raises an issue: how do new social designers work with aesthetics in their work. The author's earlier work has described three aesthetics approaches in social design, one building on 20th Century avant-gardes like Situationism; another building on process art; and the third going back to some of the founding beliefs of conceptual art (Koskinen 2016). This work also pointed out that new social designers have a vocabulary for objects they create, but less so for those forms of action they want to construe, nor to their collaborative methods. The problem this paper addresses builds on this foundation and asks what kind of object is social action in new social design?

Habermasian Communities: Agonism

Recent literature in interaction design has touched upon aesthetics in two waves. The first literature has built on Dewey's pragmatism, which places aesthetics to the gap between experience and an experience. Here, an experience is something lifted out of the stream of experience. It is reportable and storyable, and in this sense transcends experience. The pragmatist approach shifts aesthetics from the designer to people being studied and expands its scope from vision to other senses, thinking and emotions (Graves Petersen et al. 2004; McCarthy and Wright 2005; Overbeeke 2007).

The second and more recent literature has shifted its theoretical basis from pragmatism to Jacques Rancière's agonism, with roots in Althusser's structuralist Marxism (Rancière 2004; DiSalvo 2011; Markussen 2011, 2013; McCarthy and Wright 2015). The shift has changed the way in which aesthetics is understood significantly. For Rancière, an aesthetic act reorganizes the social field by introducing new heterogeneous objects into perception. By reorienting perceptual space, it disrupts socio-culturally entrenched forms of belonging and inhabiting the everyday world. Writes Thomas Markussen, a scholar of design activism:

> For Rancière, what characterizes the aesthetic act in particular, is that it introduces new heterogeneous subjects and objects into the social field of perception. In so doing, the aesthetic act effects people's experience in a certain way: it reorients perceptual space, thereby disrupting socio-culturally entrenched forms of belonging and inhabiting the everyday world. (Markussen 2011: 4).

When new social design is done under these auspices, it operates by creating objects around controversial topics to raise discussion that bring adversaries to the same table to discuss their relationship to these topics. The topics range from robotics (Auger 2012) to poverty (one example in DiSalvo 2011 is *Million dollar blocks*). The method is debate that redefines the meanings of objects like words, things or social processes like detention rates by neighborhood. The debate paves way for new types of action that bypasses those habits that make current social order unequal, unjust, wasteful and suboptimal.

A good case to see how the aesthetic operates is *Material Beliefs*, a design project about bioengineering technologies in Goldsmiths College (cf. Beaver et al. 2009). The framework that guided the project was called "design for debate." The designs created in the project were intended to provoke questions in the minds of the public, and lead to debate around these questions. The aim was to enable the public to form an opinion about whether they prefer the implications of bioengineering or not. The strange and provocative designs that resulted included projects like *Carnivorous Domestic Entertainment Robots*, a series of robots that caught flies and mice and extracted energy from their bodies to keep the robots running.

Lamp Shade Robot in Figure 1 was designed to be both strange and familiar. It captured flies, killed them with UV light, and consumed their bodies in a microbial cell to create energy that kept the robot running. It was simultaneously an exploration into science, domestic technology, and design (Beaver et al. 2009; Auger 2012).[1]

In agonistic thinking, aesthetics usually gets an instrumental role. For Carl DiSalvo, a forceful proponent of the agonistic model, design works like a sugar coating on a bitter pill: "But the aesthetics of design, in a formal and traditional sense, still have significance in evoking the political... many examples of adversarial design leverage an expertise in the making of products and the use of formal aesthetics as a strategy for luring people into the consideration of use" (DiSalvo 2011: 102, 125). The result is typically an avant-gardist aesthetics that balanced the familiar and the strange.

While the implications of this aesthetics to objects are clear, the aesthetics of action is a much less charted territory. If we turn back to Material Beliefs, we can find some cues about the aesthetics of action. The project firmly placed aesthetic into the minds of the people, and in this regard, it is in line with contemporary art since the time of Duchamp. In the spirit of Duchamp, Material Beliefs took design out to museums, galleries and other types of community gatherings, and used them as props to debate the implications of bioengineering. The form in which these debates were curated, however, was remarkable in

[1] The author would add that it could be seen as an indirect commentary on energy harvesting at home as well.

their familiarity. They were curated in a manner art and literature salons, and although they broke the line between the designers (performers) and the audience, the forms were not radicalized to any significant degree.[1]

Figure 1. Lamp shade robot by James Auger and Jimmy Loizeau (thanks to James Auger)

At least at the outset, then, the agonistic aesthetic seems to be Janus-faced. It is avant-gardist and strange in terms of objects, but conventional in terms of social action. While objects are seen as props that generate discussion and debate, social forms used to curate these conversations are familiar from everyday life, and even more so from institutional forms of action. Conversations in museums and galleries have been around for decades, and city planning has been built on participatory events in most European countries and North America since the sixties. The chips are put on the power of debate, reasoning, and thinking about the future together. Debate makes participants aware of not only how they see objects and issues they may (or might) embody, but also of how others see these objects. Debate generates understanding and tolerance, and creates a future people can agree upon regardless of whether this is said out loud. The hope is that debate turns dissensus into consensus by creating an emancipatory Habermasian community of reason that is put into motion by design (see Habermas 1987).

[1] Thanks to Paul Chamberlain for pointing out the similarity to salons.

Designing Conviviality

Another aesthetic can be called convivial. Its aim is to create a community that generates its own social goods. The aesthetics is located into emergent social forms; it is open-ended; and it works through direct community involvement. The convivial approach presents an alternative to the agonistic aesthetic, which is an heir to avant-garde and usually leftist social movements, and it has similarities to contemporary process and community art rather than to their historical ancestors in the avant-gardes.

The immediate aim of the convivial approach is to create a community that creates social goods that the market would not be produce. These goods may consist of many types of things and activities, including daycare, car-pooling, handyman help, communal cooking for children and seniors, and better care for the physical environment, among others. Designing becomes an activity that organizes these activities by creating a community spirit. This spirit produces social controls that keep people participating in these activities and control free riding through social exchange rather than by creating hierarchies or markets.

The best-known project is *Nutrire Milano* that aimed at shortening the industrial food chain by creating shorter connections between agricultural producers around Milan and people in the city. It created a food network that connected these two parties and kept it going by creating a Web site (including a shop) and by building and running a Farmer's Market in Eastern Milan. (Figure 2).

Anna Meroni, one of the project's senior researchers told the author that the project made a distinction between conventional and convivial aesthetics. Conventional aesthetics referred to the artifacts created by the project, including graphics, Web designs, and spaces. These were designed professionally, and they reflect the prevailing design aesthetics of their time. Convivial aesthetic, in turn, referred to the emerging forms of social action in the communities the project created. Examples of these forms were celebrations and interactions in the Farmer's Market. The convivial aesthetic was the heart of the project and though it is hard to capture in words, it was crucial to the project's success and appeal, Meroni speculates.[1]

A detour in art helps to understand the aesthetics of action in Nutrire Milano. Rirkrit Tiravanija's process art of the 1980s took age-old social forms like cooking together or having tea and brought them into an art gallery. His artwork was not a painting, but the (temporary) community and the activity that created it. The act of cooking and eating together, for instance, created only a short-lived community, but it also created an opportunity to experience what it means to be together and to enjoy an exotic meal. His art gave participants an opportunity to see each other in new light, which, in turn created an opportunity to reflect upon their relationship to these others, and that way question their own pre-conceived identities. (See Grassi and Tiravanija 2007).

[1] Anna Meroni, e-mail at 15 Oct 6:05 am.

Figure 2. Nutrire Milano: a community in action (thanks to Anna Meroni)

Something similar was happening in Nutrire Milano, which brought together various parties who knew each other previously only through the commodified, impersonalized, and dehumanized relationships of the market-driven food chain. In Nutrire Milano, farmers, merchants and city-dwellers alike got an opportunity to shortcut these relationships and meet each other as individuals. Much as in Tiravanija's art, Nutrire Milano delivered many types of social goods: not just better food, but also *joie de vivre*, enjoyment of being together, a sense of achievement, and a flash into the world of people the participants would not have met in everyday life.

The convivial approach faces several possible criticisms, of course, but Nutrire Milano confronts many of these. One problem is that its means of action are limited to the community worked with, which may mean that the solutions remain only locally relevant.[1] For example, Tiravanija is the middle of attention in his performances, which limits his acts to those who are invited to his openings. As a form of public action, Nutrire Milano had to negotiate with the city, farmers' organizations, and neighborhood associations. The original Farmers' Market in East Milan was closed because of the pressure from the neighborhood,

[1] This problem is a variation of the critique Tiravanija faced in Germany. His performance in Koln Kunstverein in Germany, which took place while the police was breaking a homeless camp right outside the Kunstverein, attracting criticism in press, local art community and by the fellow Thai artist Jay Koh (Kester 2004: 105). Bishop (2012: 210-211) points out a larger paradox in Tiravanija's work: as it intensifies convivial relations for a small group, it excludes others.

but it was later reopened elsewhere in the city. Also, the way in which Nutrire Milano was done provides some answers to the first critique. It was a research project, which used international design research community to spread the news, and it also used the Desis network (desis-network.org) to share learning from the project.

Another potential critique is the project's reliance on local community as a resource for improvement, which may be seen as an inherently conservative response to social problems – as if rebuilding bucolic villages would somehow heal the earth. However, although the aim of the project was to produce a community rather than direct this community to political action, political action is by no means excluded from its outcomes. Nutrire Milano was animated by a reformist social agenda, which was also anti-capitalist, as the idea of shortening the food chain suggests. The project built convivial communities, but did not suggest them as the only solution to ills in society.

The third question is the designer's role in the process: is he an insider or an outsider? Tiravanija was usually in the middle of action, while his fellow artist Gabriel Orozco positioned himself to the margins of his processes (see Morgan 2011: 25). In Nutrire Milano, researchers were participants, observers, designers, and facilitators. Their role set was complex, and designed to support many types of action. Finally, another potential critique is the open nature of community action: what about a community decides to turn against society, and how to prevent, say, racism in it? Logically speaking, the convivial approach cannot rule out racism or misogynism, but a quick look at the background of the project reveals a reformist agenda that works to make communities more resilient at the face of ecological and social threats.

5. Social Sculpting in *Ave Mellunkyla!*

A third approach treats aesthetics as a found object and builds its program around small changes rather than debate or creating new communities. In the manner of conceptual art, the approach foregrounds the community and its aesthetic and pushes the designers' aesthetics, skills, and opinions to the background. The aim is to build on existing social forms and steer them to outcomes that would be unattainable without a design intervention. The process works through small, situated designs that have a small-scale local relevance. The unit of design is the situation, not the community, as in convivial aesthetics, or its belief patterns, as in agonism.

Ave Mellunkyla! is a good example for studying how this aesthetics might work. Mellunkyla is a leafy East Helsinki neighborhood that consists of four former villages, each with a distinct identity. Mellunkyla suffers from a bad reputation and it is poor by Helsinki standards. Its public housing stock is mostly from the fifties and the sixties and approaching an age in which it needs heavy restoration. The local populations are proud of the neighborhoods, but it is aging. Some parts of the neighborhood are densely populated, public housing attracts social problems, and it has also become a destination for immigration. The greener parts of Mellunkyla consist of houses and semi-detached houses, and have a village-like feeling.

Ave Mellunkyla! was a part of the City of Helsinki's program of reviving old suburban neighborhoods. As a part of the World Capital 2012 year, a group of design students rented apartments in the Kontula subsection of Mellunkyla. They also rented an office space from the Kontula mall. From this "design research field station," they worked with various groups in the neighborhood to push local democracy, to help people to organize renovations of apartment buildings, and to help them to organize things like neighborhood festivals. (Figure 3).

The project had several noteworthy aesthetic qualities. Its approach was molecular at heart: it did not try to produce anything transferable (though it had nothing against the idea of reusing the ideas elsewhere). It was also conceptual: its outcomes were largely invisible to those who did not know about the project. The design objects of the project were social forms in the community, but unlike in Nutrire Milano, there was no attempt to create new forms of social action. Rather, the idea was to facilitate existing social forms.

Figure 3. Ave Mellunkyla! Clockwise from the logo: co-design exercises in housing estates; studies of how to use coffee and food to work with the community; assisting the authorities to set up a graffiti wall; liaising with media in village festivals (thanks to Katja Soini)

This sort of conceptual understanding, of course, has been well rehearsed in art for decades.[1] Although easily dismissed as conceptual and ephemeral, these art works may lead to significant impacts. For instance, Joseph Beuys's *7000 Eichen (Oaks*) consisted of 7000 basalt blocks that were unloaded in the front of Fridericianum museum in Kassel in 1982. Anyone could take a stone and plant it in Kassel, if they promised to bear the cost of 500 DM. The work was presented in documenta 7 in 1982. By *documenta 8* in 1987, all 700 oak

[1] Treating aesthetics as a found object goes back to Duchamp's bottle rack and his infamous urinal, and to the main ideologists of conceptual and minimal art in the sixties.

trees had been planted, each with a basalt stone standing next to it. One tree at a time over a five-year period, Beuys's artwork changed the cityscape of Kassel for decades to come, and to the better. Another project that have inspired the conceptual approach of Ave Mellunkyla! was Rick Lowe's *Project Row Houses* in Houston, Texas. This project treated the city's Third Ward as a found object and revived and turned this formed slum district into a lively neighborhood that has been able to resist real estate barons for two decades. These art works took existing social activities and shaped them to achieve ends through a series of activities that, as a whole, massively improved the lives of people in Kassel and Houston.

Something similar happened in Ave Mellunkyla!, in which the process was even less material than in these references. The project worked with citizen boards and housing associations, youth clubs, sports clubs, event organizers, and the city to produce a series of plans that were mostly immaterial. If successful, however, the impact of these design activities will be seen for decades. This is equally true for urban furniture, detail plans of the neighborhood, and for social forms like youth clubs. Design may disappear from sight, but if it is able to form habits, Ave Mellunkyla!'s minimalistic conceptual approach may be a particularly efficient form of designing.

If we zoom still farther away from the project to its political and scientific (sic) environment, we can also see some of the larger connections of the project. Ave Mellunkyla! had its origins in the City of Helsinki's urban planning, and although it used some radical techniques, it built on a legacy of many other projects (Soini 2015). Some of these projects had led to changes in rules, statues and even law. The project was a part of a City initiative that aimed at reviving aging neighborhoods within the city limits. It was also a continuation of empathic design, a research program in industrial design in the former University of Art and Design Helsinki (see Mattelmaki et al. 2014). Through this program, it had references in earlier research. The program also became a reference for further work. Its significance was not just local.

Finally, one of the key researchers of the project, Dr. Katja Soini, was well read in contemporary art, but her interpretation pushed it to the background to give room focus for design instead. Her conclusion was that although art can open up ways of thinking for designers, it couldn't provide design solutions that have to come from the world of design. What remained from her reading was tolerance to the idea that a strong concept is more important than its material realization. She also realized that a minimal aesthetic building on local vernacular might sometimes be the best path to improve a neighborhood. Her language reflected this reasoning. During her PhD work, she initially spoke about co-design, but turned later into collaborative design stress that she works actively with people and does not put herself above them. She also discarded notions about creativity, innovation and even designing, and preferred instead to work with the therapeutic language of "facilitation." This conceptual learning became the main message to other designers, empathic or other.

Discussion

This paper has explored the aesthetics of action in new social design. While the aesthetics of objects in new social design has been studied elsewhere (Koskinen 2016), the aesthetics of action has received little scholarly attention.

A few precedents exist. A few interaction designers have shifted aesthetics from designers to people through pragmatism, (Graves Petersen et al. 2004; McCarthy and Wright 2005; Overbeeke 2007). The last few years, however, interaction design has seen a surge in interest in Jacques Rancière's agonism, especially after DiSalvo's "adversarial design" (DiSalvo 2011). In design literature, Julier's and Markussen's "design activism" similarly refers to Rancière (Julier 2013; Markussen 2011, 2013). This shift in theory has shifted the locus of aesthetics back from people to designers. In pragmatism, aesthetics resides in people, and designers have to capture it. In agonism, aesthetics becomes a "lure" (DiSalvo 2011) that attracts people to pay attention to the designers' underlying political message that is aimed at reorganizing their perceptions.

Upon closer reading of these literatures, however, we see aesthetic attention mostly goes to objects. One of the reasons may be that this literature largely relies on visual metaphors (like perception) that tend to push social objects and processes to the background. This creates a gap in language in understanding how to work with aesthetically design social action.

This is the gap this paper has tried to address. It has studies three projects to see how they treat social action in aesthetic terms. A detour through art has given some cues to this analysis. In art, we routinely see objects of many sorts, but we also see activities like happenings and performances that involve human bodies and social interactions. Through this analysis, the paper has described three ways in which social action can be treated in aesthetic terms.

- *Agonistic approach* radicalizes the aesthetics of objects in the name of bringing adversaries to the same table to debate their differences. It uses conventional social forms in curating these debates, though;
- *Convivial approach* puts its chips in building communities that produce their own social goods. The approach has precedents in process art;
- *Conceptual approach* pushes design-based aesthetics to the background and gives priority to local vernacular. It leads to minimal design interventions in the community, but aims at producing designs that live in the community for a long time.

The main outcome of this paper is that it shows that there is an aesthetic of action in new social design regardless of whether we acknowledge it or not. Aesthetics is an important tool in new social design, and it has many implications to how it is done. It aligns designers with agendas of many sorts; for example, agonism aligns design with avant-garde art and its usually leftist political agendas. Aesthetics also creates expectations of how to interpret a piece of work; for example, if the approach is conceptual, a fair evaluation of a piece of design requires that this fact be respected. This paper has also shown that social designers

have several ways to work with aesthetics, and each can be turned into an instrument of change, though through very different means.

Large-scale research pending, this paper is best treated as a hypothesis, of course. For example, although a project like *Presence Project* (2001) gives little attention to action as a design object, this does not mean that it is non-existent. It may lie in the Situationist foundations of the project. These hidden roots of the aesthetics of action are matters of further research, however.

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About the Authors:

Ilpo Koskinen is professor in the School of Design of the Hong Kong Polytechnic University. He has been working on mobile multimedia and methodology, and recently on the theoretical and aesthetic underpinnings of new types of social design.

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Designing Debate: The Entanglement of Speculative Design and Upstream Engagement

Tobie Kerridge

Goldsmiths, University of London
t.kerridge@gold.ac.uk
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Abstract: This paper offers a critical reflection of a design practice in which a speculative approach to design became entangled with upstream engagement with biotechnology research. Given that both practices claim to enable a public discussion about emergent technology, what is the nature of their mixing, and how should an analytical account of such a design practice be made? I focus on the project Material Beliefs as a case, and argue that the move on upstream engagement by speculative design is an imbroglio that goes beyond mixing the formal features of practice, and requires a discussion concerning the actions of the designer in relation to a broader set of accountabilities. Ultimately, I contend that this mixing provides an opportunity to foster a reflexive and empirical account of speculative practice, inciting analysis of the organisations and settings that support a speculative approach, and providing a critique of upstream engagement.

Keywords: Speculative, Engagement, Qualitative, Empirical

Introduction

In this paper I argue for the value of empirical analysis of the activities undertaken where speculative design's impulse for debate become mixed with upstream public engagement with biotechnology research. There is an emerging literature within the design research community dealing with speculative and critical design (SCD) approaches. Ph.D. theses include Ramia Mazé's account of critical design as a ideational tool for interaction design research (2007), Simon Bowen's critical artefact workshops as an innovation method (2009). Other academic accounts of critical practice include an account of critical making by Matt Ratto (2009), and a Ph.D. offering a taxonomy of critical design by Matthew Malpass (2012). More recent developments include a discussion of events in practice based design research to conceptualise the integration of critical approaches with co-design (Lenskjold & Jönsson, 2013), an analysis of the formal approaches adopted in a design for debate project (Mollon

& Gentes, 2014) and a feminist discussion of normativity in speculative and critical design (Prado de O. Martins, 2014). In this respect SCD is becoming established as an object and method of enquiry for design research, providing a much-needed context for enquiry, where designers who identify with SCD are supported in making analytical accounts of their practices.

In relation to the case discussed in this paper, wherein SDC's impulse for debate becomes mixed with upstream public engagement, there exists a more focused set of literature, which takes the public settings into which the outcomes of SCD travel, as sites for conceptualising the relations between design, issues and publics, including Ramia Mazé and Johan Redström (2008) and Carl DiSalvo (2009). For example, DiSalvo makes a case for the emergence of issues during public encounters with speculative representations of technology, arguing that publics come together through the capacity of speculative encounters to elicit those issues. However, like Mazé and Redström, DiSalvo does not develop an empirical discussion of the design process or the effects of these practices in public settings. Additionally, analysis of practice in these projects does not extend to a sceptical treatment of the programmes and institutions that frame the topics and structure of the design activity. There are opportunities to develop and extend this emerging literature of SCD, to treat the methods and processes of the making of speculative outcomes empirically, and to treat critically the coalitions and topics that enable SCD practices to move into diverse professional and public environments.

The entanglement of a speculative practice and upstream engagement

In this section I provide a review of descriptive and analytical literature that provides context for the case of practice discussed in this paper, a design project where speculation and engagement became mixed. It is seen that SCD infuses technology with narrative, to generate debate rather than provide utility, and to move from an academic environment into public settings, enabled by the formation of a network where "design thinking can be encountered by the public" (Dunne, 1999), and as an alternative to academia which is seen to confine the appeal of the work (Debatty, 2007). In order to deliver these ambitions, designers sought partnerships with other organisations that would act as clients of SCD. For example, in the UK, public perception of risk in relation to novel forms of technology including biotechnology have precipitated programmes of funding that encourage scientists to make partnerships with artists and designers in order to engage the public about their research. This supported the expansion of SCD commitments to public debate. For example, Biojewellery (Thompson & Kerridge, 2004) and Hybrids (Ashcroft & Caccavale, 2004), sought and were granted funding, from the EPSRC and Welcome Trust respectively. These projects saw conceptualisations of debate rooted in disciplinary notions of criticality, challenged by versions of public engagement that are responsive to the interests of science educators and funding councils. As a result of these concrete associations with programmes of funding and specific professional networks, I argue that designers' expectation that SCD drives public

debate became refined through the rubric of upstream engagement in particular (Wilsdon & Willis, 2004). The promise of the upstream, that early stage scientific research provides a context for democratic engagement in relation to potential future issues of technology (Stilgoe, 2007), supports designers' commitment to speculation.

However, STS literature is sceptical of the claims made for these enlightened and participatory styles of engagement (Irwin, 2006; Wynne, 2006). The upstream is seen to be a rhetorical posture that merely seeks to negotiate the risks associated with predetermined paths of innovation (Wynne, 2006, p. 218). Indeed, the conceptualisation of technology as following a 'stream' reproduces technocratic models of expertise that have been empirically challenged (Bijker, 1987; Wynne, 1992). These sceptical accounts of expertise and power provide nuanced and conceptually rich registers that extend both SCD's assumptions about debate, and those expectations about dialogue incipient in upstream talk.

Material Beliefs as a case of practice

In this section I take episodes from Material Beliefs as the basis for an empirical account of the mixing of SCD and upstream engagement. Material Beliefs was a public engagement with science and technology project funded by the Engineering and Physical Sciences Research Council (Kerridge, Custead, & Gaver 2006), in which I acted as project lead with a wide set of collaborators who are credited in the end of project publication (Beaver, Kerridge, & Pennington 2009). Both the project publication and my Ph.D. thesis, which I have drawn upon for the arguments of this paper, extend and support this section.

Initially I discuss labs as sites where designers, scientists, and non-experts come together to discuss and to problematize accounts of biotechnology research. Next, I examine the process of making speculative designs, and here I emphasise the ways in which issues, materials and practices become compiled as exhibitable prototypes. Finally I consider the circulation and reception of these designs in public settings, including exhibitions, workshops, and online formats.

Situating biotechnology

The funding proposals for Material Beliefs saw that biotechnology and cybernetics facilities were at the centre of a programme of activity, and it articulated three core expectations of labs (Gaver, Kerridge, & Custead, 2007). Firstly, labs were seen as the locus of biomedical and cybernetic research activity, whose likely future applications would entail controversy, for example privacy of data (RS, 2004), and would therefore offer potent start points for SCD projects. Secondly, labs were seen to be venues that would host interdisciplinary collaborations between designers and researchers. Thirdly, it was envisioned that these collaborations would make the lab available as a venue for public engagement. In particular, the issues and topics identified by the designer as a result of their association with researchers would become developed through the delivery of events in the lab, an expectation that aligned with models of upstream engagement (Wilsdon & Willis, 2004). In

the proposal, the designer was seen to be an intermediary who convenes activity that encourages others to imagine the implications of lab research.

After funding was granted, Initial project activities sought to build a network of designers and biomedical researchers to undertake the aims of the proposal. Four designers were recruited to the project, and subsequently a series of interviews were undertaken with biomedical researchers, which were filmed and photographed. Designers encouraged researchers to elaborate upon discursive contexts of biotechnologies rather than technical aspects of research. For example, a discussion about biomedical implants led to chat about the 'worried well' and other features of the market for healthcare. These tangents were seen by designer 1 (d1) and designer 3 (d3) to provide anecdotal treatments of biotechnology that supported the conceptualisation of design scenarios. In this way while researchers might be expected to act as technical consultants, or as experts who can verify and authenticate the biotechnology which is seem to be extended by the design, they in fact contributed to discursive and imaginary treatments of research that supported design speculation.

The interviews also acted in various ways as start points for public engagement activity. A discussion with researcher 1 (r1) about the public controversies of genetically modified organisms led to reflection on the need to communicate the value of nanotechnologies. The conversation led to r1's participation in a public event with d1, despite divergences in their respective expectations of the event, which was for the researcher an opportunity for educating young people about nanotechnology, and for the designer a chance to develop a workshop activity that allowed biotechnology to treated imaginatively.

As a visiting researcher at a biomedical institute, d1 led a number of workshops, one of which is described briefly here. Mind the Loop was a half-day workshop convened at the institute for a small group that included a clinician (r4) a participant from a previous public event participant (p1) who was also a patient of r4, a researcher who was developing an artificial pancreas (r5), and a filmmaker. An aim for the workshop was to allow the participants' diverse perspectives on an artificial pancreas to be shared, elaborated and documented.

It was demonstrated that such biomedical therapies are likely to have effects that are additional to the control of the disease, including the demands of data interpretation upon the patient and clinician, and the affective nature of the technology upon the patient. R1 reflected that these types of insight challenged their own expectations about the workshop as a mechanism for generating speculative design concepts, and became exposed to forms of knowledge that challenged the formulation of controversy for debate that characterised the critical inheritance of their speculative approach. Where speculative design is treated as research, it is possible for an account of practice to give expression to, and find value in, forms of activity that are not well aligned with the exhibition narratives that would otherwise be the dominant mode of outcome.

Designing speculatively

This section provides an overview of making designs in Material Beliefs. The four project clusters of Material Beliefs led to a range of prototypes for exhibition including Neuroscope, Carnivorous Domestic Entertainment Robots and Vital Signs. Despite the diverse approaches and outcomes of these projects, three criteria are useful for considering the mixing of speculative design and upstream engagement. Firstly the designers' association with researchers is conceptualised and managed in different ways, secondly the functionality of a design enables experimental forms of practice, and thirdly the ambition for the design as provide alternatives for biomedical research acted to displace existing variety. I expand upon each of these three criteria below.

Firstly, different forms of association between designers and researchers are evident in the cases of Neuroscope and CDER. In the first case, the designer (d3) and researchers met at the beginning of the project and set a course for subsequent and frequent association. Here the designer takes an experimental approach to their practice by setting up occasions for co-authorship of design materials, including a brainstorming session about future products. However, a later discussion between the d3 and researchers demonstrates that the collaborative generation of such material exposes differences in disciplinary approaches regarding scientific rigour and design open-endedness, and reveals expectations from researchers that d3's design will communicate the value of their research. The second case provided a different approach, where the designers of CDER worked relatively independently, with researchers providing periodic advisory input. Here, the designers see biotechnology as providing raw material for design, where researchers descriptions resource initial design concepts. In contrast the design of Neuroscope leads to a more complex entity.

Secondly, the features of designers' association with researchers during the making of Neuroscope and CDER shaped the development of functionality in the prototypes. Design functionality for Neuroscope became challenged through the technical requirements of system integration, while for CDER there was a focus on behaviours that demonstrated function in order to communicate the design proposal. Both design processes are mindful of the status of the prototype as a public entity, though different forms of publicity are anticipated and embodied in the design, including dissemination, demonstration, debate, promotion, education and ethics. CDER aligned strongly with the designers' initial ambition, a substantial set of speculative work was produced, and design characteristics align with the format of critical design. In contrast, the Neuroscope followed a deep and complex association with researchers, where the speculative nature of the design was challenged by functional integration with biotechnology, and the outcome was experimental and risky.

Thirdly, where the Vital Signs project offered a speculative alternative to a platform for biometric sensing, the design scenario acted to displace expressions of variety that already existed in researchers own accounts of their work. In treating the digital plaster as a monolithic biotechnology, d1 suggested that once the platform leaves the lab, the platform becomes reconfigured to support market driven applications, including biometric surveillance, with dubious implications for liberty. However, the platform had already been

presented as enabling a range of applications including assisted living for the elderly, elite athlete monitoring and the internet of things (Burdett, 2009). In this way, biotechnologies in the making are being both concretely and speculatively tied to entities 'outside' of the lab by researchers. Like the designer, the researcher is actively engaged in the production of scenarios, and the practice of biotechnology research is inherently social.

However, this flexibility is expressed primarily through networks that support innovation, comprised of actors able to provide material, financial and political resources (Wynne et al., 2007). This network construes the public as outsiders, who are characterised as irrational in their misunderstanding of the value of these biotechnical innovations in the making. It is in this context that public engagement becomes a tool for the positive promotion of emergent biotechnology to a lay audience, and at that point the variety and instability of biotechnology becomes fixed (Wynne, 2006). I argue that despite the limitations of Vital Signs as a project, which acted at times to reify these boundaries (of expert and public, lab and society, research and application), an analytical treatment of practice allows these entanglements to become unpicked.

Circulating design

In this final section I review three pairs of episodes where designs circulate in public settings. Firstly, two group exhibitions, one at LABoral in Gijon, Spain and the other at the Royal Institution in London. Secondly, two evening events at the Dana Centre in London, where designers worked with venue staff to deliver public workshops. Thirdly, the compilation of project documentation on a website and in a book, as examples of publication. These examples of circulation, representative of the public-facing activity delivered throughout the project, are discussed below.

Exhibitions are seen to be a core activity for speculative designers, conceived as being the final stage of a designer's work, and considered as the settings where the public encounter speculative designs in the flesh, and where debates happen. However, I argue that the assumption of debate at exhibitions should be treated sceptically, and wonder why, given the value placed on exhibitions, that accounts of what goes into exhibitions and what happens there are so sparse.

Two exhibitions from Material Beliefs were Nowhere/Now/Here at LABoral in Gijón, and Crossing Over at the Royal Institution in London. Nowhere/Now/Here is a contemporary design show that fosters a curatorial agenda about the role of designers in driving cultural change (Feo & Hurtado, 2008), while Crossing Over is a contemporary art exhibition where artists are credited with rearticulating the characteristics of biomedicine (Albano, 2008). These curatorial themes at times aligned with the topics of individual projects and elsewhere required compromises to be made. Therefore while the idea of discussion and debate is largely associated with general expectations regarding public encounters of a design, it is an explicit yet under articulated feature of the negotiations of event partners that take place during planning.

It can also be said that designers and researchers raised doubts about the value of exhibitions as a mode of public engagement. D3 disputed the idea of debate happening at exhibitions given the absence of the designer and their partners, a subject echoed by r14 who commented "you can't ask questions at an exhibition unless there's somebody there to ask the questions to". Elsewhere, d5 saw that in contrast to live events like workshops, exhibitions tend to emphasise role of the designer(s) exclusively, and that therefore the features of collaborations and partnerships become displaced (Dawson, 2009).

The second example of design circulation is a pair of evening events at the Dana Centre. This London venue provides a programme of informal adult education, and identifies with the informal and deliberative formats of public engagement proposed by the Café Scientifique movement (Dallas, 2008). The first event took place after project collaborations had been established but before design work had started, while the second event was delivered nine months later, when designs were well established though not complete. While initially seen as marginal, or as the poor relation of the exhibition, over the course of the project, workshops emerged as preferable formats for some designers, at least in relation to their own conceptions of public engagement.

Sessions at these workshops broadly took one of two formats, firstly where a researcher's account of their work and the designer's proposal for an alternative became synthesised, and secondly where a monolithic account was delivered my either a designer or a researcher. In the first case, design scenarios extended the research narrative, demonstrating that the potential outcomes of research are not necessarily constrained to the applications anticipated by the researchers. These sessions supported discussions that at times aligned with a designer's proposal, and at other times related to practical and personal issues, for example the embarrassment of using biomedical technologies in the workplace. Here, the workshop format exposed variety and generated discussion, in contrast to d5's comments on exhibitions.

The second format for the workshop sessions was a monolithic presentation that supported the speaker's conceptualisation of public engagement. For example at the first workshop, the convener acted as representative for the Dana Centre's broad interest in informal adult education around contemporary science research, whereas a designer mobilised speculative design as a framework for the debate of liberty and privacy, in contrast to a spokesperson for transhumanism who vociferously promoted a gerontology foundation. At times a particular approach prevailed, and activity became largely framed by the concerns of that particular presenter. In this respect, where designers see that their interventions exclusively set the terms for a debate, it should be recognised that their expectations merely contribute to a variegated scene of public engagement.

Finally, it can be seen that a website and a book supported aims of the original proposal to make the project process visible to less immediate audiences. Both these outcomes drew substantially on the same material, including interviews with biomedical researchers, the process of designing artefacts and the exhibitions and public events of the project. However, the website was formative in character and so a blog became a distinctive feature, whereas

the summative nature of the book supported indexes and essays that surveyed the project and its themes.

Due to its formative nature, online documentation presented a challenge to the effective formation of a design outcome. Early stage drawings of the CDER designs were posted on the project website, and the editor of a popular design blog was contacted and sent a set links to this content, resulting in an interview about Material Beliefs accompanied with the CDER drawings (Debatty, 2008). This was seen by d4 to diminish the impact of the design as a finished proposition. Here, the idea of a stable 'public image' seems at odds with speculation as a format that encourages debate and discussion, which would seem to entail versions and opinions rather than a single agreed format. However, d4's concerns can be seen as a response to what is seen to be premature and badly executed promotion, rather than a rejection of an experimental approach to engagement, and this is due to the somewhat strange conflation of promotion and engagement enabled by the website.

Nevertheless, there is also a sense that a designer's control of the representations of a design, and the role of a designer as sole arbiter of the terms of debate, become challenged by attempts to connect design practice to public engagement. Certainly an ambition for a responsive mode of documentation of design processes interferes with the focus on the exhibition of finished designs that has been inherited from critical design's version of public debate.

The value of empirical speculation

In this paper I have treated a case of speculative design practice empirically, taking a focus on project episodes associated with fieldwork, making and dissemination, in order to deliver a reflexive analysis of the mixing of the designers' ambition for public debate and the funders expectations of upstream public engagement of biotechnology. At the outset I argued that such an empirical description of practice would make a constructive contribution to a developing theme within design-research that makes analytical account of SCD. In this final section I discussion three features of this empirical case.

Developing the rhetorical claims of speculative design's practitioners

The idea that speculative design engages the public and enables debate need to be grounded in the analysis of actual events. Frequently, designers' and curators' claims for practice are rhetorical and anticipatory, and are not supported by analysis of the circumstances of making, installing, exhibiting, and promoting designs. I am therefore sceptical of claims made for the effects of SCD by its practitioners, which often suggest that the creation of a network for exhibitions and other public events, enable the critical discourses that inform their design work, to become more widely available as a form of public debate (Debatty, 2007; Dunne & Raby, 2003; Kerridge et al., 2006). Coupled with this notion of establishing a network for the circulation of speculative design is the idea that exhibitions enable a broad medium for the discussion of critical ideas, where those concepts in their original form are seen by designers to be inscrutable, scholarly and remote.

However, I contend that the discourses used by curators and practitioners to make rhetorical accounts of design projects are not somehow unshackled from disciplinary and specialist knowledge, indeed the languages and conventions of the network that SCD has established is opaque and mysterious.

I have demonstrated that an empirical analysis of speculative practice deals with the process of design as well as the outcomes. In the case presented here, outcomes included the exhibition of designs and their documentation in catalogues and project publications. While these forms of circulation are taken for granted, their features have been described elsewhere in limited ways. Additionally a range of activities took place during the trajectory of the project, including proposal writing, interviews, workshops and the making of prototypes. Treating these various processes as episodes for reflection and analysis requires an account of speculative design that includes the positions of non-designers. In taking focus away from the intent of the designer, a richer picture of the design setting has been captured, and the claims made for the effect of a design have become challenged and shown to be multiple and at times contrary.

Speculative design's enchantment with upstream engagement

In this paper I have grappled with speculative design's attraction to the idea of upstream engagement. As a consequence of writing analytically about this project, preliminary ideas about the compatibility of speculation and engagement have been challenged and developed. For, despite policy ambitions for experimentalism and democratic participation, upstream modes have reintroduced problematic and patronising models of public engagement (Wynne, 2006). Therefore, rather then applying the rubric of upstream talk to the rhetorical features of speculation, sceptical treatments of public engagement have supported a richer articulation of design practice, and allowed more robust accounts, not only of the practice but the frame in which the practice is carried out. This mode of writing has something in common with social scientists' accounts of practice (Doubleday, 2007; Horst, 2007), where researchers speak reflexively about project activities in which they have a hand.

The will to engage mobilises divergent and incompatible energies including education, public relations and deliberative policy. I have endeavoured to provide an alterative to articulations of speculation that would align it instrumentally to one or another of these schemes, particularly where the designer could become a conduit for the ambitions of an entrepreneurial, scientific innovator. There is a possibility here, that speculation becomes reduced to a mode of communication regarding the benefit of biotechnology (RS, 1985). Crucially, though speculation also does not explicitly link into some later mechanism, such as the formulation of policy. Rather, speculative design offers a practical critique of public engagement's assumptions.

For I believe that a strength of speculative design is that its disengagement from engagement keeps the conceptualisation and evaluation of technology talk loose, whereas upstream engagement ultimately conceptualises discussion in relation to a linear model of

technology development (Stirling, 2008). The notion of a 'stream' of activity that can be navigated goes against the open-endedness that is established in forms circulation described here. Michael has written about the multiplication of versions of technology in speculative projects, which "Spiral out in many conceptual directions, raising questions about a multitude of indistinct issues surrounding science and technology" (Michael, 2009). I have argued that rather than talking about creating debate, designers could admit to a less authoritative and central role, accept the proliferation and indeterminacy of their concepts, and commit to providing an account of this variety.

Speculative designers as practitioner-researchers

I hope that this paper is a tentative exemplar of a mode of writing where SCD practitioners provide analytical accounts of the activities they undertake, so that knowledge about their practice can be shared with others. Those who identify with a speculative approach may not be seeking partnerships with biomedical researchers, though they will probably be working with partners from another professional setting. They might not be conducting interviews in labs, but there will likely be processes of discovery within partner settings where ideas are generated and proposals are designed. Those outcomes might not be encountered by particular publics and responded to in ways that are characterised as challenging the configuration of biotechnology, but no doubt there will be an emphasis on the imaginative reaction of a particular community or participant. So this paper has provided an example of how the features of a particular case of speculative design can be captured and shared.

Having argued for the accountability of SCD through analytical writing, I would like to dispel what might be a persistent doubt in the minds of some speculative designers about doing practice-based research. For speculative designers, there is perhaps a discomfort in treating their own work critically, a sense that analysis would diminish the assurances and prestige granted by the circulation of finished designs. However, I contend that the discomfort experienced by a speculative designer as they adopt an analytical mode is in fact productive, and hopefully resources a conceptually rich and much expanded account of practice that is legible to other designers, academics and project partners.

Conclusion

I have emphasised that without robust analysis, speculative design is tied to modes of writing that offer limited and rhetorical accounts of its features. In moving beyond descriptions that support the promotion and exhibition of their projects, speculative designers can become responsive to the features of the settings in which their work operates. Additionally, given the association of my speculative design case with upstream engagement, this paper provides a distinctive and critical lens for the idea of upstream engagement. Thirdly, given that the processes of making and circulating speculative design artefacts provide the grounds for a reflective analysis of practice, this paper encourages speculative designers working with partners in professional settings to treat the activities they undertake as research.

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About the Author:

Tobie Kerridge is a Design Researcher and member of the Interaction Research Studio, Goldsmiths. He takes a collaborative and speculative approach to design, providing empirical and critical accounts of practice. His designs have been exhibited internationally, including at MoMA andw the Design Triennal, Beijing.

SECTION 6

DESIGN AND TRANSLATION

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Introduction: Design and Translation

Giovanni Baule* and Elena Caratti

Politecnico di Milano
*giovanni.baule@polimi.it
DOI: 10.21606/drs.2016.617

> "Translating as an activity and translation as the result of this activity are inseparable from the concept of culture. The translational capacity of culture is an important criterion of culture's specificity. Culture operates largely through translational activity, since only by the inclusion of new texts into culture can the culture undergo innovation as well as perceive its specificity" (Torop, 2002).

The track Design and Translation faces the issue about the relationship between design culture and translation starting from different research perspectives (theoretical, critical, methodological, phenomenological, experimental and operative), and in relation to manifold design domains or contexts of application.

The prerequisite is that translation can be understood in term of a "transformative design activity" aimed at reformulating, translating or, more often, transmuting contents from one starting condition to a final one. We'd like to assume that through the translation paradigm it is possible not only to generate new expressive interpretations, contaminations, simplifications or expansions of meanings, but also define tools and methods capable of dealing with a world that is always more inter/multi/trans-cultural and inter/multi/trans-media. As Morin asserts in relation to complexity: "the principle of disjunction, of separation (between objects, between disciplines, between notions, between subject and object of knowledge), should be substituted by a principle that maintains the distinction, but that tries to establish the relation" (Morin, 2005), we think that the paradigm of translation accomplishes these tasks.

From the perspective of Communication Design to translate means to facilitate comprehension, to make content accessible to a specific audience, to identify the most appropriate form of expression for a new medium, to improve the quality of communication in a multilingual, intercultural context or in a multidisciplinary cooperation, to actively contribute to the sharing of a critical culture, a new awareness in all dimensions of social life, (education, work, politics...). More broadly, the connection between translation and design

concerns the definition of systems of productive mediation finalized to create reflection, inclusion, interaction, collaboration and exchange.

Furthermore, the continuous shifting of boundaries between disciplines, fields of knowledge and productive models, demands more design skills able to develop themselves as a process of translation between different codes and patterns, and thus it makes it necessary to redefine not only the linguistic and interpretative sphere, but above all the critical and analytical thresholds of the designers who produce communicative artefacts.

According to these premises, the designer plays a role similar to that of an interpreter: "he has the task of putting the client in dialogue with users, the economic values with the values of use. The designer mediates between the complex nature of the artefacts and the sense effects that these will have on persons-users – on the totality of human life." (Zingale, 2012: 50).

Translation presupposes an interpretation, but also every interpretative process can be exemplified through a process of translation that, on the basis of different theoretical matrices, can assume multiple connotations. We can distinguish: the classic arrangement of Jakobson's semiotics follows further elaborations within the sphere of translation studies which, in short, uses the term translation to mean the transposition of a text from one natural language to another (*interlingual translation*); the transposition of a work from one artistic form to another (*intersemiotic translation*); the transposition of a text from one form to another within the scope of the same natural language (*intralingual translation or paraphrasing*); the reference of a text to a prototext, or transposition of someone else's words into the words of the author (*intertextual translation*); the verbalization of a thought or an idea—writing, conversation (*verbalizing translation*); or the assimilation of a verbal text—reading, listening (*de-verbalizing translation*) (Osimo, 2015:320).

These theoretical formulations of the concept of translation constitute the basis for further distinctions if applied to the field of design:

- What are the design articulations that are more sensitive to the translation paradigm?
- Why can a design artefact also be seen as a text resulting from a translation process?
- In what way can the translation process proper be defined and described in design?
- Is it possible to identify some recurrent "translation models" in design?
- What are the positive or negative implications of a translational sensitivity?
- What kind of impact can this paradigm have in design education?

The contents and the aims of the majority of the papers presented – and thus the track as a whole – are evidences of the significant growth of initiatives, projects and other forms of design-knowledge production directly or indirectly linked to the concept of translation or of translation processes.

In the introductory paper, *Towards translation design. A new paradigm for design research*, Baule and Caratti explore the concept of translation, starting from the assumption that it constitutes an essential reference for design culture. They assume that a designer (and from

their perspective a communication designer) is a "translator", since he or she realizes a continuous process of mediation, transfer and re-transcription between the systems of departure and arrival.

This perspective leads them to suppose that the application of the "translational paradigm" within the design domain can generate new design sensitivities and new research opportunities into language and into the processes of transferral between different supports and media.

Zingale's contribution, *Design as translation activity: A semiotic overview*, addresses the relationship between design and translation, according to the semiotic and linguistic perspective. Starting from relevant models of the theory of translation, he recognizes three modes of conceiving the translating activity in design.

Firstly, the translating activity in design is the ability to say explicitly something that had not had the possibility of being expressed before, but which is nonetheless present in the common conscience as content looking for a form of expression: in this case, the designer invents and elaborates the proper form of expression that was lacking or inadequate before.

Secondly, the translating activity in design presents itself as the ability to say clearly what was obscure and would have no other possibility of being comprehended: In this case, the designer is an interpreter of semiotically undefined contents and invents or elaborates a form of expression that makes those contents more accessible.

Lastly, design is an act of translation because it tries to say differently something already expressed, but that is semiotically weakened by the changing cultural contexts (or by historical, ethnical, geographical ones), but which could gain more strength if renewed and reformulated through techniques and instruments enhancing its expressive effectiveness.

In the paper, *Word to image – image to word*. *The contribution of visual communication to understanding and dialog*, Renner starts from Gadamer's description of hermeneutics to analyse methodologically the practice of visual communication as a form of interpretation, negotiation and insight. His considerations are reinforced by some concrete didactic experimentations realized by the students of the Basel School of Design.

The concept of interpretation is explained through the process of drawing (conceived as a gestural activity) and in relation to the different possibilities of iconic interpretation. According to Renner, the designer realizes an interpretation of the world that expresses an individual point of view beyond preconceived conventions: the goal of drawing does not primarily focus on the representation of reality, but rather on the provocation of thought, which leads to a dialogic conversation.

The relationship between word and image is deepened through the analysis of the process of visualization of an identity. The author asserts that through the field of corporate design, it is possible to strengthen the hypothesis that images follow a logic that is only partially accessible through words. Lastly, through the analysis of pictographic images or diagrammatic images, Renner suggests that "practice-led iconic research" is a methodology that uses a systematic generation of images to advance our knowledge of images. The

author concludes that the generation and analysis of visual variations is comparable to a discursive and language-based methodology in hermeneutics which requires that various contrasting aspects be considered.

Nordvall and Arvola, in their paper titled *Perception, meaning and transmodal design*, address the theme of translation in the area of interaction design, or rather, in the area of transmodal design. They start from the consideration that our cognitive activities are transmodal, and they assert that an appropriate use of different modalities and their translation in design can facilitate understanding, make information more accessible, improve communication, stimulate critique, and improve inclusion of, for example, people with sensory disabilities. In particular, they analyse three interactive systems to propose that a "transmodal design approach" facilitates designers to realize the communicative potential of different modalities and hence present users with a transmodal perspective on their interaction space that allows for continuous rearrangement and use of modalities.

Dina Riccò, in the paper *The ways of synesthetic translation: Design models for media accessibility*, debates the theme of accessibility to contents through the concept of synesthetic translation. This original form of translation can be considered as a particular type of intersemiotic translation that requires and targets different sensory registers. This perspective focuses on the consistency of the relationship between multiple languages but also on the translation processes that are independent from the media. In particular, Riccò argues that synesthetic translation can overcome sensory barriers starting from three main transfer procedures: from written language (verbal and/or figurative) to oral language (and vice versa); from written language (verbal and/or figurative) to tactile language (and vice versa); and from sonorous/musical language to visual language (and audiovisual). The goal of the author is to achieve a form of design that grants everyone access to content (design for all). The conclusion is that all too often, despite having access to the necessary tools, visual designers tend to neglect the needs of the disabled.

In the contribution of Ciastellardi and De Kerckove, *The narratives and the supports. Remediating design culture in the translation of transmedia artefacts*, the authors describe an emergent design translation model related to transmedia artefacts. These artefacts include all kinds of productions that can be created, distributed and consumed across multiple platforms and formats in order to expand the participative audiences as well as the narrative itself. Their translation model summarizes the different patterns and the necessary phase for the design of a transmedia product, and it is finalized to improve comprehension and the trends of transmedia phenomena, as unique artefacts as well as micro-universes of different cultural assets. According to the authors, this task requires a change of perspective about some traditional models of content translation, media translation, and editorial translation, but it allows for moving toward a frontier that is fundamentally changing the rules of social, economic and cultural consumption and production.

Damon Taylor, Monika Büscher, Lesley Murray, Chris Speed and Theodore Zamenopoulos, in the paper *Rules of thumb: An experiment in contextual transposition,* discuss methodologically the specific transfer mechanism of transposition. The authors report the

results of an interdisciplinary experiment about contextual transposition finalized to foster cross-disciplinary collaboration and innovative project ideation through facilitated serendipity. They define contextual transposition in terms of a mobile, inventive method capable of extending existing creative and participatory design methods in a way that more effectively respects and leverages the practices and knowledge of the "publics" researchers engage with. The aim of the experiment in contextual transposition was to explore the potential of transposing the structural imperatives and practices of "a" specific practice: hitchhiking – to another cultural context in a way that supports greater social justice.

According to the authors the value of transposing knowledge and practices from one context to another indicated that the transposition from domain to domain was not acting as a mechanism for preserving useful structural characteristics, but rather was acting as a springboard for generating new or previously unobserved structures within a new context.

Ruedi Baur and Ulrike Felsing, in their contribution *Juxtaposing Chinese and Western representational principles: New design methods for information graphics in the field of intercultural communication,* address the issue of visual interlingual translation.

The authors examine different knowledge graphics from Chinese and Western cultures, which in the course of globalization, are being increasingly loosened from their original cultural references.

The paper focuses on the question of which design methods are capable of making the diverse relationships between these representational systems comprehensible.

We move always in a pre-understandings system, in other words we produce prejudices, because we belong to a culture, a language, a system of values, a tradition, a history. There is not a neutral relationship with the world: it is always pre-judged, interpreted and translated on the basis of a meaning that precedes it and directs it.

Blair Kuys and Wenwen Zhang's article titled *Elucidating perceptions of Australian and Chinese industrial design from the next generation of industrial designers,* reports a recent pilot survey targeted at Chinese and Australian industrial design students about perceived issues associated with industrial design programmes at university level in both China and Australia. This survey aims to better understand the mindsets of the next generation of industrial designers, as they will be the people in positions to truly develop change. The authors assert that the survey confirms many stereotypes associated with both China and Australia, however, by questioning the next generation of industrial designers, they will hopefully realize the importance of their role within their country to help strengthen their discipline and dispel myths and stereotypes.

The concept of interlingual and intersemiotic translation is deeply examined by Anne Ketola in the paper *Translating picture books: Re-examining interlingual and intersemiotic translation*. Starting from Jakobson's classification of translation models (intralingual, interlingual and intersemiotic), the author deals with the problem of the translation of picture books: a particular multimodal artefact characterized by the coexistence or interdependence of the verbal and the visual source text. Her analysis of the three Finnish

translations of *The Tale of Peter Rabbit* by Beatrix Potter provides the opportunity to demonstrate that the translation of a picture book includes elements of both interlingual and intersemiotic translation separately, as well as a combination of them both – a type of translation not represented in Jakobson's classification. According to the author translation is a richer interpretative process than traditionally assumed: the process of interpreting verbal signs by means of other verbal signs – determinately labelled as "translation proper" by Jakobson – is often enriched by information derived from modes other than the verbal.

The last paper from Ola Ståhl, *Long Kesh: Site – sign – body,* addresses the concept of translation beyond the act of faithful interpretation; translation here is conceived as a practice of manipulation.

In reference to the events at Long Kesh prison in Belfast in the 1970s and early 1980s and in particular to the republican inmates' protests depicted in Steve McQueen's film *Hunger* (2008), the author engages a set of concepts and practices that pertain to today's thematic: violence, the body, semiology and design. The case of Long Kesh represents the ways in which design practices are involved and instrumentalized in the socio-political process of discipline and control. The author affirms that in design research it is necessary to develop approaches and perspectives that deal with design as manipulation, repression, subjugation and exploitation from a historical as well as a contemporary perspective.

The last author demonstrates that the act of translation could be connected to political, social or ideological factors and translation can be an effective tool of manipulation and transformation; this reminds us that the designers-translators play an important role of mediation and they are responsible for the efficiency and effectiveness of artefacts but also for the long-term consequences on our society and our environment.

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About the Authors:

Giovanni Baule full Professor at the Design School, Politecnico di Milano, was co-coordinator of the PhD in Industrial Design and Multimedia Communication. His interests deals with theory and methods of communication design project. Expert in visual communications, is engaged in design history and criticism.

Elena Caratti Architect, Ma in E-Design and PhD in Design, is currently Researcher and Assistant Professor at the Design School of Politecnico di Milano (Degree Course in Communication Design). Her research interests cover communication design theory and design education.

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Towards Translation Design A New Paradigm for Design Research

Giovanni Baule* and Elena Caratti

Politecnico di Milano
*giovanni.baule@polimi.it
DOI: 10.21606/drs.2016.421

Abstract: In this paper we explore the concept of translation, starting from the assumption that it constitutes an essential reference for design culture. We assume that a designer (and in particular a communication designer) is a "translator", since he realises a continuous process of mediation, transfer and re-transcription between the systems of departure and arrival. This perspective leads us to suppose that the application of the "translational paradigm" within the design domain can generate new design sensitivities and new research opportunities into language and into the processes of transferral between different supports and media. We believe that design has specific affinities with the field of translation on several levels and, at a general level, has at least two main shared characteristics, one relating to content and the other to process.
If design is translation, what are the nodes of pertinence and the implications in terms of research?

Keywords: communication design, translation paradigm, interdisciplinarity

The Translation Paradigm for the Field of Design. Design is translation

The paper summarises an interest in the field of design for translation cultures, accepting an extended meaning of the total concept of translation (Torop, 2000), and considerably broadening the spirit of traditional "forms of translation" (Holmes, 1988). In this sense, we understand both de-verbalising and non-textual forms of translation, and all those cases in which translation studies specifically place the emphasis on non-literary texts or on the intersection between literary and non-literary texts (film scripts, for example).

The evolution of this relationship can be traced back to the idea of producing texts beyond the linguistic limits recurring in the development of semiotic studies (Snell-Hornby, 1988). The evolution of translation theories and studies (Steiner, 1975) is briefly represented by what are commonly known as three generations: the first is "translation science", which is limited to the word as a terminological transposition; the second corresponds to "translation theory", which evolves from interlanguage relations to intertextual ones (Nergaard, 1995); and the third generation seems focused on disciplinary identification and, under the name of translation studies, it categorises translation as intercultural communication (Holmes, 1988). The evolutionary development in the field of translation studies marks the passage from "text" to "culture" (Snell-Hornby, 1988).

These generational passages have allowed us, on the one hand, to overcome the stereotypical elements that overshadowed the debate within translation studies in the past, such as the principles of faithfulness, transparency and equivalence, which drew attention to the real problems of interlanguage textual translation. What is more important, as far as we are concerned, is the crossing of "a line in research focused on the different relationships between a system of departure and arrival" which would have "led translation theory to a dead end" (Toury, 1980).

These references have given way to an intercultural dimension of translation; this means that the dialogue between cultures has to involve the meeting of various disciplinary fields which are contiguous or which bear some kind of affinity. In this sense, a genuine paradigm shift (Kuhn, 1962) must be recognised, one which makes the translation principle an open system.

Consequently, the process that has crossed translation theories has made plausible those interdisciplinary contact points that are the prelude to the construction of a translation paradigm that can be adopted by other study fields, and has multiplied them. Along the same lines, if translation studies and theories show that they have established a programmatic expansion of the field over the years, other disciplinary fields—and particularly design and design culture, as far as we are concerned—have also been affected by a cultural turn, shifting their traditional study subject and extending their interdisciplinary scenario.

The design field, within the wider area of design disciplines, now comprises those theories and practices which, having different but related fields of application, and involving different tangible and intangible systems and objects, share the same cultures, methods and basic formative processes. In particular, it is communication design that reveals itself as the area considerably closest to translation culture: it looks at the design of objects and communication systems and, being an activity that mediates between different languages, it implies continuous transferral of supports and media. It shows specific affinities with the field of translation on several levels and, at a general level, shares at least two main characteristics, one relating to formation, or purpose, and the other to process.

The formative characteristic postulates the communicative nature of translation: "From a theological point of view, translation is a communication process" (Levy, 1967).
The process-related aspect highlights the translation procedure, like that of design, as a system of continual options: "From the practical point of view (...) translation is a decision-making process: a series of a certain number of consecutive situations—of moves, like in a game—situations which force the translator to choose between a certain number of alternatives" (Levy, 1967).

The translation dimension seems indivisible from the design process: the act of designing and the act of translating can be identified under a shared performance principle.
If the interdisciplinary relationship between the fields of culture of design and translation studies seems to refer to an ideal common translation platform, the translation paradigm assumed in the field of communication design studies prompts a definite incentive in foundational terms, promoting contributions to the theory and practices of design.

Nodes of Pertinence. Translation towards communication design

Some nodes within translation studies highlight their proximity to relevant themes in the field of design and lay the foundations for a common paradigm. Thanks to these nodes, we can identify the assonances and first connections between the two different fields of study.

We ought to start out by looking at how much the history of translation theories (Nergaard, 1993) and the anthropology of translation (Bettini, 2012) have restored in terms of constant change in time.

It is also helpful to remember the different meanings of the term “translation”, starting from those used way back in the classical period (Osimo, 2015:1): for the ancient Greeks, it was associated with the verb to transport (*metafero*), but also to paraphrase and, lastly, to denote the operation of transcribing (*metagrafo*); for the Latin peoples, it was correlated with the text obtained in the receiving culture and associated with the activities of copying (*vorto*) and transcribing (*transcribo*), but also with the activity of translating at narrative level in order to produce a legible text (*converto, transverto and imitor*).

In the sphere of semiotics, too, it is possible to enumerate the many nuances of the concept of translation, starting with the first important theoretic expression in Jakobson (Jakobson, 1959). Translation is distinguished here in terms of *intralanguage translation,* or reformulation, which consists of an interpretation of verbal signs using other signs in the same language; *interlanguage translation,* or actual translation, which consists of the interpretation of verbal signs using another language; and *intersemiotic translation,* or transmutation, which is represented by an interpretation of verbal signs using non-verbal signing systems (Jakobson, 1959).

The classic arrangement of Jackobson’s semiotics follows further elaborations within the sphere of translation studies (Osimo, 2015), which, in short, uses the term translation to mean the transposition of a text from one natural language to another (*interlanguage translation*); the transposition of a work from one artistic form to another (*intersemiotic*

translation); the transposition of a text from one form to another within the scope of the same natural language (*intralanguage translation* or paraphrasing); the reference of a text to a prototext, or transposition of the someone else's words into the words of the author (*intertextual translation*); the verbalisation of a thought of an idea—writing, conversation (*verbalising translation*); or the assimilation of a verbal text—reading, listening (*de-verbalising translation*). It is with the field expansion implemented by translation studies that the area of reference of "translating" extends so much as to allow the identification of pertinences within the field of design.

If language skills are based on an acknowledged "grammar of options" (Bell, 1997), this forms the backbone of translation. It is in this sphere that we create that control of transformations that lies at the basis of the act of translation. And the claims made by Levy (Levy, 1995) in "Translation as a decision process"—a study which also has the merit of highlighting the process-related aspect of translation—reveal this aspect as a further theme for the generation of the convergence with the field of study of design cultures. Not only the act of design in general, but also—and particularly—all those transferrals from one language to another that are typical of what we call "translation design", seem to be based on a grammar of options in the broad sense.

The consonances with the field of design culture multiply when the theories of translation bypass "literalism"—the idea of literal translation, or translation to the letter; the main meaning of "loyalty"; the conception of an "original" text; the very idea of a "source" text—in favour of a circularity and a reciprocity of interaction between texts to translate and translation texts. Even the referral to memetics (Dawkins, 1976)—the principle of transmission and reproduction of culture and information – within the traductological sphere (Salmon, 2003:155) opens up scenarios that converge with communication design.

Hence the overcoming of a rigid and schematic vision of the principle of equivalence found an outlet in Skopostheorie (Reiss & Vermeer, 1984): the centre is occupied by the purpose of the translating act, "the translator's coherence with his project (...) and the concept of "loyalty" can only be used relatively in relation to this coherence: no longer to the original but to the project" (Salmon, 2003: 118). In this case, too, there is a clear signal of proximity to the methods and cultures of design.

In turn, the principle of inter-culturality means that "never more so than in this decade has translation been talked about as intercultural communication" (Nergaard, 1995:16). The recognised intercultural nature of translating "stems from the claim that translation regards cultures more than languages, stems also from the fact that, among all the difficulties and all the aspects to consider, language is probably the least important" (Lefevere, 1992: XIV).

The idea of translation as "an act of communication that takes place between cultures" (Nergaard, 1995:16) implies a further effect that also concerns the design field. Consequently, numerous passages among different cultures, including those that we call "visual cultures" and "digital cultures", for example, or visual manipulations and medial hybridisations (Manovich, 2010), can be recognised as translation passages. In this case we

are very close to the themes of communicative access, design of access (Baule, 2009) and design of the interface (Anceschi, 1993), as the design of mediation devices for interaction between different worlds. In these cases, there is also a theoretic proximity with the hermeneutic perspective of translation, seen by Gadamer (1960) as dialogue and cancellation of the conflict between opposites.

The very theme of the invisible nature of translation, according to the stance taken by Lawrence Venuti (1995, 1998), is connected to the invisible nature of translators.

Paradoxically, the translator seems to be "visible" only in negative terms: he shares the presumed faults of the author, but not the merits. In particular, the undisputed merit of translation studies is that of having clearly defined the paradox by which, at least in the West, translators, the people who allow cultures to open up, evolve and find new methods of thought and expression, are excluded from adequate social, economic and affective recognition (Salmon, 2003).

The invisibility of the translator corresponds directly to the invisibility of the designer in his anonymity: alongside certain duly and emphatically "signed" authorial projects, the invisibility of the translator is a frequent rule, especially in the communication design sphere, albeit within a context in which the figure of the designer seems to apparently enjoy personal recognition and social prestige. Within the design sphere, the matter of visibility implies, as a counterthrust, a forced authorship, such as to guarantee maximum visibility and media success, to the detriment of a design based on the principle of the right measure.

Transitions of the Discipline. Communication design towards translation

The Communication design is a discipline that has changed over time in relation to the development of the historical, social, economic, technological and productive contexts: not only has there been a quantitative and qualitative explosion of the types of content (multimedia, multimodal, generative), and a multiplication and complexification of the technologies and channels of production, distribution and fruition of the artefacts, but there has also been a passage from an "artisan" way of doing things, aimed at the organisation of visual components and printing processes, to a dimension of dynamic, articulate, plural design research, focused strongly on the user.

Among the critical aspects and highlights of this transition, Pizzocaro (2015:28) notes "the increase in flexibility of the different disciplinary areas of design, the boundaries of which often seem to be blurred; the emergence and advancement of a conspicuous area of experimentation in relation to the experiential components of the products, which integrate with the physical components of the materials; the absence of a clear demarcation between products and services; the consolidation of research methods aimed specifically at grasping and interpreting peoples' needs and desires".

The values that focus research within the plurality of interrelation and reference technologies are numerous and sometimes interconnected, and include information (Sless,

1992; Bonsiepe,1993; Frascara, 2015); the display of data of complex spaces (Tufte, 1997; Wood, 1993); multimediality and multimodality (Anceschi, 1996); interaction (Anceschi, 1996; Lowgren & Stolterman 2004; Moggridge 2007); critical reflection (Baule & Bucchetti, 2012; Dunne & Raby, 2001; Mazé & Redström, 2007; Schön, 1983; Senger et al., 2005); user centrality (or experience) (Frascara, 1997; Mitchell, 1993; Norman & Draper, 1986; Pizzocaro 2015); crossmediality or transmediality (Flusser, 1997; Jenkins, 2008; Manovich et al., 2014); synaesthetic perception (Marks, 1975; Riccò, 1999); communicative access (Baule, 2012); services (Manzini, 1993; Meroni & Sangiorgi, 2011), and collaborative participation in design activities (Poggenphol, 2004; Sanders, 2013). In short, from a research model founded on a single discipline, we now find ourselves looking at a "research programme" structured on an integrated system of disciplines focused on different segments of society.

This first reference framework reveals different levels of complexity which require the designer to have a strong cultural barycentre and the ability to plan numerous points of view and then switch from one to the other.

Our research starts from the basis according to which the configuration (the unifying nucleus of communication design) forms the catalysing element of a series of transformative possibilities (or translation practices), which allow designers to put different disciplinary spheres, application contexts and users in touch with each other.

As reported by Cross (2007b: 25) when quoting the work of Hillier and Leaman (1976), it is as though the designer has a sort of artificial language which has transformation properties: "in effect, the designer learns to 'speak' a language—to make a useful transaction between domains which are unlike each other (sounds and meaning in language, artefacts and needs in design) by means of a code or system of codes which structure that connection."

The communication designer is comparable to the figure of a "translator" in that, via configuration and transferral procedures, he performs a continuous mediation activity between the elements of context and the diversity (geographic, cultural and physical) of the players involved. He not only performs a task which is linked to the aesthetics of products or the way they are staged, but also makes the contents available for use in terms of legibility and hierarchy, contributing to determining their articulation through graphic editing operations, renewing the possibilities of communicative access to contents (tangible or intangible), and creating tools for sharing knowledge and facilitating its dissemination.

In other words, the communication designer has specific abilities and transversal skills, which are implemented in the interpretation and organisation of content (from a perceptive and semantic viewpoint); in their transferral from one context (physical, geographic, organisation or cognitive) to another; and in the invention of "new interpretants and social habits" (Zingale, 2012: 31) which renew our relationship with things but, above all, the relationships with and among people.

Mechanisms of translation and interpretations are also implemented within the design process itself: Tomes, Oates and Armstrong (2015: 3) affirm that the processes of "translation" from verbal to visual and from visual to verbal (intersemiotic translations) are

essential in every design phase: “the outputs of individual creativity are progressively negotiated to a mutually satisfactory outcome, first with other designers and subsequently with the client. In this process the ability to articulate verbal meanings associated with visual design, and conversely, to interpret verbal messages in visual terms is a core skill. Viewed in this light, the whole of the design process is directed towards the achievement of a mutually acceptable visual “translation” of the brief, and it is achieved along the way through the medium of lesser translations from the verbal to the visual and back again.”

The concept of translation applied to the sphere of design and the design of communication must not be confused with translation in its pure sense (as practised by publishing houses [Eco, 2003]), or with the concept of prefiguration (Vorstellung, which is the ability to present the mind with an image of something which is not in front of the eyes [Zingale, 2012]).

By translation, we mean a “transformative design activity” (Darstellung, meaning presentation through ostentation, which implies a shared and intersubjective dimension [Zingale, 2012]) aimed at reformulating, translating or, more often, transmuting contents from one text to another. The goal is to generate new expressive interpretations, contaminations, simplifications or expansions of the source text within an inter/multi/transcultural dimension.

This brings us closer to the ethical dimension of communication design, which affects the value, meaning and content of communication artefacts and their impact within a social context: “the ethics of responsibility, in the technological society, assumes a wider dimension: it means to change the projective dimension of the project. The quality of the single communicative artefact, a starting condition, can no longer be independent from the general quality of communicating and from the perspectives of the communication as a whole” (Author, 2007: 57).

This first formulation of the concept of translation opens up the way to numerous other distinctions. To further analyse the relationship between design and translation, it is necessary to make some assumptions as to the design articulations that are more sensitive to the translation paradigm. We have identified (without claiming to have been thorough) three spheres of research which have as their guiding thread a close relationship with the skills of communication design.

3.1 Translation for social change and criticism.

This research perspective is related to a complex series of matters that concern the catalysing role of design within the social, political and cultural context. In this sphere, a series of translation processes is aimed at the development of “resistance tools” (Author, 2012), “critical reflection tools” (Dunne & Raby, 2001; Sengers et al., 2005) and “co-participation tools” (Burns et al., 2006), to acquire and introject a critical dimension into the design activity which makes reflection, active intervention in society and change possible. This is generally the activation of an ethical “translation” project, to be considered here in its most profound meaning of remedying, putting right, correcting, helping to understand,

reviewing, rereading and educating in order to generate transformation and social innovation.

Sangiorgi and Scott (2015) have identified four approaches "that present slightly different understandings and build on different theories and assumptions about what triggers and sustains social and systemic change as well as what designers can do within these processes:

- *critical practices in design*: objects become the provocative materialisation of a critical reflection conducted by the designer and are considered as the medium to elicit a similar critical reflection and possibly behaviour in users and observers;
- *design for social practices*: the critical reflection is instead at the basis of any kind of practice-oriented design intervention as it helps to recognise the elements that constitute and perpetuate existing practices and possibly inspire ways to 'de-link' them and trigger change;
- *transformation design*: here the critical approach and reflexivity are qualities that both designers, as facilitators, and project participants need to develop to challenge existing power relationships and develop the knowledge and skills to envision, initiate and sustain change processes;
- *design for social innovation*: here designers identify and support promising practices and open innovation processes that manifest, sometimes in an implicit way, critical perspectives towards the current modes of production and consumption as well as towards existing power structures in decision making."

What emerges from these four approaches is that their common denominator is represented by the substantial mediation activity carried out by the project operators, and this allows the tangible possibility of translating critical thought into action, and the production of awareness and real social change.

3.2 User-centred translations.

"User-centred design is a process, non-exclusive to the design of interfaces or technologies, in which the needs and limits of the addressees of the end products of the products, services and processes are held in consideration during every phase of the project. This is a design method characterised by multilevel problem-solving processes which require the designer to analyse and predict how a user will use a product, and how to verify the behaviour of real users" (Pizzocaro, 2015).

In spheres of research closer to communication design, the value of the centrality of the user is flanked by the management and organisation of knowledge. The aim of information design (Bonsiepe, 1993; Frascara 2015; Sless 1992) is to interpret and translate information into analogical artefacts (product labelling, instructions, contracts, policies, letters, bills, forms, statements, highway signs, public information symbols, etc. [Sless, 2014]) and/or digital artefacts (interface design, design of information bodies, design of audio-visual means [Bonsiepe, 1993]). More particularly in the sphere that concerns the design of graphic interfaces for IT systems and electronic devices, approaches to the design interface are

numerous, but they can also include intersemiotic data and information translation processes.

Quaggiotto (2012: 39-40, paraphrased) distinguishes three spheres of research: the recent translation of human-computer interaction, which is proposed as a transdisciplinary approach to the problems of design and the methods of interaction between the end user and digital technological systems; the information architecture that plans the arrangement of information, its categorisation and breakdown, in order to facilitate access and rediscovery by users; and lastly, the sphere of visualising information (information visualisation, visual data mining, visual info retrieval, knowledge visualisation), the aim of which is the visual portrayal of information through encoded forms of symbolisation, deriving from statistic and scientific visualisation.

In short, in both the analogue and digital spheres, the translation of the source information, its encoding in data form and attention towards the addressee are essential within the design process. As maintained by Frascara (2015:5): "information design is of necessity user-centred. It is ethical because it recognises 'the others' as different from the designer and deserving respect in their difference. These differences require that one considers as one of the first priorities the knowledge of the people one is addressing. This is why there are no recipes for information design: there is knowledge to be applied, but its application must always be framed by paying due attention to who is the public, what one is talking about, why one addresses them, and where, when and through what media."

The centrality of the user, the recognition of "other" as a subject who is different from the translator, is one of the main values of the translation process. As maintained by Oittinen and Ketola (2014: 108): "as an innate part of the translation process, translators build a mental model of what the new target audience may be like: what their motivation is to read the text, what they will use the text for, how much they already know about the subject matter, and so on. Translators are then able to adapt their translation choices according to the anticipated needs of these receivers."

The communication designer plays an essential role in interpreting and translating information "in order to develop specifications or principles to guide or inform the design development of product and services. They also apply their tools and methods in the evaluation of concepts and prototypes" (Sanders & Chan, 2007).

3.3 Translation for participating in and sharing experiences.

"Participatory design attempts to involve those who will become the 'users' throughout the design development process to the extent that this is possible. The participatory mindset reflects the Scandinavian way of thinking—that it is obvious that those who will be affected by design be included in the design process. […] Generative design research focuses on the creation of tools that non-designers can use to express their dreams (or fears) for the future. These expressions inform and inspire designers to make things that people really need (and at many levels of need). Some designers become inspired to make tools that the people can use to make their own things" (Sanders & Chan, 2007: 1).

As confirmed by Osimo (2015: 86) “a translator is someone who, in the system, takes on the role of representing the culture of the confine. He is an individual (or it is an entity) that is, first and foremost, aware of the difference between a culture inside his system and that outside it. Once he has this metacultural awareness, the translator finds himself between two extreme poles of the cultural mediation strategy: one consists in trying to incorporate others inside himself and the other consists in taking possession of others.”

Participatory design starts from the assumption that everyone is creative and that everyone can play an active role in the design of solutions aimed at changing society; “this mindset contrasts with a user-centred mindset that recognises researchers and designers as being the experts and relegates the people being served by design to be the research subjects and/or the recipients of the designed object” (Sanders & Chan, 2007: 1).

Cultural diversity and communicative activity are the sustaining values of participative design and, in this sphere possibly more than any other, translation practices in which the communication designer plays a significant role emerge. Cultural mediation is achieved through the design of “generative tools” (or communicative artefacts), which make it possible to open up communication, involving all the players concerned (designers/researchers and stakeholders), Sanders (2013: 71), distinguishing them into making tools and techniques (collages, maps, models and mock-ups created by non-designer participants), and telling tools and techniques which verbally support and guide the exchange of information and explanation (stories and storyboarding, diaries, images for self-observation, documentaries and movie-making, experience timelines or maps, paper spaces, cards, and voting dots).

Conclusion. Implications of research

“The translator is an expert in the thoughts of others and in ways of expressing them. The translator is an expert in the boundary between his own way of life and of seeing the world (his own “culture”) and other people’s way of life and seeing the world (seven billion “other cultures” plus seven square billion possible combinations). The translator is an expert in nuances of sense, in the art of adaptation and adapting” (Osimo, 2011: 293).

Bringing the figure of the translator close to that of the communication designer means starting from the assumption that the design activity is distinguished by a series of translation activities of which we are relatively aware. Certain types of transfer typical of the design process within the communication design sphere are:

- *graphic translations,* from manual writings to mechanical and digital forms of writing, comprising the transferral of signs and writings from signs to signs, from alphabets to alphabets, using endosemiotic methods;
- *illustrative translations,* with de-verbalising forms comprising *visual translations* from text to image (using intersemiotic methods) and from image to image (using intrasemiotic methods);

- *intersupport, intermedial or transmedial translations,* from a tangible support and/or from one format to another, particularly all the mutations or declinations of artefacts in transition to digital, which contemplate a specific multimodal recording practice;
- *synaesthetic translations,* as a method of translation from oral verbal language to written language (verbal and/or figural) and vice versa, from oral verbal language to sign language and vice versa, and from written language (verbal and/or figural) to tactile language and vice versa;
- *intralanguage translations,* which concern the semantic behaviour and the transformation of the artefacts on the basis of specific cultural, social, market and mass-media storytelling connotations;
- *interlanguage intersemiotic translations,* as a method of translating the verbal signs of a language through figural language.

According to this perspective, translating means making the contents of a communication process accessible, identifying the most pertinent form of expression for a new medium; but it also means having the ability to move in an increasingly interlinguistic and intercultural universe, made up of a variety of cultures, supports, systems and languages that cohabit and communicate with one another.

Our research intends to promote, in founding terms, the meeting of two components, the cultures of design and of translation (in the terms of translation studies), recognising the specific function which communication design, in particular, occupies as a mediator of design cultures for communication artefacts. In other words, the aim is to explore a sphere which is growing today at a national and an international level in response to the need for those translation models and processes necessary to the converging culture of contemporary society (Jenkins, 2006; Uricchio, 1997). Specifically, the continuous shift of the frontiers between disciplines, fields of know-how and production models requires increasing design skills capable of developing as processes of translation between different codes and registers, making it necessary not only to define the linguistic and interpretative sphere, but especially the critical and analytical thresholds of those who plan communicative artefacts.

Tackling the theme of translation within the domain of communication design suggests for the future a complex task which will be undertaken on various levels:

- theoretic-scientific research, in relation to the cultural contribution of translation studies, to the contributions of semiotics and to those of media studies or cultural studies;
- analysis of the different declinations of translation within the processes of configuration of communicative artefacts in the analogue and digital spheres;
- research through didactic experimentation to contribute to the detection and encoding of “translation models” within the scope of communication design;

- research finalized to build a bridge between the national scientific community and the major international organisations interested in defining a joint path founded on an original and transdisciplinary approach to the theme of the relationship between communication design and translation.

In essence, we think that the concept of translation can be a distinctive characteristic of design culture: design can be intended in terms of translation and all design process involves translational pathways. In the specific area of communication design, these translational pathways require first of all an in-depth knowledge of the scriptures and languages of representation, but also a real translational sensibility which, through inclusive acts, enables the overlapping of the linguistic world, originally distant.

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About the Authors:

Giovanni Baule, full Professor at the Design School, Politecnico di Milano, was co-coordinator of the PhD in Industrial Design and Multimedia Communication. His interests deals with theory and methods of communication design project. Expert in visual communications, is engaged in design history and criticism.

Elena Caratti, Architect, Ma in E-Design and PhD in Design, is currently Researcher and Assistant Professor at the Design School of Politecnico di Milano (Degree Course in Communication Design). Her research interests cover communication design theory and design education.

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Design as translation activity: a semiotic overview

Salvatore Zingale

Politecnico di Milano, Italy
salvatore.zingale@polimi.it
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Abstract: The paper originates from the following question: can the design activity, intended as an inventive and project-making activity, also be viewed as a form of translation? To answer such a question we are compelled to overcome a paradox, because design does not involve a transfer from a source text from which it translates. Design generally acts like a translator and interpreter of social needs that previously existed as unstructured, non-textual, open-ended entities, thus exposed to uncertainty and incoherence and striving through design to acquire a proper structure, i.e., a textual form. From the extensive literature on the subject in semiotics and linguistics, here we will select and outline only the fundamental semiotic models that could help us overcome the paradox, at least from a theoretical viewpoint, and provide a plausible answer to our opening question.

Keywords: semiotics, interpretation, design, translation studies

Introduction

Discussing the subject of translation applied to design requires, on the one hand, considering language in a wider sense, since design concerns phenomena that are not strictly linguistic; on the other hand, it needs some principles to be established in order to avoid using the concept of translation as a generic metaphor. As we shall see later on, although translation – or rather the *translation activity* – is a fundamental aspect of every interpretation process, not all interpretation processes can be defined as translation (see Eco, 2001, p. 67-71).

If we conceive design merely as the activity of producing aesthetically relevant artefacts, similarly to art, then we should have no reason for studying it as a process functioning by means of translation. The designer's creativity (or his inventiveness[1]) would only be of interest to the semiotics of interpretation without any need to take translation into account. But when the design's aim is not the artefact's form itself but its ability – even through its

[1] On the relationship between semiotics, inventiveness and design, see Zingale (2012).

form – to "be an interpreter" of social needs or to provide answers to questions, then the translation model is very applicable to the field.

However, the theory of semiotics encounters a paradox here: While translation involves a shift from a *source text* (ST) to a *target text* (TT), i.e., a passage between two structured entities, design instead has no source text *from which* to translate, but rather a certain range of social needs of which it has to become interpreter (meant strictly as "translator"). The source text of design is then usually an unstructured entity whose lines are blurred, open, exposed to uncertainty and incoherence and which tries to attain a closed structure precisely through design. Such an unstructured, *fuzzy* entity may be for example a company's search for a visual identity, or the cultural tone a certain publication would like to convey, or a set of statistical data to be displayed. In each of these cases, it can be noted that the *object to be translated* lacks the structure of a text, but still the search for an artefact that interprets it successfully is totally comparable to a translation process.

For what reason, though, in the above cases as in many others, is the interpretative design activity *also* a translative one? Furthermore, if there is no real shift from one text to another, in what way can the translation process proper to design be defined and described?

The thesis of this essay is twofold: (i) the designer *acts like a* translator since he conceives his activity as an interpretation process where he is able to infer a question from another question, a sign from another sign, until he constructs an artefact-text translating the entire process and is able to answer all the questions; (ii) in order to act effectively as a translation, the design's interpretation process requires a first interpretative step: the textualisation of the unstructured entity from which the process originates.

To support such a thesis we have to review, albeit briefly, some of the main topics in the semiotics of translation.

Semiotics and translation

2.1 Inside and outside language

The theme of translation has always been present in semiotics. Some of the most relevant studies dedicated to the subject range from the grounding ones by Roman Jakobson (1959) and Georges Mounin (1963) to the extensive one by Umberto Eco (2001). Further research focuses more on literary critics, such as *Lezioni sulla Traduzione* (Lessons on Translation) by Franco Fortini (2011) or the numerous works in the field of translation studies, extensively outlined in Susan Bassnett (1980).

The issue of the periodical *Athanor* conceived and edited by Susan Petrilli (1999–2000) endeavoured to collect and compare different approaches to translation. In this work, in particular, two different ways to approach translation as a semiotic topic emerge: On the one hand, translation is investigated *within the language*, internal to historically settled human languages both as a social necessity (translation as an act of linguistic/cultural exchange) and as a literary issue (translation as reinvention). But translation, and everything

it involves as a semiotic model, lies not only within the conventional human verbal languages. The so-called intersemiotic translation (Jakobson, 1963), as we shall see, assumes that not only a text can be expressed through different formal and expressive means, but whole sign systems may also be conceived as connected through translation. Moreover, Petrilli's (1999-2000) collection suggests that the concept of translation can be also applied to the field of biological interactions or to the study of today's technological development. Here the "transfer of information" is not just a mechanical process but rather a phenomenon pertaining to the entire biosphere, as Augusto Ponzio underlines in the preface to Petrilli's volume. Some examples are the transfer of genetic material determining life; or the case of *transduction* in molecular biology, i.e., the ability of a cell to convert an external input into a specific cellular response; or the process of transduction in microbiology, through which genetic information is transmitted from one bacterium to another.

All these diverse approaches may induce us to think that the theory of translation will spread so much in all fields of research that it will lose its scientific value. This risk is real, that is why we shall specify better the purpose of this essay by distinguishing three ways to look at translation semiotically. Two of them have already been mentioned, the third is the one we will adopt here.

The first way is when translation is a technical issue: it is generally a linguistic or, consequently, a semantic question. A second way – and here the above-mentioned risk emerges more clearly – is the idea of considering as "translation" the many processes that only *resemble* translation but that pertain other forms of "semiotic transformation," such as processes of understanding or transtextuality. In this case, the term translation is used in a figurative acceptation. A passage by Umberto Eco where he reflects upon one of his texts can better clarify what we mean here:

> In explaining Jakobson's position […] I wrote: 'Jakobson demonstrates that to interpret a semiotic item means "to translate" it into another item (maybe an entire discourse) and that this translation is always creative enriching the first item'" (Eco, 1977, p. 53). As you can see, I put "to translate" between inverted comes, to indicate that this was a figurative expression. … I would like to point out that I submitted my essay to Jakobson before publishing … . On that occasion, no objections were made to my inverted commas. If Jakobson had thought them misleading …, he would have pointed out to me that he had intended to use "to translate" in a technical sense (Eco, 2001, p. 71).

So the third way, the way of both releasing the concept of translation from its strictly linguistic acceptation and at the same time not having to renounce the fruitful outcomes of using translation in its metaphorical meaning, is to intend it as a semiotic process. Better said, as a *semiosic*[1] process, which is deeper and more general. As Susan Petrilli observes, "between the meaning and translation there is an indissoluble relationship of interdependence" (Petrilli, 2014, p. 96).

[1] As we will see, the terms *semiosis* and *semiosic* refer to a process that leads to the production of meaning through signs, whereas *semiotic* means "pertaining to semiotics", i.e., the discipline that studies semiosis.

This interdependence exists because every signification and every form of communication require necessarily a given path to be followed in order to *gain effect*. This path, or *interpretative route*, never leaves things as they are: it transforms and reinvents them. Hence, the next step highlighted by every study on translation: translation is a (theoretical and practical) form of interpretation. Precisely because of this structural connection, translation is one of the forms through which *semiosis* happens, i.e., the sign-activity starting a process of sense production. As Susan Petrilli observes, "semiosis is itself a process of translation" (Petrilli, 2014, p. 96). But as already noted above, the problem is that even though translation is a constitutive part of semiosis, not every process of interpretation takes the form and model of translation.

2.2. Translation activity in Peirce's model

The reference to one of the two founders of modern semiotics is inevitable. In Peirce's model, often represented as a triangle (Figure 1), semiosis is not conceived as a reference from Signifier to Signified, but rather as a transfer from the Object to the Sign, and from the Sign to the Interpretant.[1] It is a kind of process in which the first element determines the second and the second the third.[2] Thus the Interpretant is determined in the last instance by both Object and Sign.

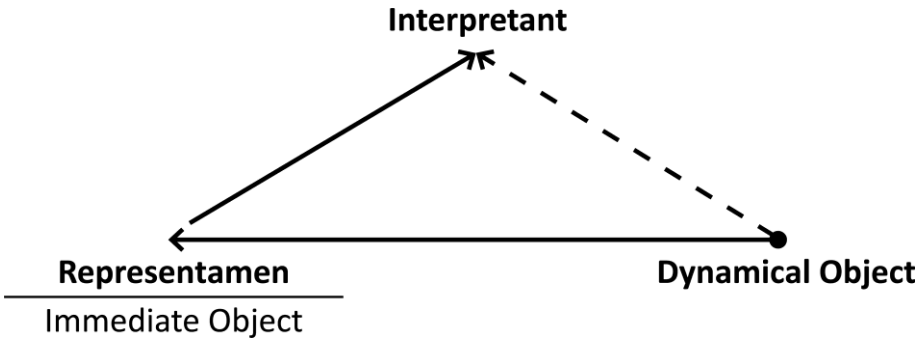

Figure 1 Peirce's semiotic model.

This transit from Object to Sign to Interpretant, and from the Interpretant again to others Objects and Signs, is what leads to the notion of unlimited semiosis: an idea that should be intended as a recursion of sense, which fulfils and develops itself only in the continuous passage through the complex net of semiosis and signification.

It is the concept of interpretant then (obviously deriving from the verb *to interpret*) that highlights the translative character of semiosis, as Peirce explains:

> every comparison requires, besides the related thing, the ground, and the correlate, also a mediating representation which represents the relate to be a representation of

[1] We will capitalise words from the semiotic lexicon when they are explicitly intended as such.

[2] "I define a *Sign* as anything which on the one hand is so determined by an Object and on the other hand so determines an idea in a person's mind, that this latter determination, which I term the *Interpretant* of the sign, is thereby mediately determined by that Object" (Peirce, 1931-1958, *Collected Papers*, 8.343).

> the same correlate which this mediating representation itself represents. Such a mediating representation may be termed an interpretant, because it fulfils the office of an interpreter, who says that a foreigner says the same thing which he himself says (Peirce, 1931-1958, *Collected Papers*, 1.553).

Two verbs are important in this discourse: *to determine*, meant as implying and producing, doing and being; and *to mediate*, meant as to be in-between, to enable becoming. The relationships of determination and mediation must be intended as translative, because every Sign translates in its features the Object determining them. But to be able to signify a given Object fully, the Sign needs to be translated in turn by an Interpretant. The Interpretant translates what the Sign *says* about the Object, since the Sign is determined by the Object. This implies that the meaning expresses itself fully in the Interpretant, which in turn translates the previous semiosic act of the Sign, and that the meaning of every sign-expression can be neither expressed exhaustively nor understood without a translative transfer.

An example from art history could be of help here, i.e., the case arising from John Constable's painting *Wivenhoe Park* (1816; see Gombrich, 1960). From Constable's perspective, painting had to be an analytical study of reality, a scientific exercise in rationality, and for this reason he invented a new technique based on colour contrasts with the aim of rendering the landscape's light (the Object to be represented) more realistic to our perception. Once presented to the public, however, his work (painting as Sign) was interpreted in the opposite way, as totally unrealistic, because his contemporaries looked at that painting through their perceptive habits (the Interpretants). In other words, they did not possess the cognitive instruments to translate from the real landscape into the painted landscape correctly: they felt estranged from Constable's new "figurative language." They lacked any mediating representation.

2.3. Jakobson's three kinds of translation

When Umberto Eco (2001) confesses that he had consulted with Roman Jakobson on the possibility of using "translate" between inverted commas, he meant to reassure his readers he had asked an authority in the field. Indeed, in 1959 Jakobson had published his essay *On linguistic aspects of translation* (in Brower, 1959), republished later in *Essais de linguistique générale* (1963). In this essay, he establishes the three forms in which translation can occur. It must not be overlooked that Jakobson (1963) was prompted properly by Peirce's model summarised above. He specifies that:

> For us, both as linguists and as ordinary word-users, the meaning of any linguistic sign is its translation into some further, alternative sign, especially a sign "in which it is more fully developed", as Peirce, the deepest inquirer into the essence of signs, insistently stated. (Jakobson, 1963, p. 114).

Here are the three forms of translation:

> 1. Intralingual translation or *rewording* is an interpretation of verbal signs by means of other signs of the same language.

2. Interlingual translation or *translation proper* is an interpretation of verbal signs by means of some other language.

3. Intersemiotic translation or *transmutation* is an interpretation of verbal signs by means of signs of nonverbal sign systems (Jakobson, 1963).

Although this scheme is the ground upon which any later study on translation has been based, we can here retrieve some aspects that need further reflection and clarification.

A first general reflection is that many cases belong to the first category (rewording): practically any case in which you use different or more analytical/synthetic words to express the same concept within a given language. This leads us to think that, in this way, translation is only a subtype of interpretation – as in Eco (2001, p. 68). However, as we observed before, this risk can be avoided if we consider translation *also* as a constitutional process of semiosis, not only as a strictly linguistic matter.

Secondly, if one looks for translation processes inside design, another terminological clarification is needed: whereas Jakobson (1963) generally talks about "language," we would rather talk today of "sign system." Translative processes of rewording occur for example also within sign systems such as music and painting: To some extent, the Wassily chair by Marcel Breuer is a reformulation – at least as far as the bending of materials is concerned – of Thonet's chairs. Similarly, in the history of the typographic design, the fonts Baskerville and Times can be seen as reformulations of Garamond. However, while variations in typography strive to achieve new visual identities or new practical applications, rewording in painting is a proper genre. For example, Pablo Picasso's 1957 cycle of 58 paintings accomplished moving from Velasquez's *Las Meninas* (1656). There are many examples in music too, where "variations" on the same theme and "transcriptions" propose again previous musical forms with big or small modifications. Many new genres too are just the rewording of previous genres.

It is thus important to release the idea of translation from its traditional bond with linguistics and to stop considering translation as a literary issue only. We have to start seeing it as an endemic part of semiosis and as a cognitive practice enabling *transfer processes* of other kinds, such as design and inventive ones.

2.4 Translation activity in Hjelmslev's model

However, the paradox remains: While every inventive design process is an act of transformation, not every transformation process is necessarily a translation. While translating means moving from one text to another, design has no real source text, but rather semiosic needs of different kinds. So the questions are: what is the object of transformation of design? Where does the inventive process of design start from?

In order to answer such questions and therefore solve the paradox, we must take into account the semiotic model by Louis Hjelmslev (Figure 2), who identifies two planes in every signification system (Expression Plane and Content Plane), each one divided in turn into Form and Substance (Hjelmslev, 1943). The two planes must be intended as mutually

defining terms and as parts of the same sign function: One plane does not exist without the other, but each one exists by virtue of the other.

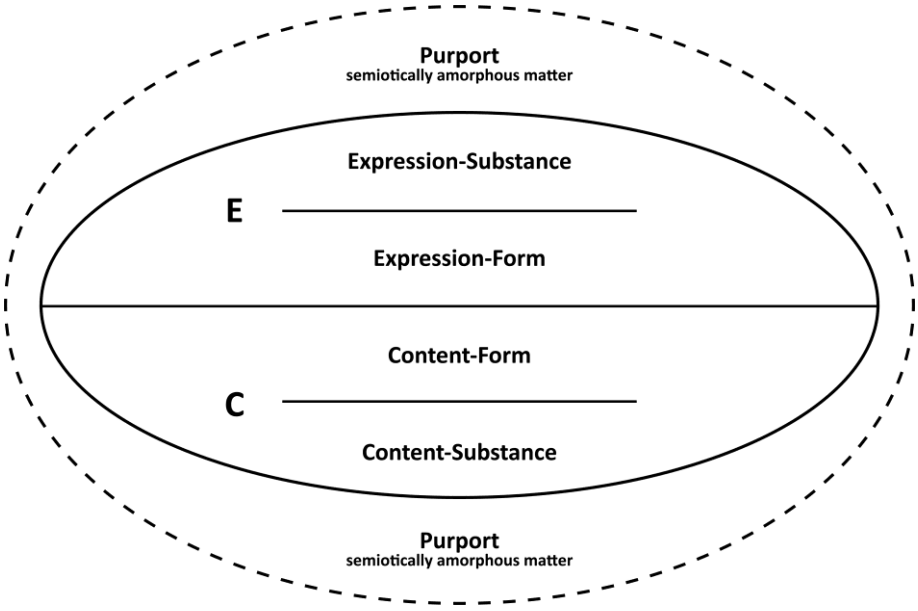

Figure 2 Hjelmslev's semiotic model.

We shall observe meanwhile that, inside the interliguistic and intersemiotic translation, the transformation happens at the level of the Expression Plane, or is a transformation of the Expression Plane, especially of its Substance (in poetry: sound and rhythm). The Content Plane poses different questions, because it is not actually a direct object of translation, but it influences every translation. The Content Plane makes the interpreting character of translation explicit. The Content Plane is indeed the place where the semantic and pragmatic effects of translation are measured, where we can see the fails and the risks of misunderstanding as well as the cognitive breaches, intercultural influences and every other semantically enriching possibility of translation. Therefore, if at a "technical level" translation regards the relation between the expressive planes of two languages, at a "cultural" level it pertains to their relative content planes.

Friedrich Schleiermacher brightly comments on this in 1817: "*Either the translator leaves* the *author in peace*, as *much as possible*, and *moves the reader towards him*: or he *leaves* the *reader* in *peace*, as *much as possible*, and moves the author towards him" (Schleiermacher, 1817). The second option is preferable: The translator grasps the meaning of every sentence and tries to give the form it would have had if it had been written in the target language and culture. This means putting two semantic worlds in communication and allowing them to inform[1] each other mutually. A good translator, Franco Fortini observes, is the one who "pulls" the readers out of their linguistic habits, passing this way from an age of appropriation to an age of collision of texts and languages (Fortini, 2011, p. 56). A good

[1] Also in the sense of *to instruct*.

translator, Massimo Bonfantini (2007) would add, is the one who is able to produce a translated text which is the reinterpretation of the semiosic meaning of a given communicative act into another semiotic act in another communicative game. Therefore, we are in front of a good translation when two planes of content penetrate and widen each other.

In Hjelmslev's semiotic terms, this means that: 1. Translation guides the reader to a journey into the semantic world of the source text; 2. Such 'journey' is accomplished through a continuous confrontation, comparison, association, differentiation – Fortini's collision – between the semiotic systems at stake.

2.5 Before the text, the Purport

There is an element in Hjelmslev's model that is particularly interesting to us here. It is what he sets before the two planes: the Purport. Understanding the term and translating it is not a simple task. The Danish scholar uses the word mening; in Italian this translates as "Materia" (matter), although others (see Marrone, 2001) split this into two terms: thought and sense. The Purport is what exists, is thought or felt, before the existence of a language that can express it. It is everything "common" in the minds and feelings of the majority, but which still needs to be translated into signs to be actually shared.

The term Purport is a matter pertaining to both the Content Plane, which Hjelmslev defines as a "shapeless mass of thought" (Hjelmslev, 1943), and the Expression Plane, like for example the phonic chain. In both cases, such matter has no "semiotic form." In Hjelmslev's famous image: the Purport is like a handful of sand that can gradually take different forms.

After all, Ferdinand de Saussure had already talked about what precedes signification (the *langue*) in his *Course in General Linguistics*: "Psychologically our thought … is only a shapeless and indistinct mass. … Without language thought is a vague uncharted nebula. … nothing is distinct before the appearance of language" (Saussure, 1974/1916, p. 112).

The sand and the cloud are useful metaphors used by the two linguists here to identify everything that precedes formation through languages and semiotic systems, but we can also add here everything that precedes the formation of *texts*.

As Cosimo Caputo observes, Hjelmslev's introduction of the concepts of Purport or Matter into the science of signs shifts the theoretical attention from the logic problem of the language to the phenomenological problem of the sense (Caputo, 2010, p. 177). Moreover, the Purport has a non-scientific, non-semiological form, which means that it is a scientifically shapeless substrate and at the same time the place of every possible marking (Caputo, 2010, p. 181).

Caputo (2010) underlines two interesting aspects for our discourse: (i) what we call "sense" constitutes a phenomenological problem, before logic; (ii) the Purport is the "place of every possible marking" and therefore, the starting point of every semiosic process, among which is also translation.

Starting from the Purport: design as translation

The notion of Purport as a phenomenological topic, instead of semiotic, mental and physical at the same time, ready for semiosis and in search for a form, seems to be the way out from the paradox with which we started this essay. We will not go deeper into the study of the transfer processes from matter to form, which are of various nature and change according to the area of applicability. However, we may say that in design, it being an inventive activity, translating means *giving shape*. It is no accident that one of the possible German translations of the word design is *Formgebung*. Design's translation activity does not aim to be understood "in another language," but to turn into a new expression, after various steps of visual or sensible invention, what originally lacked a form or a fixed textual structure. In design, the translating act is above all an action giving shape to what still has no shape but only a purport, i.e., it exists as common sense but is destructured and therefore not sharable.

Thus, to abandon the linguistic model, we have to think of translation as a process containing all the elements of the semiotic models previously summarised. Hence, it can be pointed out that in design, translation moves from Hjelmslev's Purport as well as from Peirce's dynamic Object.

3.1 Two phases and two transfers

With the help of a graph (Figure 3), the translation process of design can be illustrated in a model consisting of two phases:

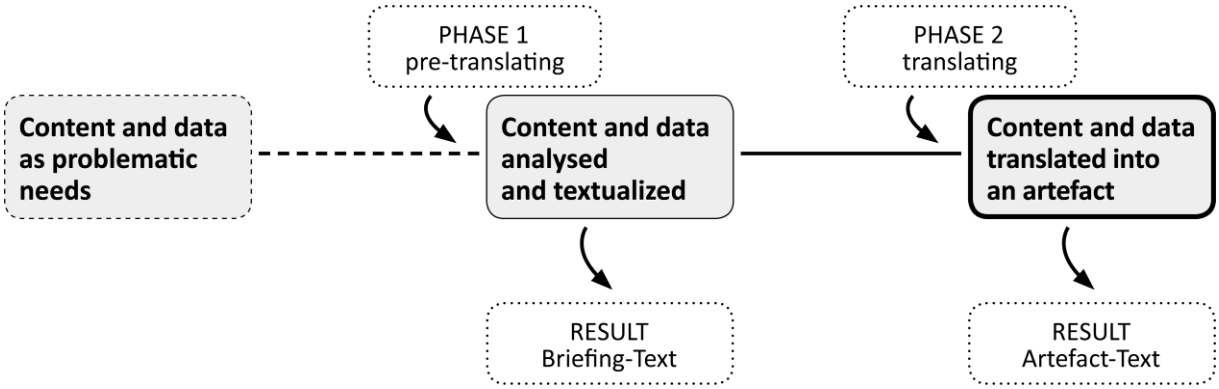

Figure 3 The translation process of design.

The first phase is pre-translating and consists in moving from the elements that in every model and semiotic act are defined as initial. This means conceiving the "problematic objectuality" from which a design process starts, which corresponds to Peirce's dynamic Object (Zingale, 2012). In this case, it means recognising and thus studying a certain problem, such as a social need, even when the problem constitutes no "shared conscience" yet, i.e., there is no defined social discourse explaining it. It must be noted that the

"problem" is not only an obstacle, but also what we feel as a lack of something whose existence can be imagined.

Understanding a problem, however, is not always enough. It is also important to identify the way in which the problem is felt and, albeit indistinctly, expressed. This means one needs to collect the *common thinking* – Hjelmslev's *Purport* – and reorganise it according to a coherent principle, selecting its applicability and letting emerge those traits that can build a hierarchy of the objectives of sense. And much more.

This first phase aims at *textualising* the social problematic needs, i.e., to turn them into a common discourse and shared object of analysis.

We shall call the obtained text *briefing-text*, i.e., an articulated and structured text possessing its own Form of Expression but still unsuitable for communication: In other words a text with the task of preparing for full signification and communicative effectiveness. The briefing-text, indeed, has a value because it defines only the Form of Content of the design needs, while the Form of Expression is still virtual rather than actual.

The second phase is the explicitly translating phase and involves passage from the briefing-text to the *artefact-text*. It may seem that this study could end at this point, but it does not. A entire part of our study could be devoted to explaining the passage from briefing-text to artefact-text, especially to how "raw" materials contained in the briefing-text turn into "refined" items in the artefact-text, since the briefing-text only prescribes what the final item must contain but does not tell us what the most appropriate form to express those contents is.

This second phase would require an extensive case-study analysis also incorporating techniques such as reverse engineering and appropriate experimentation, with the aim of observing how different possible routes lead to different texts. Such a study obviously cannot be conducted here, but we can trace the basic principles that answer our opening question: why can an artefact also be seen as a text resulting from a translation process?

3.2 Because design is a translation

Design presents itself as a translation, not in a figurative sense, for at least three reasons linked to one another:

Firstly because the type of *semiosic* or *performative act* of design is common to translation: design stands as an element of *mediation* and *access* between a set of contents and a user/reader. Translation happens because someone needs to gain access to a semantic area that would otherwise be inaccessible to them, because of a language barrier or because the area cannot be clearly 'seen' for various reasons.

Secondly, because being an act of mediation and access means being based upon the logic of the mathematical function: the artefact-text, or target text (TT), is a dependent variable of the source text (ST), the independent variable:

$$TT = f(ST)$$

Thirdly and as a consequence of the first two reasons, design can be defined as an act of translation because the Form of Expression of the artefact-text is *one of the many possible* that can be generated from the briefing-text. This is one of the demarcation lines between design and every other artistic activity. Despite the pervasive use of the buzzword creativity, designers are not asked to "create" anything at all, they have to *translate into an artefact* a need that is expressed and communicated in other ways or that even lacks appropriate expression. The results of such translation are potentially endless, as in the endless ways in which a poem can be translated into a given language.

Conclusions

As said above, a complete semiotic view of design as translation would require a study that is yet to be developed, especially as far as the passage from the first to the second phase is concerned. At the same time, the development of that attention would also require an appropriate test phase helped by commutation and reverse engineering techniques. The aim would be to observe the various transformations the same content in the briefing-text could undergo during the process of translation into an artefact-text, and to detect how the variables at stake influence certain aspects of the Form of Expression the designer chooses, among which is the reformulation or rethinking of the briefing-text. Translation, especially in design, is Play, both intended as a game with rules to be followed and as a performance, but above all as a place for the free movement and mutual influence of the elements at stake (in the sense of clearance). The space for this play is what Peirce called *Commens*, the *common mind* that enables understanding and communication (Peirce, 1991-1998, EP, 2: 478). The Commens is a cognitive and empirical place at the same time, and for this reason, we think it should be studied through experimentation and observation in design and in social communication science.

At the moment, our conclusion is limited to highlighting three modes of conceiving the translating activity of design.

Firstly, the translating activity in design is the ability to *say explicitly* something that had not had the possibility of being expressed before, but which is nonetheless present in the common conscience as content looking for a Form of Expression: In this case, the designer invents and elaborates the proper Form of Expression that was lacking or inadequate before.

Secondly, the translating activity in design presents itself as the ability to *say clearly* what was obscure and would have no other possibility of being comprehended: In this case, the designer is an interpreter of semiosically undefined contents and invents or elaborates a Form of Expression that makes those contents more accessible.

Lastly, design is an act of translation because it tries to *say differently* something already said but that is semiotically wakened by the changing cultural contexts (or by historical, ethnical, geographical ones), but which could gain more strength if renewed and reformulated through techniques and instruments enhancing its expressive effectiveness.

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About the Author:

Salvatore Zingale is Assistant Professor at the Department of Design of the Polytechnic of Milan, Italy. His books on design are: *Gioco, Dialogo, Design* (ATì, 2009) and *Interpretazione e progetto. Semiotica dell'inventiva* (FrancoAngeli, 2012).

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Word to Image – Image to Word The Contribution of Visual Communication to Understanding and Dialog

Michael Renner

University of Applied Sciences Northwestern Switzerland (FHNW)
michael.renner@fhnw.ch
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Abstract: Translation, understood as an interpretation of experience, opens a broad field of inquiry into a variety of disciplines. Hans-Georg Gadamer's description of hermeneutics as a language-based methodology to develop understanding, insight, and agreement within a group, serves as the starting point to analyze the practice of visual communication as a form of interpretation, negotiation, and insight.
In a first step, the paper discusses the process of drawing and its relationship to interpretation. The classification of drawing as a gestural activity establishes a link to recent anthropological theories, which see gestures as precursors of the human language. Through an analysis of processes in the field of corporate design, we can strengthen the hypothesis that images follow a logic that is only partially accessible through words. In respect to interpretation, the images of an identity visualization follow a convention held in our collective memory or derived from preconceptions and provide a new aspect of a familiar experience to a beholder. Following this line of thought, the paper suggests that "practice-led iconic research" is a methodology that uses a systematic generation of images to advance our knowledge of images. Going back to the initial question of a language-oriented hermeneutics, we can conclude that, in the context of iconic research, the combination of experimental image creation and the analysis of these images with the help of words leads to a uniqe insight. The generation and analysis of visual variations is comparable to a discursive and language-based methodology in hermeneutics which requires that various contrasting aspects be considered.

Keywords: interpretation, hermeneutics, visual communication, communication design, practice-led iconic research

Translation and Interpretation

Today, the term of *translation* is used in many highly specialized fields such as computer science or cell biology. But the most common use of the word *translating* means

to transfer a text from its original language to another language. The etymological roots of the term of *translation* describes the activity of carrying something across[1]. The person who is translating is called the *translator,* or even more to the point, the *interpreter*. This term is accurate because it describes the act of translation not merely as a one-to-one transformation, but rather as a process of re-formulation within the given context of another language. Hans-Georg Gadamer (1900 – 2002) describes the problem of translation as follows:

> "For therein lies all the misery of translation, that the meaning of a sentence cannot be transferred by the mere assignment of an element of a sentence to the corresponding element of the sentence in the new language, and that
> this creates the dreadful structures which we are so often asked to tolerate in translated books –insipid letters devoid of meaning."[2] (Gadamer 1970 p. 84)

If we understand *translation* as *interpretation,* we open up a broad field of inquiry reaching from hermeneutics to the critical making of images in the context of visual communication. In both fields, there seems to be a link to an artistic activity with a *poietic* outcome.

> "Hermeneutics primarily means an artful practice. This is indicated by the term itself, which has to be complemented by 'techne'. The art it is all about, is the art of announcement, of interpretation, of explanation and of exegesis and finally and of course includes the art of understanding on which it is based and which is required wherever the meaning of something does not appear unambiguous." (Gadamer 1966, p. 32.)[3]

The historical development of *hermeneutics* as summarized by Gadamer begins with a reference to Hermes, whose name and mythological role as a messenger of the gods already implies a double meaning. On the one hand, Homer's *Ulysses* describes Hermes as a messenger literally conveying a message. On the other one, Homer describes Hermes in many situations translating what was formulated in a foreign and incomprehensible language into a language which is generally understood (Gadamer 1968, p. 32).

In addition to a historical elaboration, Gadamer points out the close relationship between hermeneutics and rhetoric – the art of speaking. But he claims that hermeneutics becomes more than mere rhetoric through the consideration of the opposite opinion:

> "But hermeneutics always contains an element which goes beyond mere rhetoric: it always includes an encounter with the other's opinions, which are also mentioned and considered. This also applies to texts which one wants to understand, as well as to all

[1] The Latin term of "translatio" is the participle of "transferre", which is translated by "to bring something across", "to carry something across", "to transfer" and "to translate". (Langenscheidt 1967)

[2] "Denn darin liegt das ganze Elend des Übersetzens, daß die Einheit der Meinung, die ein Satz hat, sich durch die bloße Zuordnung von Satzgliedern zu den entsprechenden Satzgliedern der anderen Sprache nicht
treffen läßt und daß so die gräßlichen Gebilde zustandekommen, die uns im allgemeinen in übersetzten Büchern zugemutet werden – Buchstaben ohne Geist." (Gadamer 1970 p. 84) English translation by the author.

[3] "Hermeneutik meint in erster Linie eine kunstvolle Praxis. Das deutet die Wortbildung an, zu der 'techne' zu ergänzen ist. Die Kunst um die es sich handelt, ist die der Verkündung, des Dolmetschens, Erklärens und Auslegens und schliesst natürlich die ihr zugrunde liegende Kunst des Verstehens ein, die überall dort erfordert ist, wo der Sinn von etwas nicht offen und unzweideutig zutage liegt." (Gadamer 1966, p. 32.) English translation by the author.

> other cultural creations with the same goal. They have to unfold their own power of conviction, in order to be understood." (Gadamer 1966, p. 56.)[1]

He also mentions the dialogic conversation as the precondition of understanding and agreeing. He identifies the necessity for the partners involved in the dialog to be on the same level and to abandon any prejudice as a precondition of a true dialog (Gadamer 1966, p. 56). But how is it possible to leave behind preconception and convention in a socio-cultural context?According to Gadamer, it is language itself that controls its own convention and is a result of the exchange within a group:

> "It is language itself that dictates what is the linguistic custom. This is not a matter of mythologizing language, but means the un-reducibility of the expression of language to an individual, subjective meaning. That it is we who are speaking here, none of us, and yet all of us, this is the being of 'language'." (Gadamer 1966, p. 76)[2]

Gadamer also debates the role of language in hermeneutics and declares that the concept that understanding can only happen in the realm of language is a challenging claim. In his discussion of examples that point to a silent understanding, he refers to phrases in language such as "a silent agreement" or "words fail me" and interprets these phrases as proof of the necessity to use language as a means of understanding (Gadamer 1966, pp. 71/72). This focus on language corresponds to the early fields of hermeneutics. The writings of Biblical texts and the inter-pretations of law are invariably related to language.From these aspects of translation briefly summarized above, we may conclude that hermeneutics is a philosophical methodology with the aim to assess the true condition of our existence by continuously interpreting texts and cultural achievements in general through their interpretation in an ongoing dialogic conversation. With a critical approach, we may ask if the necessity of a dialogic conversation is exclusively bound to language or if we can find aspects which relate to the above described approach of hermeneutics in the context of visual communication. In fact, we could claim that the exclusivity of language is just a consequence of a deeply rooted aversion to the senses and, therefore, is opposed to images. Is hermeneutics just another indication of the dominance of conceptual thinking over the sensuous, the inferiority of the sensuous in comparison with the super-sensuous, as Nietzsche called it in his brief overview of the development of Western philosophy (Nietzsche 1888)? In other words, do images and the processes of their creation have the potential to assess the conditions of our existence through a dialogical conversation between individuals? In the following part of the paper, the role of images in a dialogic conversation is critically assessed from the point of view of the practice in visual communication.

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[1] "Doch enthält Hermeneutik stets ein Element, das über die blosse Rhetorik hinausgeht: Sie schließt stets eine Begegnung mit den Meinungen des anderen ein, die ihrerseits zu Worte kommen. Das gilt auch für zu verstehende Texte, wie für alle anderen kulturellen Schöpfungen dieser Art. Sie müssen ihre eigene Über-zeugungskraft entfalten, um verstanden zu werden." (Gadamer 1966, p. 56.) English translation by the author.

[2] "Die Sprache selber ist es, die vorschreibt, was sprachlicher Brauch ist. Darin liegt keine Mythologisierung der Sprache, sondern das meint einen nicht auf individuelles subjektives Meinen je reduzierbaren Ausdruck der Sprache. Daß wir es sind, die da sprechen, keiner von uns, und doch wir alle, das ist die Seinsweise der 'Sprache'." In addition he describes the natural transformation of language as an antagonism between convention and revolutionary awakening. (Gadamer 1966, p. 76.) English translation by the author.

Drawing and Interpretation – Image to Image

We could make our inquiry into the relationship of hermeneutic practice in language and the practice of image generation in the context of visual communication, by defining what images are. To do so in-depth would however be beyond the scope of this short paper, but some of the aspects of the iconic may help us to develop a plausible connection between image generation and hermeneutic practice. Hans Jonas (1903 –1993) defined the creation of images as a unique ability of human beings (Jonas 1994 p. 106). In his definition, an image has to be similar to an object in our world. The qualities of the object represented in the image have to be similar to those of the real object, but they cannot be complete, otherwise we would perceive it as a copy or a clone of the original. An image emphasizes or neglects aspects of our experience through its selection of qualities. In this process, the designer realizes his or her interpretation of the world. A multisensory experience, with all its emotional reactions and socio-cultural indications, is transformed into an artifact, which is then (visually) perceived and allows its beholder to recall the experience. If we ask how this selection takes place in practice, we can refer to the processes of image generation and look at the most basic methodology – the process of drawing. The sequence of images taken in the process of creating a drawing shows a methodology of image creation in which many tentative lines are placed in a specific format before a definite form is found [Fig. 1].

If the format of the drawing is large (DIN A2) and the paper is attached to a board on an easel, a physical movement of the arm and the entire body is involved in the process of drawing. This process consists of a circular sequence of observing with the eye, putting a line on paper with a gesture, and aligning what we see on the paper with available records in our memory and the observed object. The intuitive phase of critical creation is interrupted at some point to evaluate the actual state of the drawing. One steps back and consciously decides if the drawing is

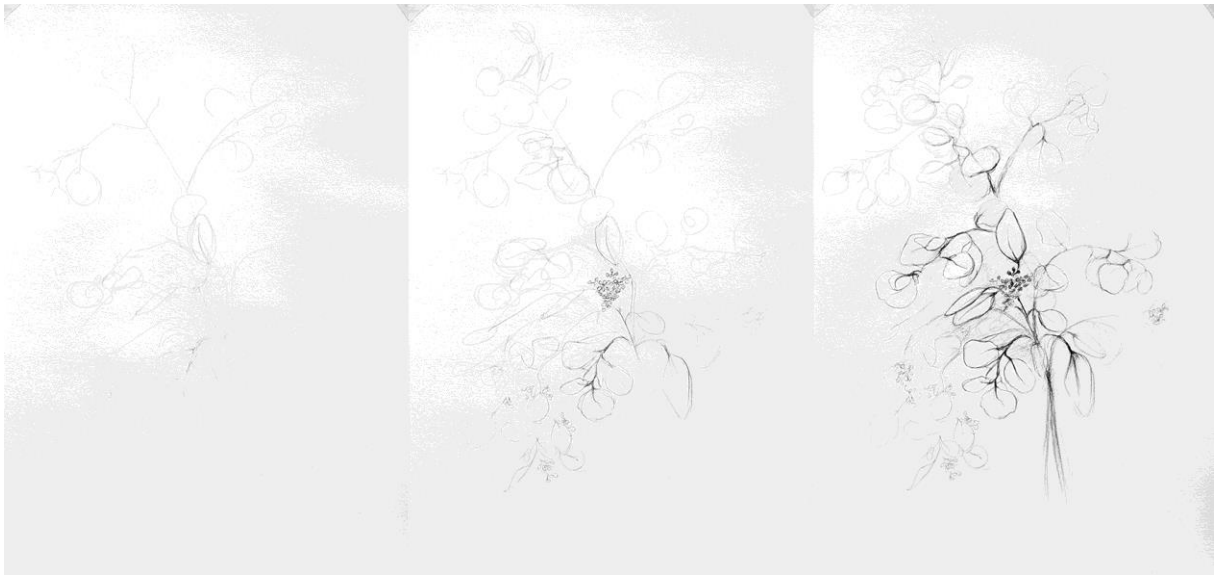

Figure 1: three selected steps in the creation of a drawing. Indre Grumbinaite, 2015, Archive of the Visual Communication Institute, The Basel School of Design, FHNW.

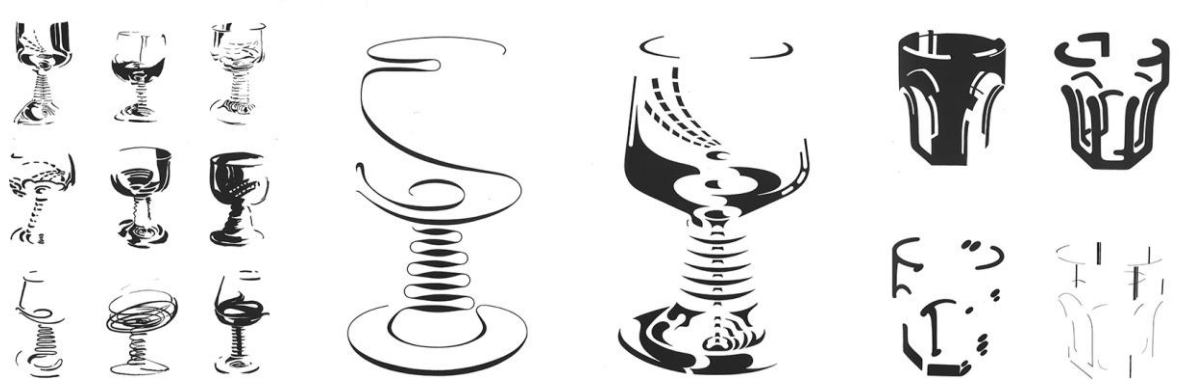

Figure 2: Black and White Translations. Results from the class of Kurt Hauert at the Basel School of Design taught between 1968 and 1988. Archive of the Visual Communication Institute, The Basel School of Design, FHNW Academy of Art and Design.

successful according to the criteria established before the drawing activity began.[1]The analysis of the concrete example of drawing described above coincides with the generalized description of image-making by Hans Jonas. In addition, we can infer from the summarized process that the selection of qualities made in the process of drawing is an *intuitive* transformation of an observation leading to an interpretation. The decisions made during the actual placing of lines on paper are made below the threshold of consciousness (Lakoff/Johnson 1999, 508 – 509). They are guided by the condensed records of our experience and formed by our dispositions (Damasio 1999, 331 – 335; 2010, 151). If we let these dispositions create the actual interpretation, the drawing has the potential to present an individual point of view. With the gesture of the body, unique interpretations can occur, which go beyond preconceived conventions (Derrida 1993, 4; Barthes 1979, 177/178). The following exercise, which was a central part of the classic Graphic Design curriculum in the 1950s at the Basel School of Design, shows the variability of interpretations of one particular object [Fig. 2]. In the exercise called “Black and White Translation”, students were asked to develop high-contrast graphic representations of a drinking glass using black and white acrylic paint. With this task, the students experienced the possibilities of iconic interpretation. In the translation from the observation of reflection, transparency, materiality, and form to an image, clear decisions had to be made in order to represent essential aspects of the object. In the intuitive sketching process, different qualities were emphasized or omitted. What needs to be included in the interpretation of an image to represent it in a universally valid manner? Is it its material quality, or three-dimensional space, its lights and shadows, its transparency, the context of the object, or a sign-like or gestural quality?

The intuitive process of evaluation and negotiation in the process of drawing and creating black-and-white translations can also be described as “thinking on paper”. But at first glance,

[1] For a more extensive analysis of the drawing process, see: Renner 2011.

the conversational aspect between individuals, which is emphasized by Gadamer in his description of hermeneutics, seems to be missing. If we compare the description of drawing to the anthropological hypothesis that human communication has developed out of the basic gesture of pointing at something (Tomasello 2008, p. 322), we can connect the gesture of drawing to the basic level of human communication. According to Michael Tomasello, the most basic form of human communication, the pointing gesture, was limited to address things in the immediate context in which the conversation took place (Tomasello 2008, p. 61). The aim to communicate with a more complex narration led to the iconic gesture, which entailed the imitation of objects and events that were remote in time and space (Tomasello 2008, pp. 66/67). But the iconic gesture was also dependent on the presence of a narrator. In the use of gestures to generate a trace – in the process of drawing – we can recognize a continuation of the iconic gesture. A drawing possesses the advantage of being independent from the presence of an individual and is, therefore, suited to serve as a tool of exchange and negotiation within a group. In the process of drawing and image-making, we can recognize an individual process of visually evaluating a field of options and the externalization of an individual point of view. This becomes the starting point for a discursive exchange in a small group.

The function of a drawing as an object supporting the process of negotiation in a group can be observed in the actual context of collaborative projects in research, development, or management. The power of visualization in the form of a spontaneous drawing on a flip chart becomes evident when shared in a group of people. At a single glance, the drawing shows all members of the group of what the organization, the structure, the outcome, or the goal of a process consists.

Every participant of the meeting can react, correct, or add to the drawing as long as there are no hierarchical structures preventing an involvement in the negotiation. If the group agrees on a drawing, it can provide orientation in a complex project for the individual activities of the participants. Since this kind of drawing goes beyond a representational interpretation, we can quite generally infer: the goal of drawing does not primarily focus on the representation of reality but rather on the provocation of thought, which leads to a dialogic conversation.

Identity Negotiation – Word to Image

If we go beyond the gestural aspect of drawing and its role in the context of communication and turn to the actual practice of visual communication, we can focus on one of the most prosperous fields in communication design: the visualization of identity. How do we arrive at images that represent a group of people? The process of defining a visual identity usually follows a complex and often unpredictable path (Olins 2002, p. 31). In order to conduct a goal-oriented project, distinguishing a number of phases is recommended (Abdullah/Hübner 2002, pp. 28 – 44). Usually, a briefing from the client is answered by a re-briefing of the design office after a first round of open questions was answered. This guarantees a mutual understanding of the client's expectations. In the following, analytical phase, the design

office develops a conceptual framework in co-operation with the client. In workshops, the self-image and the external perception of the institution are assessed. An analysis of competitors is conducted as well, and strategic steps on how to proceed are evaluated. All these issues are summarized in a written concept. Approved by the client, this paper serves as the basis for a first phase of visualization in the form of rough sketches. In many cases, the presentation of the first visualizations of key elements leads to a controversy. What has been agreed on in the medium of language was not directly translated into a visual materialization. This shift, which can be observed in many projects, lets us infer that sketches show aspects of identity which cannot be addressed by words. The translation from language into images is even more difficult than the translation from one language to another. In the design phase, the negotiation of identity shifts to a concrete and material level. After the first presentation, reactions to the proposed visual sketches are carefully examined and reconsidered for the next phase of the design process. Eventually, after several presentations, the process is narrowed down to a single solution or the project stalls. In the concrete example of the visual identity of the University of Applied Sciences and Arts Northwestern Switzerland, which was developed in 2005 by our internal office, we can closely follow the steps of negotiation. Three smaller regional universities supported by one or two cantons merged due to a Federal master plan to establish seven larger areas of Universities of Applied Sciences and Arts[1]. The merger was a long process of negotiation between the educational departments of the four cantons and the Federal government, before a corporate design process could be initiated. Prior to the resolution of the political processes, the internal design office of our university was commissioned by one of the cantons (the one who hesitated the most to join in for financial reasons) to develop a corporate design for the merging institutions. An entire corporate design was developed over a period of months using the afore-mentioned phases. A major goal was to convey the message of a cost-conscious educational institution with a broad portfolio of application-oriented Bachelor and Master educations with a regional focus. The corporate design was implemented at the commissioning institution before it was presented to the two other partner institutions [Fig. 3]. The newly developed design was rejected by the other two institutions because their self-image and the proposal were not congruent. There was no possibility to negotiate the identity of the proposal with all the parties involved. As a result of this conflict, the corporate design was rejected and the development of the identity visualization process started anew. This time, the process was conducted in close co-operation with the newly appointed Director of the merged universities [Fig. 4]. The process of negotiation focusing on who we are and who we would like to become still continues. From our involvement in this process, we could infer that identity visualization can be elusive if it is only conducted on a verbal level. Images are more specific, and this specificity is crucial for the visual experience of an identity. This example can be used to support the idea that images have their own, unique logic, which is only partially accessible through

[1] All the disciplines of art and design are exclusively situated as Schools at the Universities of Applied Science and Art in Switzerland.

words. In this sense, identity design points to the unique status of images from another perspective as that of the experimentations conducted in the field of modern art (Boehm 2004).On a larger scale, the process of defining the design of the Swiss banknotes can be analyzed under the aspect of negotiating a national identity. The results of the competition, which was held years before the new Swiss banknotes will be printed, present an interpretation of the future of the country. These proposals, developed for the competition and their dissemination in the media, provoked a series of public debates on the future development of the nation. The process of translating an individual vision into a group vision that can be accepted by a majority, often persists for many years and, as a result, ends in an unspectacular compromise (Renner 2013). The design of the Euro bills is one such example as it lacks any individual interpretation and, therefore, is quite conventional. What Gadamer calls the "being of language" can be applied to describe the process of identity design. "It is we, who are showing the identity of a nation." We can continue the transposition from Gadamer's quote: "That it is we who are presenting images, none of us, and yet all of us, this is the being of a 'collective visual identity'". In opposition to the idea of images being a result of mere convention, François Lyotard (1924 – 1998) describes, in his essay *The Paradox on the Graphic Artist,*

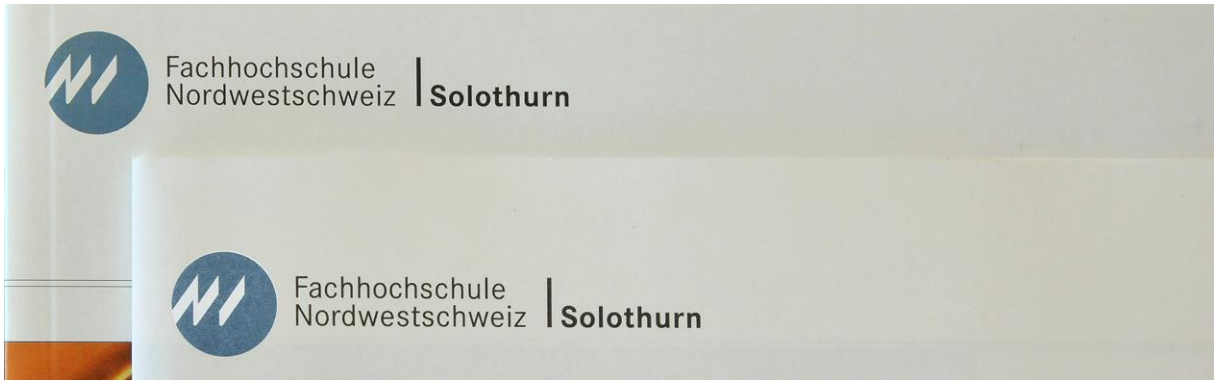

Figure 3: first corporate design for the University of Applied Science and Art Northwestern Switzerland, Internal Office for Communication Design, 2004.

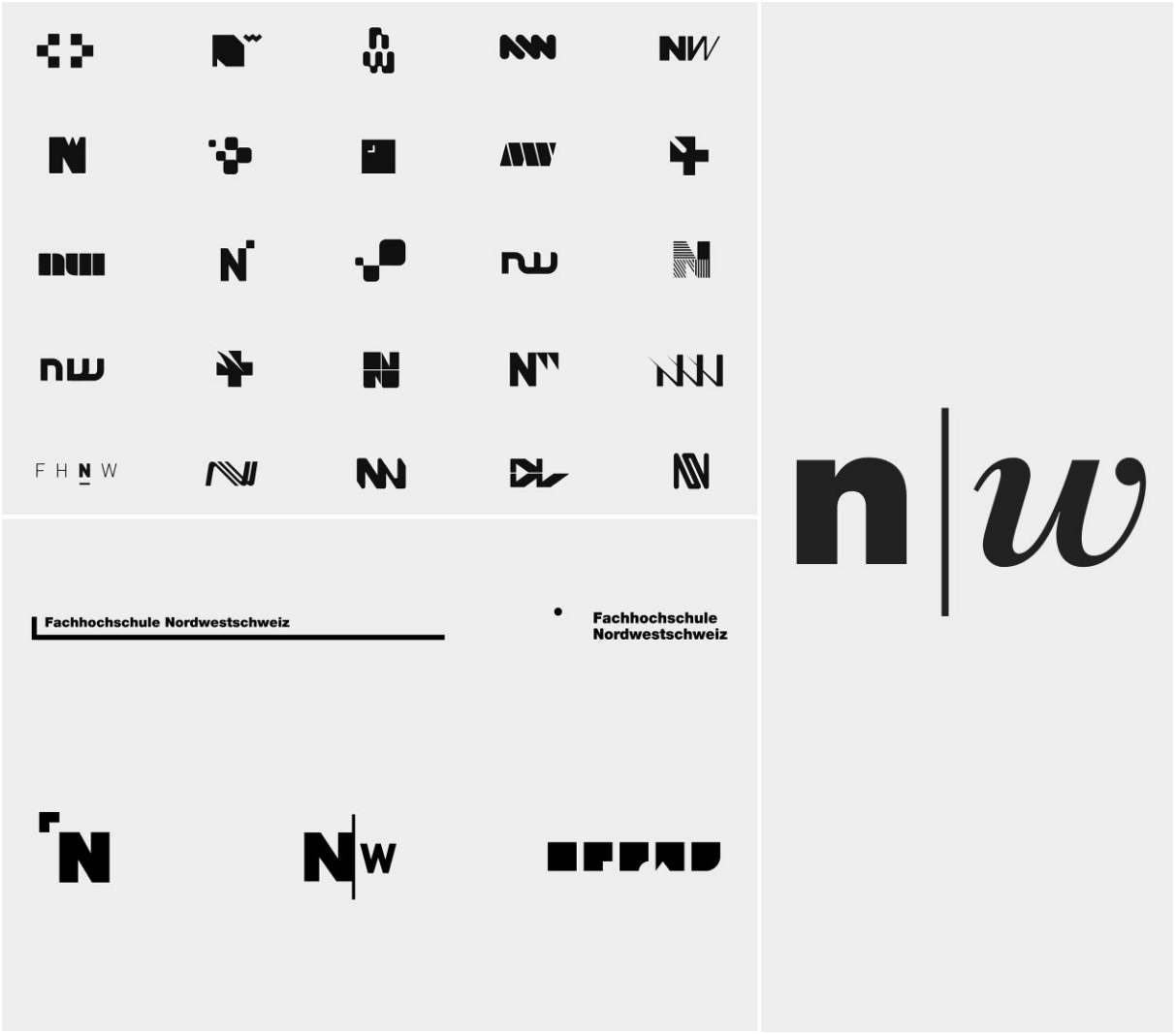

Figure 4: sketches of an idea (top left), intermediate proposals (bottom left) and final logo (right) for the University of Applied Science and Art Northwestern Switzerland Internal Office for Communication Design, 2005.

that graphic design is art encountered in the street. Only through the contrast to what has been seen before and is stored in our collective memory can attention be captured and an object of visual communication be intriguing, confronting, or surprising (Lyotard 1994). Lyotard states that through a new interpretation of a familiar experience, a graphic object enables the beholder to see something from a new perspective (Lyotard 1994, p. 44). We can confirm this observation with successful examples of drawing and identity visualization. The examples that are compromised lack exactly this effect of providing a new perspective of a familiar experience. They only repeat what we know. If we come back to Gadamer's theory of hermeneutics and his insisting on the role of language, we can refer to Gottfried Boehm, who has analyzed the "misinterpretation" of Gadamer's hermeneutics being limited to language as a problem of German philosophy (Boehm 1996, pp. 243/244). Therefore, it is no surprise that there are links between the above described division of images (those that are compromised as opposed to those that are unconventional) developed in the context of

visual communication and Gadamer's categorization of images in "presentations" and "copies". In *Truth and Method,* he explains the image category of "presentations" as consisting of pictures that maintain a relationship to the original but develop their independent status through a deviation from the original. In contrast, he distinguishes the "copy" as entirely dependent on the original. He infers a one-directional dependence of the "copy" on the original, whereas the original is also influenced by its "presentation" (Gadamer 1960, p. 135). Following this line of thought, we can transpose Gadamer's idea of the two image categories onto the communicative image and free it from being exclusively bound to a mimetic role of showing the world. Thus we can say that the processes of negotiation with images in the context of visual communication either leads to images entirely dependent on the original formed by the collective memory of a society (copy) or to a result which changes the collective perception (presentation) and, therefore, reality (the original). This may be considered a central argument if we are distinguishing word and image in the context of communication. If we are negotiating an identity with language it is agreeable, but the first sketches of a corporate design address a possible reality and influence the perception of an identity through visual means in a more direct and powerful way.

Practice-Led Iconic Research and Hermeneutics – Image to Word

The comparative inquiry into hermeneutics and visual communication could be continued through an analysis of pictographic images or diagrammatic images. Their advantage over language can be seen in their universality and their ability to present data at a glance. As exemplified by corporate design, the negotiating process in the making of images could also be discussed in other fields of visual communication. How are decisions made and how much is a beholder part of the negotiation when data is selectively transformed into an image presenting a set reality?

In addition, we can determine the conversational aspect in the multiplicity of interpretations that a beholder can encounter regarding a specific depiction. In a comparative and critical viewing of these interpretations, a conversation and an evaluation could be possible. But then, how many people are conceivably able to conduct this kind of analysis today?

This is where the project of "iconic research" (Bildwissenschaft) began to take hold. The claim of the Iconic Turn (Boehm 1994, Mitchell 1995) led to the observation that there is a lack of scientific and, therefore, also wide-spread knowledge concerning how images generate meaning. This becomes especially evident if we consider the long history of scientific reflection about language. Thus, the lack of awareness of how images affect a beholder and the increasing communication through images caused by digital technology are a threat to any democratic society. In fact, we may ask if we are at all

able to develop an independent opinion or if images are creating our reality in a manipulative manner such as described by Gadamer's term of "presentation".

If we take the idea developed above, namely that images draw upon a unique logic and that they carry their own intrinsic meaning, we can infer that it is misleading if we approach images as a mere transposition from language. How can we approach the meaning of images through the means of language? And how can we avoid the bias of language in a scientific discourse about images? Many disciplines such as art history, philosophy, the history of science, psychology or sociology are participating in "iconic research". Their methodology is usually determined by their discipline as historical, hermeneutic, or empirical. What connects them is the contribution of the disciplinary findings by language. Since a scientific discourse is based on the exchange of a finding in order to share, support, or contest it, the use of language seems to be inevitable. Thus, we may ask: is it possible to translate the effect an image has on an audience into language? We consider the use of any existing imagery and a detailed "reading" of these images with language as an approach of the humanities. The practical field of visual communication uses the singularity of images and the problem of their translation into language as a basis for its contributions to iconic research. What we call "practice-led iconic research" can be interpreted as a methodology to create images in order to differentiate their meaning through images as opposed to through language (Renner 2010). By leaving the field of analyzing existing images, practice-led iconic research either focuses on the processes of image creation or uses the creation of images as a methodology to inquire into a specific category of images such as a documentary image, an ornamental image, a diagrammatic image, or a portrait. If we conduct an inquiry into the image category of the portrait, a sequence of variations can be created in search of the common denominator between a physical image of a face and an image-schema of a face held in the memory of the be-holder. In other words, how general can a visual constellation be while still triggering the recognition of a face in a frontal representation? In the experimental approach shown in a set of 42 variations, a reduction to black and white in a frontal view of a face was chosen in order to create an overview in a field of potentialities [Fig. 5].

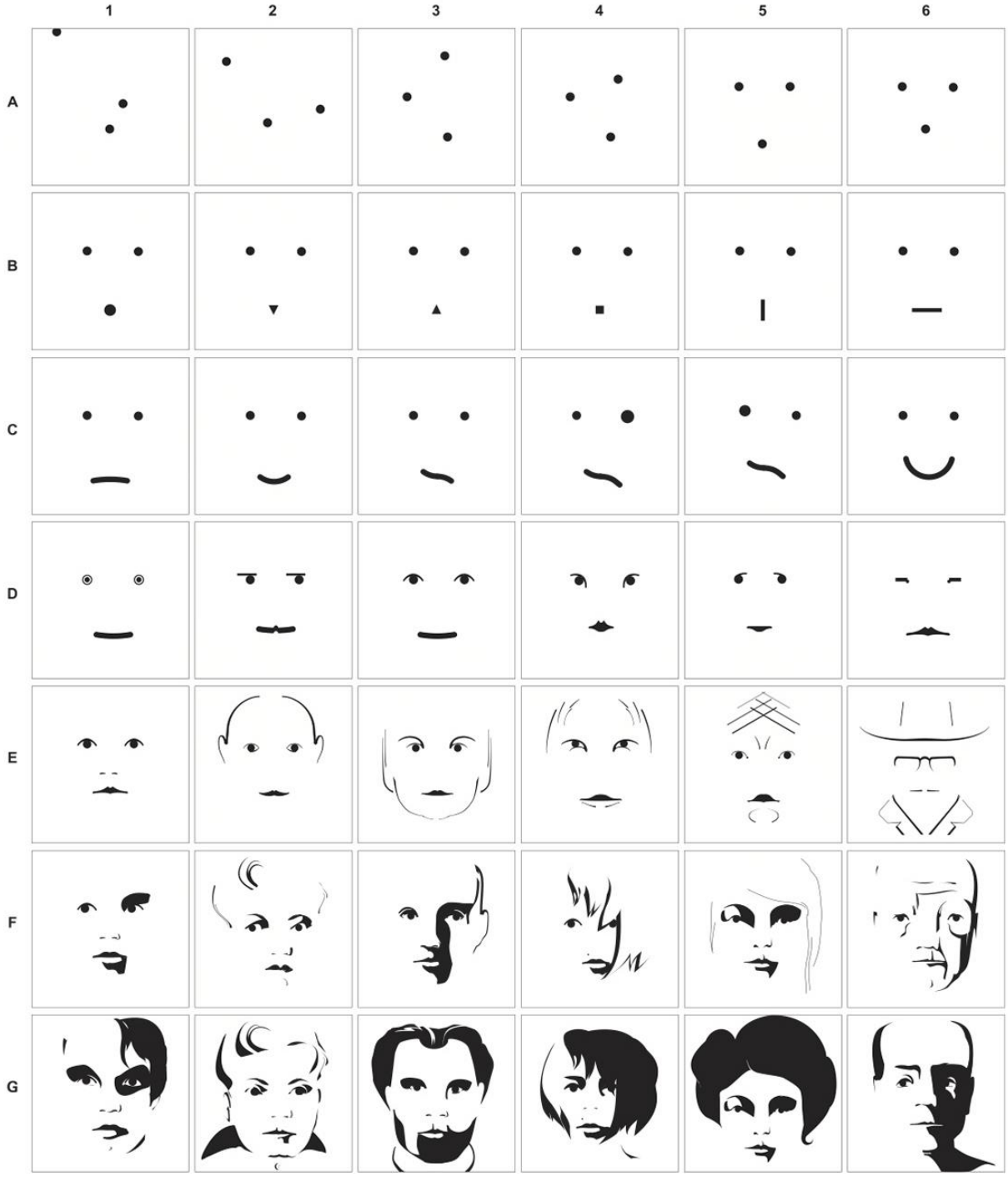

Figure 5: variations on the frontal representation of a face with the restriction to a high contrast black-and-white translation by the author, 2013.

Within this framework, each row was designed with a set of criteria, ranging from the composition of three circles in a square in the first row to the observation of light and shadow in the row at the bottom. Based on the variations, we can evaluate how the compositions recall the image of a face as a starting point for a stereotypical representation and as a final representation showing a living individual. In view of the variations, we can

verbally describe, e.g., in which constellation of the three dots of the first row it is plausible to imagine a face (A5/A6) or to what extent any symmetry in the representation of the face inhibits the reading of an individual (row E and F). Thus, we can use this example to claim that we need a variety of images to verbalize the effect of a single image in comparison to the others. The verbal inference is pointing to the effect the image causes and, therefore, word and image complement each other in this approach to iconic research. The following example also lets us infer an aspect of portrait images. The series of image pairs was generated by taking two photographic portraits with two different emotional expressions of the same person. In a second step, the top and the bottom part of the images were exchanged and reassembled so as to render the manipulation invisible. Even though we cannot express by words what is wrong with the portraits, we are irritated by the problem of reading the emotional state in the anatomically impossible depictions [Fig. 6]. From this photographic image series, we can deduce the high level of sensitivity which is employed in the process of interpreting faces and their representations in portraits. Based on the shared idea that the photographic image represents a real situation, the beholder's irritation appears through a slight deviation from the memorized schema of a face formed by experience. We are irritated but we are unable to put the reason of this reaction into words. Thus, the series lets the beholder experience an emotion which does not cross the threshold of consciousness. And even though we do not know how the images were created, we intuitively sense that something is wrong.

Figure 6: in these image pairs, the areas of the eyes and the mouth were exchanged, Axel Öland and Efa Mühlethaler, 2009. Archive of the Visual Communication Institute, The Basel School of Design, FHNW Academy of Art and Design.

After this brief description of an experimental approach[1] to image creation in the context of "practice-led iconic research", we can assess the role of the visual and the role of language in the scientific inquiry into images. In comparison to an approach that is based on an analysis of existing images, "practice-led iconic research" employs a *strategic creation* of

[1] These examples of practice-led iconic research and more experimental approaches to the image category of the portrait were published in: Renner (2015).

images as a basis for their differentiation. In opposition to what is called artistic research, where the paintings exhibited in a gallery space are considered the result, the proposed approach of an experimental creation of images is bound to a hermeneutic interpretation in language (Elkins 2009). The role of the images is to provide an experience. With an overview of visual options, we are able to define the meaning of one image in a comparison with other images (Boehm/Pfotenhauer 1995). We can say that a methodology of "practice-led iconic research" goes beyond a language-based hermeneutic approach and allows an approach where the relationship of the sensuous and the conceptual has to be continuously re-evaluated. On the one hand, we were able to put Gadamer's idea of a hermeneutics purely bound to language into perspective with this approach. On the other one, we have provided a small example of his claim that the arts have their own approach and are equal to the humanities and science in their aim to assess the true being of our existence (Gadamer 1992).

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About the Author:

Michael Renner is Professor and Head of the Visual Communication Institute, The Basel School of Design, HGK FHNW. With his approach of gaining knowledge through the creation of images, the design process at the same time becomes the central subject of research and a methodology.

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Perception, Meaning and Transmodal Design

Mathias Nordvall* and Mattias Arvola

SICS East Swedish ICT AB
Linköping University, Sweden
* mathias.nordvall@liu.se
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Abstract: Our perceptual system allows us to experience and make meaning of the world through different modalities. We can move between feeling, seeing and hearing things and still makes sense of our world. Our cognitive activities are transmodal. In interaction design this means that both our design processes and our users' interactions are transmodal. We have gained insights into how transitions between modalities, both in the design context and in the users' interaction context, modulate meaning and experience, by analysing three interactive systems: SimProv, VibEd, and Sightlence. We propose that a transmodal design approach facilitate designers to realize the communicative potential of different modalities, and hence present users with a transmodal perspective on their interaction space that allow for continuous rearrangement and use of modalities.

Keywords: situated cognition; transmodal design; transmodality; interaction design

Introduction

Making appropriate use of different modalities and translating between them in design can facilitate understanding, make information more accessible, improve communication, stimulate critique, and improve inclusion of, for example, people with sensory disabilities.

In interaction design, multimodality has been a highly active research topic for decades (Turk, 2014). Multimodality, in that tradition is however mostly a computer input issue (e.g. keyboards, mouse, speech, touch), even though computer output modalities also have been considered. It is in the multimodal user interface research, not as much about expressing the same content or meaning in different modalities, or translating between them, but rather how they can supplement each other to increase users' immersion or proficiency (Nesbitt & Hoskens, 2008). An example of that would be a virtual cave environment with real-time 3D graphics, audio stimuli (ambient, static, and event sounds), and haptics (wind and tactile feedback when touching objects) (Fröhlich & Wachsmuth, 2013). Furthermore, the design

process that is needed to create multimodal interactive systems has generally not been addressed.

The notion of multimodality can be contrasted to what we call transmodality, in which we focus on how different modalities not only supplement each other but also sequentially perforate and interpenetrate each other (Murphy, 2012). Transmodality concerns a kind of translation or transposition over time where meaning is modulated in the movements between modalities with different communication potentials. An example of a transmodal shift in interaction design is if ambient background sounds would be transposed to visual form as a user brings a background object into focal attention. A question is then how continuity of meaning and experience is preserved. This points also towards a conceptualization of interaction design as a process by which the designer presents a user with a perspective on their interaction space, referring some objects and aspects into the user's focus and others to the background (Arvola, 2014).

The perspective is then rearranged dynamically in interaction. Multimodal design has other concerns. Oviatt (1999) describes a number of myths concerning multimodal interaction with one myth being that multimodal integration involves redundancy of content between modes. Based on this, Turk (2013) concludes that complementarity of content between modalities may be a more important consideration for multimodal system design. Whereas multimodal design focuses on input and supplementary modalities, transmodal design deals with content that is translated between modalities as an activity evolves.

Turning from product to process, Murphy (2012) has described how transmodality can operate in a product design process spanning a few days, and Arvola and Artman (2007) have given examples of how iconic gestures representing design ideas were transformed into visual and verbal concept descriptions. Transmodality in design processes can also encompass much larger time spans. An example of that, in the domain of interactive systems, is that games before computers always have been multisensory experiences, but in the first computer games they became primarily visual, before sound was introduced again and primitive forms of haptics entered at a much later stage.

In this paper we will argue that transmodality operates both in the actions, and processes involved in a designer's work, and in a user's interactions that the designers target to shape.

Perception and Meaning in Translations between Modalities

Transmodality involves accordingly the mechanisms by which content is transformed to be presented and perceived by means of one or another of our sensory modalities. This points towards epistemological considerations about how we can gain information about the world through perception, and towards phenomenological considerations about the conscious and continuous experience and meaning of perception at a semiotic level.

From our intuitive first-person understanding of what it means to perceive the world around us, Fish (2010) proposes three key principles to structure an analysis of different theories of

perception: the common factor principle, the phenomenal principle, and the representational principle.

The common factor principle separates the mental state or event of perceiving something from the material properties of that which is perceived, and also claims that there is a commonality between all mental states or events that are experienced as identical by a perceiver regardless of the actual material properties of that which is perceived (Fish, 2010). Fish distinguishes between three ways of perceiving something with varying success: perception, to perceive a thing as it is; illusion, to perceive a thing as it is not; and hallucination, to perceive a thing that is not.

The phenomenal principle states that perception is about something that is experienced. That something has felt qualities—qualia—that can either be conceptualized as sense data or as more complex experienced qualities that are actively searched for.

The representational principle states that perceptions have content and are about something beyond themselves. This means that the things that meet our senses, regardless of modality, are meaningful and made sense of.

We need to address the three principles to understand transmodality in design. First, we need to consider how to design for people to perceive things as they are, as they are not, or perhaps also perceive things that are not. We can, in intersemiotic translation (Jakobson, 1959) between modalities, address what is lost in how things are, how we introduce distortions in perceptions of things, or even perceptions of things that do not exist. In doing so we should consider if the phenomenon is perceived with the same experienced qualities or how it has changed in the transition between modalities. Finally, we need to think about how we represent things and what aspects of it that are represented, and what its meaning is. The representational principle also points towards the semiotic aspects of transmodality.

In interaction design the material is dynamic, computational and abstract in its essence. The written program code, its subsequent presentation in runtime behaviour and interface for human interaction, can be conceptualised as signs. Using Pierce's model, a sign consists of three parts: a representamen, an interpretant, and an object. The representamen is the sign's shape, the interpretant is the sense made of the sign, and the object that exists beyond the sign is its referent (Chandler, 2007).

The user interface of an interactive system can be conceptualised of as representamen that signifies the object, which is the computational objects, processes and events in the computer. The interpretant is a designer when designing the system, and a user when using the system, and their reactions in their respective contexts. The interpretant specifies a relation between the representamen and the object, which gives rise to meaning. The objects and events in the computer are signified by the user interface in the context of, for example, the designer or in the context of the user (Kindborg, 2003). This means that user interfaces are conceived as signs made by designers and taken by users to be expressions the designers' intent and of the inner states of an interactive system (de Souza & Leitão, 2009). The interpretant of one sign may in turn be a sign that refers to some other object for

another interpretant. For example, the sense made by a user may be taken as a sign that refer to a sub-optimal design solution for the designer. Or visa versa, the sense a designer make of computational events, becomes a representamen in a user interface for a user. Designing transmodal transformations in user interfaces thus involves traversing and understanding different interpretant contexts to successfully create a new representamen in another modality while keeping essential aspects of the interpretant intact. Similarly, understanding transmodal transformations in design processes, requires an analysis that take the movement across interpretant contexts during the semiosis into account.

In a transmodal transformation between, for example, a textual and a visual representamen of an object there is also a possibility that a sign vehicle changes the sign category. It could, for example, in text be a symbol with an abstract connection to the object, but in a transmodal translation turn into an icon that resemble its object in some sense. In a transition between modalities, a symbol or icon could potentially also turn into an index, which is directly connected to the object it refers to.

Transmodality

It is well established in multimodal communication and interaction that meaning is collaboratively produced in a complex of talk, embodied action (e.g. gesture), and physical as well as social and temporal context (e.g. Goodwin, 2000; Streeck, Goodwin, LeBaron, 2011). However, little effort has been placed on the intricate ways in which sensory modalities (seeing – drawing, hearing – saying, moving – touching, etc.) integrate, affect, and transform each other during the course of an activity. To address this gap, Murphy (2012) introduced the notion of transmodality as a component of the multimodality framework. He studied product design activities with a focus on "the sequential generation of linked semiotic chains over relatively long stretches of discontinuous time (Murphy, 2012, p. 1967)." By "relatively long stretches of time" he referred to a process in which an abstract idea of a candleholder was transformed into a concrete prototype across many interactions that spanned several days. The notion of transmodality brings to the analysis a perspective of how different modalities not only supplement each other, but also sequentially perforate and interpenetrate each other. Over time, the meanings expressed in one modality, dynamically blend and shape what is expressed in other modalities. This produces, according to Murphy (p. 1969), "a series of semiotic modulations in which certain core qualities persist, but others are noticeably transformed in the transition from one mode to another." The modulations can include movement, mutation, and amplification.

Transmodality can, according to Murphy, also be described in terms of a translation that involves transformative procedures that operate on different aspects of the original code, as for example forms, grammar, etc. The transformative procedures produce new patterns of semiosis that still have elements of the source material that can be recognized even though the core meaning is expressed in different ways.

In face-to-face-interaction, transmodality takes place through sequential chains of utterances and gestures, that enact the production of meaning as verbally expressed ideas that subsequently materialised as gestures, notes, or rephrased utterances. Transmodality can however operate across longer time spans and across different media and people.

The central question for this paper is how transitions between modalities both in the design context and in the users' interaction context modulate meaning and experience. The focus is not only on small pieces of interaction, but also extended periods of time in a design project. This opens opportunities to study semiotic modulations that are dislocated in time, but still influences the meaning and experience of design.

Transmodal Design

The context of a design activity can be transmodal, as shown by Murphy (2012), as well as by Arvola and Artman (2007). The context of users' interaction with the resulting product can however also be transmodal. For example, fire fighters that enter a smoke-filled house can no longer rely on visual maps and visual perception for navigation but have to feel their way forward with their sense of touch, which is an atypical way of navigating spatial space. Adaptive user interfaces can support the user by changing the interface modality used to present information. This would be a clear change compared to contemporary user interfaces as they primarily rely on the visual modality to present content and enable communication. Desktop computers use audio for content delivery in the form of music and movies, but their user interfaces are mostly graphical, and the haptic modality is practically absent. Mobile phones and video game consoles contain simpler vibrotactile actuators that are used to a limited extent. User interfaces can be considered transmodal when they can transform information across different modalities without loosing essential meaning when doing so. Transmodal design concerns itself with those situations where such transformations are beneficial or necessary.

In the following section we describe three systems that were designed with transmodality in mind. The first system, SimProv, was designed in different versions that make use of different modalities. The second system, VibEd, is a visual editor for prototyping haptic interfaces. The third system, Sightlence, is a computer game that can be played through any combination of graphic, audio, and haptic modalities.

4.1. SimProv

SimProv is an education simulation for pre-service teachers' leadership development. A part of the pedagogical idea of the simulation is that the pre-service teachers explore it together in pairs. The content consists of scenarios that feature common problematic leadership situations that teachers often encounter in their classroom. The pre-service teachers engage with the content through reflective discussion of suitable approaches, deciding on a course of action, evaluating the scenario, and exploring alternative approaches. The scenarios are based on longitudinal studies of classroom life. The different prototypes of SimProv variously

present the scenarios through texts, radio theatre, still images, three-dimensional game spaces, and combinations thereof.

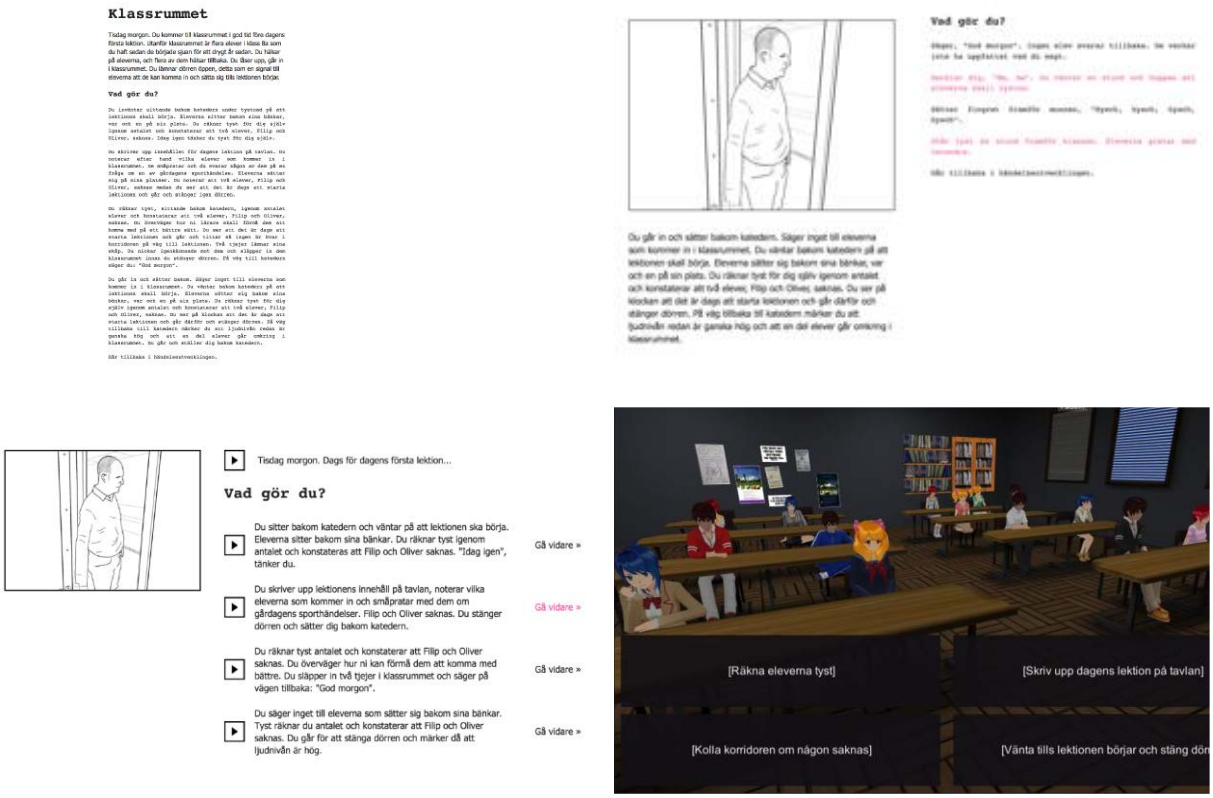

Figure 1 Stages of SimProv. The first text-based prototype turned into a second prototype that also included still images. A third prototype added audio and changed the focus to radio theatre. A fourth prototype explored the use of three-dimensional space.

Figure 1 shows SimProv prototypes that were built to explore various ways of presenting the simulation content for the pre-service teachers. The first prototype was entirely based on text and focused on getting the wording, flow, and description of the scenarios right, so pre-service teachers would find them authentic, as well as exploring different formats for the pre-service teachers to engage with the scenarios. The second prototype took its basis in the first one but added still images to the scenarios in order to highlight various aspects of the texts. The third prototype changed focus from text by rewriting them to be shorter and sparser, and instead added an audio modality by recording the scenarios in the form of radio theatre. A fourth prototype rewrote the scenarios by removing all text that was not focused on dialogue and modelled a three-dimensional space with avatars that presented the dialogue in a more game like form.

During the design process, the written scenarios were illustrated, which meant that features that had never been described in the text suddenly became stated. Features such as the age and gender of the teacher now became part of the scenarios through the still images instead of being left to the pre-service teacher's imagination. The prototype that explored audio through radio theatre made it possible to not only express what people said but also how they said it with more nuance, which in some cases created differences of impression

between the teacher's behaviour as written in the text compared to as it was acted out in the radio theatre. These differences in modality presentations afford both opportunities, and aspects of normativity that need to be considered in the design of scenarios for educational simulations. We are currently investigating the relative merits of text, still images, audio, and spatial environments for information quality in SimProv (Nordvall, Arvola & Samuelsson, 2014).

4.3. VibEd

VibEd is an editor for designing haptic interfaces for productivity software and computer games intended for personal computers, game consoles, and mobile phones. It visualises haptic signals in a manner similar to how Digital Audio Workstations visualise audio signals. By transforming the signals into the graphic modality they can be displayed on computer monitors. Through this transformation these two modalities become available as design materials that can be used and shaped with the same hardware, and peripherals as those that are used when working with graphics or written language.

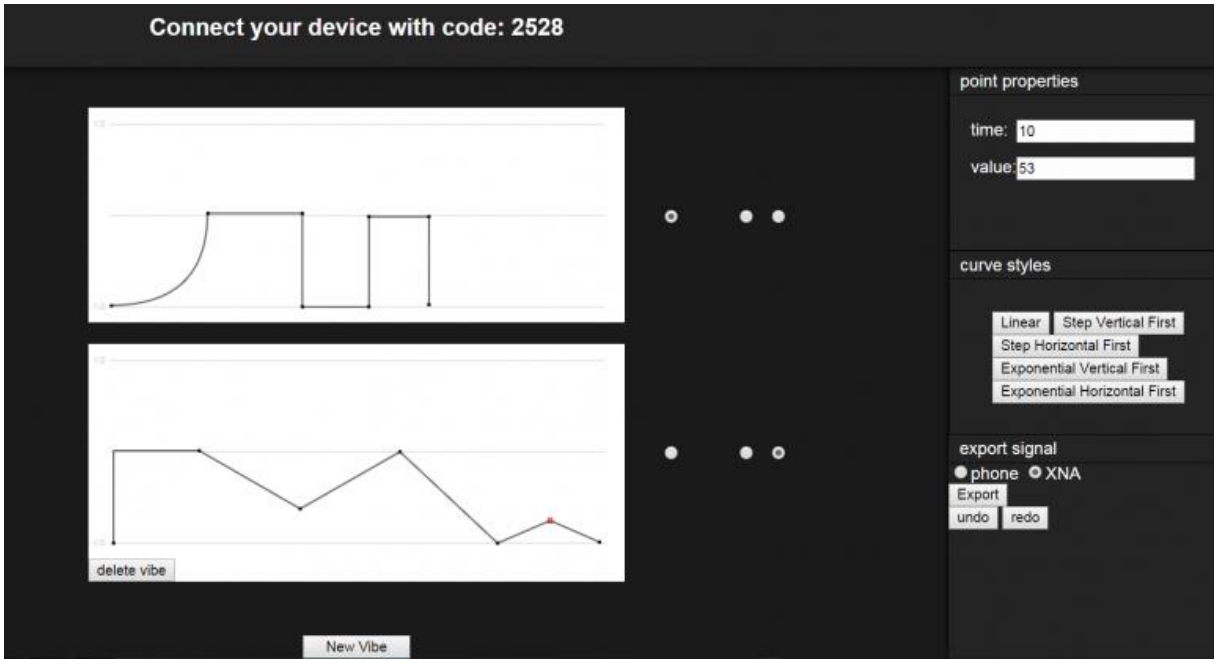

Figure 2 Visually expressed vibrotactile signal patterns in the VibEd system. The different signals represent different vibrations with regard to amplitude, duration, and rhythm.

VibEd allow designers to create haptic signals intended for vibrotactile actuators by drawing visual descriptions of their amplitude, duration, and rhythm. The designed signals can then be tested immediately on a gamepad or smartphone thanks to companion apps, and if they are satisfactory they can be exported as code for use in development. Exported haptic signals needs to be hardware platform specific since there is a large variability in the control different platforms offer developers over the parameters of their haptic actuators. How to convey the communication potential available on a particular hardware platform as a result of the hardware quality of, and software access to, its actuators remains an open issue.

Another open design issue that concerns how editing tools that visually work with the haptic modality are to show and integrate the parameters that can be used in the composition of a haptic signal for a computer interface. The haptic modality has similarities to both audio and to graphics, and similarities impose restrictions on the possible design solutions that can be used to visualize it. The haptic modality shares similarities with audio in the temporal aspects as a particular signal can be described through the parameters of frequency, amplitude, waveform, duration, and rhythm. It also shares similarities with graphics in that it has spatial aspects that can be described in the form of location and surface area. These can in turn form spatiotemporal patterns, which have always been a challenge to represent as a single static two dimensional image in order to give overview. This is the reason for why the haptic modality is problematic to visualize since its temporal aspects must be given spatial form in a space that is already occupied by its spatial aspects.

4.2. Sightlence

Sightlence is a transmodal user interface redesign of the classic computer game Pong. It is a conceptual variant of table tennis. Two players control a paddle each that can be moved vertically up and down across the screen. The goal of the game is to successfully hit a ball that travels back and fort across the screen. The players score points when the other player miss the ball. The user interface redesign makes the game information normally presented with the graphic modality in Pong available through the audio and haptic modalities as well. This redesign also makes the game accessible for people with blindness and deafblindness (Nordvall & Boström, 2013; Nordvall, 2014).

The redesign was done by analysing how the objects, rules, game mechanics, and interaction of Pong were presented to the players visually. Because of the limited resolution of the vibrotactile actuators in the Xbox 360's gamepads it was necessary to design haptic modality translations that were based on symbolic signs more closely corresponding with spoken language as the technical limitations of the gamepads make it hard to design haptic signs that incorporate iconic or indexical aspects. Even though audio speakers in general have superior audio resolution compared to the haptic resolution of game console gamepads, the same approach was used for the design of Sightlence's audio interface as well. The haptic and audio interfaces therefore have some commonalities with each other compared to the graphic interface.

The monitor displays the game objects graphically while their relationships are implied through the dynamically changing white space between the objects. For the haptic and audio interfaces the players' perception of figure and ground is reversed, and the relationships in the game becomes explicit while the game objects recede to an implied existence. Both interfaces have a signal that signifies a shrinking distance but they leave it to the players to infer the particulars of the game objects that are involved. The players must therefore go through a dual process of both learning the rules and game mechanics of the game, and also learning the symbolic language of the audio and haptic interfaces in order to interpret its information output successfully.

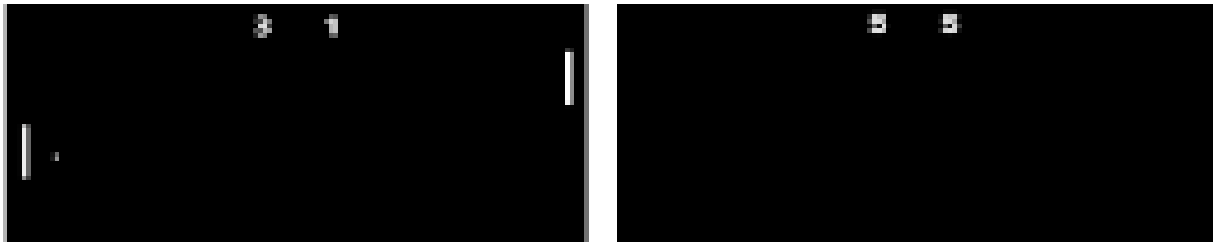

Figure 3 Sightlence with and without graphics. In the haptic-only mode, only the score is represented visually on screen while the rest of the objects, rules, and game mechanics are conveyed through the haptic modality.

Sightlence is played with two Xbox 360 gamepads for each player since the vibrotactile actuators in the gamepads have limited resolution. One gamepad is held in the hands and is used for both the player's input, and for interface output. The other gamepad is placed in the player's lap and is only used for interface output. Vibrotactile signals from the gamepad held in the hands represent the spatial location of the ball relative to the player's paddle through a steady vibration with a low amplitude when the ball is above the paddle, and with high amplitude when the ball is below the paddle. The vibrotactile vibration is silent when the two game objects are horizontally level with each other. Short low frequency signals of high and low amplitude play when the ball hits the player's paddle, and their opponent's paddle, respectively. Vibrotactile signals from the gamepad resting on the lap increases steadily in amplitude as the ball approaches the player, and decreases as it retreats. Short low frequency signals of high and low amplitude are played through the lap gamepad when the ball hits the upper and lower edges of the screen. A rhythmic vibrotactile signals is played through both gamepads when a player scores a point. An evaluation of Sightlence shows that the game is just as fun to play with the haptic modality even though it is much harder to play proficiently (Thellman, 2013).

Maintaining and Revealing Meaning in Transmodal Modulations

This paper's central question is how transitions between modalities modulate meaning and experience in both the design context, and in the users' interaction context.

The transmodal changes in SimProv happened over extended periods of time as the prototypes not only moved between interface modalities but also between iterative development phases focusing on design, writing, illustration, and audio production. The transmodal nature of this design process created signs in different modalities, which resulted in variations of representamens and interpretants across the prototypes. The modality translations in VibEd were more straightforward as they move between the visual and the haptic modalities. They do highlight the need for the design process to be sensitive though to differences between the parameters of modalities, and the expressive capacity of different platforms' actuators. The haptic signals that can be designed in VibEd are the representamens that make up Sightlence's haptic interface. The game's interface translations between the graphic, audio, and haptic modalities can therefore be thought of

as an attempt to change the representamens of the game's interface while keeping the interpretant intact. Pong was originally played primarily through its graphical interface but the translations should not be seen as translations from the graphic modality to the audio, and haptic modalities. All three modalities are used to create interfaces that allow the players to understand and interact with the machine code that's running invisibly inside the computer, and that's how the modality translations should be understood.

Murphy (2012) notes that transmodality gives rise to movement, mutation and amplification. We could observe such aspects in SimProv as meaning and experience were amplified in some modality translations, while others were mutated as a modality could be more specific in some aspects and less in others. The visual representamen in VibEd had a greater expressiveness than the expressiveness of the vibrotactile actuators in mobile phones, which gave rise to mutations in the form of filtering effects. The interface modalities in Sightlence also experienced mutations as the game objects' figure-ground position changed from being explicitly displayed semiotic icons in the graphic interface to becoming indexes of events instead in the audio, and haptic interfaces as the representamens of the latter two interfaces' made the relationships between game objects explicit while the game objects themselves became implied. These mutations are interesting examples of changes that happen in intersemiotic translations between sign systems (Jakobson, 1959).

Opportunities for future investigations into transmodal design include explorations of how transmodal interfaces can provide ambient background information in one modality and then transform the information into another modality as the user's attention shifts between different information sources; how transmodal interfaces can move between and combine multiple modalities during the user's continuous interaction flow; and how continuity in experience and meaning is maintained during modality shifts. Answering questions such as these will have implications both for inclusive design for people with sensory impairments, and for the design of adaptive and context aware user interfaces.

Transmodal design contributes to the understanding of the active role that the interactive and dynamic computer medium plays in the production of meaning in action. It also contributes to the understanding of interaction design as a multimodal design practice since a transmodal design approach encourage designers to realize the communicative potential of different interface modalities.

It has been suggested that interaction design can be conceived as suggesting a perspective on an interaction space, that users rearrange in action according to current objects of interest (Arvola, 2014). The perspective on the interaction space places some objects and aspects in focus, and other objects and aspects in the background. The notion of transmodal design highlights that the rearrangement of the perspective on the interaction space includes shifts between modalities and also modulations of experience and meaning.

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About the Authors:

Mathias Nordvall is a PhD student in Cognitive Science at Linköping University where he does research on game design, user experience, and interface modalities.

Mattias Arvola is an Associate Professor in Cognitive Science at Linköping University where he conducts research in user experience, interaction and service design methods and practices.

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The Ways of Synesthetic Translation: Design models for media accessibility

Dina Riccò

Politecnico di Milano, Italy
dina.ricco@polimi.it
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Abstract: Synesthetic translation, historically applied to artistic productions and in the twentieth century applied by scholars to neuroscience to explain the unity of the senses, is addressed, defined and illustrated in this paper with regard to designing access to content. In particular, the paper shows how the concept of accessibility, underlying every interlinguistic translation process, may be promoted by synesthetic translations, i.e. particular types of intersemiotic translation – among various codes (verbal, figurative, sonorous, etc.) – in which the original text (prototext) and the translated text (metatext) use different sensory registers. The goal is to achieve a form of design that grants everyone access to content (design for all). This paper compares synesthetic practices in typhlology, i.e. aimed at the blind, with extravisual communication design techniques. The conclusion is that all too often, despite having access to the necessary tools, visual designers tend to neglect the needs of the disabled.

Keywords: synesthesia; intersemiotic translation; tactile graphic design; design for all

Introduction: Translation and Accessibility

The theme of translation, especially in linguistic terms, has always played a fundamental role in the circulation of ideas. As stated by Tullio Gregory "The passage of a cultural heritage from one civilization to another, from a geographic context to another, is always tied to a translation [...] Translations are vital in the transition from one culture to another. It is not just a question of translating texts, but also of transferring experiences, myths, values, models. The history of civilization is a continuous translation, to facilitate *access* to texts that would otherwise remain unknown" (Gregory, 2015, my Engl-tr.).

The main concept underlying the main function of a translation, therefore, is *accessibility* to a text, or more generally to a content that, if it were not translated, would remain unknown. Gregory refers to the translation of texts from one language to another, but the same

principle also applies to every kind of translation, i.e. not only – with reference to Jakobson's tripartite division (1959) – to *intralinguistic* and *interlinguistic* translation, i.e. transfers between verbal systems, but also to *intersemiotic* translation, i.e. transfers between different codes (verbal, figurative, sonorous, etc.) that do not necessarily include the verbal code.

It is this aspect of translation that I wish to address in this paper: translation as an action that widens the potential user base, expanding the possibility of accessing certain content. Specifically, I propose to study and identify those tools, techniques, languages and explicative cases that enable the proposal of concrete solutions, achievable with current technology, to extend content accessibility to those cases where the barriers are of a perceptive rather than a linguistic nature, due to the presence of sensory disabilities

Synesthetic Translations: Definitions and Disciplines

By *synesthetic translation,* I mean a particular type of *intersemiotic translation* in which *the prototext* – that is, the "original" text, according to the definition by Osimo (2010), and taken up by A. Popovič – and the *metatext* – that is, the secondary, or translated text (Osimo, 2010) – require and target different sensory registers.

Compared to other expressions aimed at multiple sensory registers - such as *audiovisual translations* or *multimedia translations* – defining these types of translations as synesthetic not only helps us focus on the consistency of the relationship between languages, but also allows us to indicate translation processes that are independent of the media. These can include translations between audiovisual, paper, analogue or digital artefacts, regardless of the media or of technology.

The expression *synesthetic translation* has been applied in the study of both representation and perception:

1. In art and design theories and practices (Bornstein, 1964 "Synesthetic translation"; Riccò, 1999; Baule, 2015 "Sinestesie traduttive"), understood as a translation from a work or other artefact to another, the codes of which are targeted at different sensory registers;

2. In cognitive science, understood as the transferral of perceptions from one sensory register to another (Marks, 1978 "Synesthetic translation"), and often used as a synonym for "cross-modal translation" (Marks, 1975) and "inter-modal translation "(Hameroff, Kaszniak, Chalmers, 1999; and many other authors).

The term *synesthetic translation* is flanked by others that, although they cannot be regarded as synonymous, are helpful keywords when searching sources and to circumscribe the study scope:

- *Traduzione fra un'arte e un'altra* (Pignotti, 1993)
- *Traduzioni sinestesiche* (Riccò, 1999; Cano, 2002)
- *Synesthetic translation* (Hunt, 1989; Hameroff et al., 1999)

- *Synesthetic translation principles*, *Synesthetic translation ability*, *Synesthetic translation skill* (Rader, Tellegen, 2013)
- *Sinestesie traduttive* (Baule, 2015)
- *Inter-modal translation* (Hameroff et al., 1999)
- *Traduzione intersemiotica* (Cano, 2002)
- *Traduzione audiovisiva* (Perego, 2005; Perego, Taylor, 2012; Fois, 2012)
- *Cross-modal translations of sensory dimensions* (Marks, 1975)
- *Cross-modal synesthetic translation* (Hunt, 1989)
- *Translation of musical compositions into paintings* (Ox, Franck, 1984)
- *Audiovisual Translation* (Chiaro, 2013; and many other authors)
- *Audiovisual translation and media accessibility* (Remael, Orero, Carroll, eds., 2012)
- *Traduzioni multimediali* (Bollettieri Bosinelli, Heiss eds., 1996)
- *Traduzione visiva* (Baule, 2009)
- *Visual translation* (Ox, 1993)

This varied set of terms reveals an interdisciplinary interest in the theme, from linguistics to semiotics, art, design, music and neuroscience.

Synesthetic Translation: History

The French philosopher Denis Diderot devoted an entry in his famous *Encyclopédie* (1751) to a particular invention of the time: the *clavecin oculaire*, or ocular organ, invented by the French Newtonian mathematician and theorist, Louis-Betrand Castel (1725, 1735). Formally similar to a harpsichord, the *clavecin oculaire* had a keyboard and made an analogy between sound and colour. When it was played, it freed coloured substances instead of music. The keyboard was not connected to hammers, but to the neck of vials filled with coloured liquids.

The colour effect was somewhat disappointing, as the liquids flowed into a single container, meaning that the visual translation of any music "played" always, and inevitably, produced a greyish result.

Diderot, however, was not so much concerned with the aesthetic effect, but with the idea of having conceived an instrument intended as a means of communication, and even more so, an instrument potentially usable by those who could not appreciate music with their own ears. He was so intrigued by the invention as to want to test the effects of ocular music on a friend who was born deaf. His friend's enthusiasm was even greater than his own: he imagined the instrument as being capable of transmitting – and therefore visually translating – thought, taking music as an expression with human communication as its primary function.

Diderot writes:

> Our deaf-and-dumb friend imagined that the inventor [Castel] was also deaf and dumb, and that his harpsichord was the instrument by which he communicated with

> other men; he imagined also that each shade of colour represented a letter of the alphabet, and that by touching the keys rapidly he combined these letters into words and phrases, and, in fact, spoke in colours. [...] The idea suddenly came into his head that he now grasped what music and musical instruments were. He supposed that music was a peculiar manner of communicating thought, and that musical instruments - lutes, violins, and trumpets - were so many different organs of speech." (Diderot [1751], 1916, p. 171)

The originality of Castel's instrument consists in having created a first interface for the visual translation of musical content, or, as Mario Costa writes, in being the first to have made a "transferral from the inside outwards, via an early 'interface' that is a true antecedent of the current 'synesthesia machines'" (Costa, 1999, p. 81, my Engl. tr.).

Between the late nineteenth and the early twentieth century, numerous research studies and theories were developed on the correspondence between sound and colour. These went hand in hand with many attempts to invent instruments that would put these theories into practice. One of the most notorious cases was the *colour organ* invented by A.W. Rimington (1895), who was asked by Scriabin to represent *Prometheus* (1910). To start with, the aim was mostly aesthetic, with the visual translation of musical texts laying the foundation for a *'total work'*, one that today we would place in the realm of '*multimedia*' content. Later on, these studies evolved for communication and education purposes. Particularly worthy of note in the latter case is the *Music Animation Machine* software produced by Stephen Malinowski for learning music notation (http://www.musanim.com/). This synesthetic translation system first dates back to 1974 and still undergoes continuous development.

The idea of translating music into visual content for communication purposes played a central role in the research work of Luigi Veronesi (1908-1998), a painter and graphic designer, a leading exponent of Milan's abstract art movement. In particular, Veronesi worked to define a code of correspondence between sound and colour. He then used this code to translate musical sequences into paintings, but above all the results of his theoretical and practical research were central to his "interest in *communication through images* and to the existing relations between various modes of communication" (Veronesi, 1977, p. 5, my Engl. tr., emphasis added).

Veronesi was keen to point out that these visual translations of musical works were not to be understood as "his" paintings, but rather as the "reading of a musical piece through a coloured picture" (ibid.). A means, therefore, of accessing content in a new way, namely, with an alternative sensory register.

Synesthetic Translation for Content Accessibility

Providing the opportunity to access content using a different sense means opening up access to content – texts, artefacts, and media in general – to people with a sensory disability.

The synesthetic translations that can overcome sensory barriers are based on three main transferrals:

1. From written language (verbal and/or figurative) to oral language (and vice versa);
2. From written language (verbal and/or figurative) to tactile language (and vice versa);
3. From sonorous/musical language to visual language (and audiovisual).

There are cases and practices of such synesthetic translations in the media, aimed both at a specific audience, with sensory disabilities, and in part also at a general audience. We have already given examples of the musical-to-visual type of translation in paragraph 3 above. Below, we will discuss a number of cases that illustrate the synesthetic translations of types 1 and 2, for a visually impaired audience.

4.1 Visual to Oral Translation: Audio Description

Audio description a technique for making any visual/figurative content, often a movie, accessible by means of voiceover added to the original sound track – in the case of a film, voices, music, sound effects – in order to describe what is happening on screen, requires synesthetic translation. This is a complex task, not only because of the multiplicity of possible descriptions – of a scene, the characters, their actions, the events occurring on the screen – and the uncertainty of their being able to suggest visual mental images; but also because things can be seen in a variety of ways, and therefore any description requires a preliminary observation, a visual exploration and interpretation by one party in favour of another observer.

For a specific example, see *Blindness* (Director: Meirelles, 2008), a film based on the novel *Ensaio sobre a Cegueira* (1995) by José Saramago, for which an audio description is available both in the novel's original language, Portuguese, and in English.

On comparing entire scenes with the corresponding audio description, Bustamante (2011), a Portuguese native speaker, intent on drawing up his doctoral thesis, revealed a number of strange incongruities. In one scene, for example, in which a plate is filmed up close (20'54"), the Portuguese audio description says "Na mesa, um prato com batatas cruas" (On the table stands a plate of raw potatoes), while the English version of the same scene tells us that what is being represented are "oranges". In actual fact, the roughness of the surface might suggest the latter, but in any case, this means that the visual mental image induced in the viewer by the audio description depends on how another observer has seen and perceived the scene, and is therefore a doubly mediated image: first, by the perception of a third party; and secondly, by the language, words and style used by said third party in making the description (Riccò, 2012a).

4.2 Visual to Tactile Translation: Tactile Graphics

Les mains regardent, the title of a famous exhibition held in Paris in the late ’70s and in Italy a few years later (at the National Gallery of Modern Art, in Rome, in 1980), clearly expresses the concept and the possibility of sensory transfer of content.

According to curator Danièle Giraudy, the exhibition was inspired by the curiosity of a blind child, who asked her an odd question: "What colour is the wind?" According to Giraudy: "our

five senses don't work properly, while the blind's four senses work miracles", teaching them to "find their way by following a scent, detect a smile with their fingertips, and tell from a person's voice if they are feeling tired, or if they are gentle and kind" (*Le mani guardano*, 1980, p. 9, my Engl. Tr.). The exhibition was the product of discussion among blind people, researchers, architects, physicians, sculptors and animators on how the blind can enjoy art. The project was created as an opportunity to reflect on the potential of the tactile sense and on the way it was inhibited by the communicative environment, at a time when "do not touch" was an imperative everywhere. You could "touch" at the supermarket, but not in the museum.

Table 1 Relationship between sensory qualities and printing techniques. The list includes the special printing techniques of two Italian companies: Grafiche dell'Artiere (known for the high quality of its prints) and Gruppo Cordenons (producer of technical papers employing innovative sensory solutions). The printing techniques are listed in increasing order of the potential they offer for extra-visual recognition.

Printing techniques	**Visual sensations**	**Extra-visual sensations (tactile, proprioceptive, olfactory)**
Offset printing + scented silk screen	Maintains the visual properties of offset printing	Use of scented inks permits orientation and providing of information on the subject represented. Not always perceptible to the touch
Hot foil stamping	Glossy/matte contrast is easily perceived	Texture is perceptible to the touch, but relief does not permit recognition of letters or shapes with eyes closed
Offset printing +glossy/matt varnish	Glossy/matte contrast is easily perceived	Texture is perceptible to the touch, but relief does not permit recognition of letters or shapes with eyes closed
Letter press printing	Maintains the visual properties of offset printing	Surface print is perceptible to the touch, but not sufficient to permit recognition of the object represented
Blind embossing	Relief is visually perceptible depending on the angle of the light	Letters and drawings can easily be interpreted with proprioceptive exploration, both on the front in relief and on the engraved back
Offset printing +blind embossing	Has the visual properties of offset printing, with the addition of relief, which is visually perceptible depending on the angle of the light	Letters and drawings can easily be interpreted with proprioceptive exploration, both on the front in relief and on the engraved back
Offset printing +thermography	Very marked contrast between glossy and matte	Relief can easily be interpreted with proprioceptive exploration

Laser engraving	Engraving is visually perceptible under light at all angles	Letters and drawings can easily be interpreted with proprioceptive exploration, both on the front in relief and on the engraved back. Great flexibility in texture solutions

Figure 1 Examples of tactile translations of visual pictograms made by students (Visual Design Studio Laboratory, Proff. D. Riccò, L. Gunetti, A. Andriani, Degree in Communication Design, Politecnico di Milano, A.Y. 2015/16). Students: G. Pinotti, L. Ferrari, C. Cocchetti, A. Pavesi (above); A. Candido (below). Photos: D. Riccò.

The exhibition is of interest to us because it demonstrates the potential and the variety of ways in which content can be transferred from visual to tactile. These are translations in which the “continuum ranging from the literal to the poetic" that Darnell speaks of (Darnell, 2002, p. 372, my Engl. tr.) with reference to interlinguistic translation is inevitable, as it is in any kind of translation. In other cases, we also find solutions in which translation faithfulness is easier to achieve, even between different registers (the visual and the tactile).

Fabio Levi (2015) – a historian with twenty years’ experience studying access to culture for the visually impaired – perfectly describes and illustrates the communicative potential of translations into tactile relief drawings. Tactile translation inevitably requires simplification over the original visual *prototext*, as our capacity for tactile discrimination is much less refined than the corresponding visual sense. But a process of simplification takes place even when we translate a text from visual to visual, proceeding, for example, from iconic representation to abstraction of representation of the same concept, or object. Levi notes that, even though we have been dealing with relief drawing for almost two hundred years, it is still underused in communication with the visually impaired (Levi, 2015, p. 63). This is due to prejudice about the ability of the blind to perceive images, but is in fact inexplicable given the tactile solutions offered by today’s printing techniques (Table 1).

Our teachings as part of the Degree in Communication Design (Visual Design Studio Laboratory, Proff. D.Riccò, L. Gunetti, A. Andriani, Politecnico di Milano, A.Y. 2015/16) have offered us an opportunity to experiment with translation of simple objects in a progressive process of simplification of representation that begins with a photograph, moves on to graphic representation and pictograms, and ends with verbal and tactile translation of the configuration of an artefact. The techniques employed – as they are intended for creating a single specimen – are necessarily manual (and digital), but they are inspired by industrial printing techniques (Table 1), and they sometimes offer stimuli for coming up with alternative technical solutions (Figure 1).

Final Considerations

The technical solutions for printed material targeted at the sighted could also be perceptible, from a tactile standpoint, by the blind. Communication strategies, however, privilege the aesthetic pleasure of exploration, the surprise, the identity and originality of the solution, all too often neglecting the opportunities for transferring information from a tactile standpoint to printed material, making it more accessible and usable in certain conditions of sensory disability. The authors agree with Levi (2015) when he says that the blind and visually impaired face concrete and specific problems; however, we also believe that certain communication design solutions targeting the blind – for example, communicative artefacts that employ embossing techniques – could, with a targeted design, and at no additional production costs, be made accessible to everyone, whether or not they are affected by sensory disabilities.

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About the Author:

Dina Riccò, Ph.D. Degree in Architecture, Ph.D. in Industrial Design. She is a Researcher at the Department of Design and a Professor of Communication Design at the Politecnico di Milano. Her main research areas are visual music and synesthesia.

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The narratives and the supports. Remediating Design Culture in the translation of transmedia artefacts.

Matteo Ciastellardi[a]* and Derrick de Kerckhove[b]

[a]Politecnico di Milano, Italy
[b]University of Toronto, Canada
* matteo.ciastellardi@polimi.it
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Abstract: Media culture has fostered over the last century an incessant proliferation of ideas, models, and artefacts that have defined specific milestones and precise references for designers, researchers, and professionals in several disciplines. Since the mid-'80s, an increasing transdisciplinarity, the ability to experiment more effective techniques, the widespread diffusion of specific tools, and a worldwide network to interconnect emerging knowledge and skills redefined the contents production and consumption.

The growth of social-driven patterns based on bottom-up collaboration, interchanging format of distribution and consumption, connective intelligence, and sharing economy fostered the rise of participative audiences and the emergence of transmedia narratives (Jenkins et al. 2006).

The paradigm shift of the realism of the forms (Flusser, 1997), the growth of crowdsourced and crowdfunded business models (Surowiecki, 2004), accessibility as a protocol not only for consumption but for development (Steve, 2004; Lessig 2004), the birth of new Software Cultures (Manovich, 2010), are some of the passages towards the definition of hybrid artefacts, collectively built and sometimes opened to narrow but very (re)active audiences.

Transmedia artefacts are among the first concrete results of this change of perspective. Over the past 50 years it has been possible to witness the birth of such transmedia experiments and artefacts (The Magus by John Fowles, 1965, and Ong's Hat, 1980). From subsequent projects (like Inanimate Alice, 2005, and The Cosmonaut, 2013), the designer's work becomes a process of hybrid and interconnected teams.

This paper aims at detecting the grassroots and the role of design culture in the definition of transmedia artefacts, showing how designers' skills move towards a translation of the narrative elements not only in terms of

adaptation from one support to another, or from one idiom to a new one, but mainly setting up crossed strategies of cultural "remediation" (Bolter & Grusin, 2000).
Keywords: Transmedia, Design Culture, Translation, New Audiences.

Design Culture from Convergence to Transmedia Artefacts

Since the mid-'80s, an increasing transdisciplinarity, the ability to experiment more effective techniques, the widespread diffusion of specific tools, and a worldwide network to interconnect emerging knowledge and skills have redefined the production and consumption of contents. In this sense, Media Culture has fostered over the last decades an incessant proliferation of ideas, models, and artefacts that have defined specific milestones and precise references for designers, researchers, and professionals in several disciplines. Internet and the increasing permeation and use of traditional media and new devices have defined an emerging design culture based on an epistemological sphere of participation, production, and transmission of knowledge and culture.

During the 1990s critics made radical claims for a narrative revolution in the light of hypertext, gaming, MUDs, and MOOs (Douglas, 1992; Landow, 1992; Aarseth, 1997; Murray, 1997; Hayles, 2001), stating that new audiences would find different possibilities to be part of storytelling experiences and co-authoring them. New terms were introduced such as *wreader* (Landow, 1992; Landow, 1997; Rau, 2000) and *interactor* (Douglas, 1996; Murray, 1997).

The rhetoric of narrative artefact moved therefore from a semiotically-measured perspective (De Saussure, 1916; Hjelmslev, 1969) to a deconstruction of contents and channels that were able to give expression to new products (Derrida, 1974; Landow, 1994; Bolter & Grusin, 1999). The paradigm shift of the realism of the forms (Flusser, 1997), the growth of crowdsourced and crowdfunded business models (Surowiecki, 2004), accessibility as a protocol not only for consumption but for development (Steve, 2004; Lessig, 2004 and the European research lines ICT-02.07.2007), the birth of new Software Cultures (Manovich, 2010), are some of the passages towards the definition of hybrid artefacts, collectively built and sometimes opened to narrow but very (re)active audiences.

In this scenario, the growth of social-driven patterns based on bottom-up collaboration, interchanging format of distribution and consumption, connective intelligence, and sharing economy fostered the rise of participative audiences and the emergence of what will assume the name of "convergence culture" (Jenkins et al. 2006).

The idea of convergence can be resumed, according to Jenkins, to the "flow of content across multiple media platforms, the cooperation between multiple media industries, and the migratory behaviour of media audiences who would go almost anywhere in search of the kinds of entertainment experiences they wanted" (2006). The possibility for "consumers to archive, annotate, appropriate and recirculate media content in powerful new ways" (Jenkins, 2004, p.33) redefined the business models and the project management for media

productions. If, on one side, the total freedom offered through digital technologies and cultural assets defines new possibilities for micro-productions and cross-networked actions, on the other the big challenge is the Media Convergence (Jenkins, 2004, p.37) between these consumer-driven processes and the top-down corporate and market-driven practices.

According to this phenomenon, many aspects of Design Culture in relation to media productions and communication artefacts faced the change and started to reconceive the necessary patterns to favour the merging of producers and consumers, transforming them into participants who are "expected to interact with each other according to a new set of rules which none of us fully understands" (Jenkins, 2006, par. 3).

Transmedia artefacts are one of the first concrete results of this change of perspective. We intend with Transmedia Artefacts all the productions that can be created, distributed, and consumed across multiple platforms and formats, in order to expand the participative audiences as well as the narrative itself. Over the past 50 years it has been possible to witness the birth of early stage transmedia experiments and artefacts, starting from metafictions like The Magus by John Fowles, 1965, and collaborative fictions like Ong's Hat, 1980, among the others, whose innovation consisted in the effort of individual participants / authors / readers to set up the narrative. From successive projects (like Inanimate Alice, 2005 and The Cosmonaut, 2013), the designer's work becomes a process of hybridization and interconnection between the project patterns and the limitless continuum with the participative publics. According to the contents, hybridization and deep remixability (Manovich, 2010) are not the only aspects of a transmedia production, but they are the basis of an emergent translation model that must confront the deep architectures of the platforms, the social dimension of the audiences, the different layers of a narrative, and the participatory production assets.

Transmedia design: the remediation of top down and bottom up philosophies

In the twentieth century Western art and, in part, literature, have promoted an aesthetics of play and self-reflexivity creating the ideal of an active participation of the receiver/audience - reader, spectator, and user - in the production of narrative artefacts and through different supports. According to this cultural stream, and as we have already underlined, in the last years both technologies (platforms, software, bandwidth, media, and distribution channels) and audiences' assets (participation, crowdfunding, crowdsourcing) played an important role in the definition of unstructured and self-generated narrative artefacts. Independent producers (youtubers, bloggers, artists, programmers, hackers, etc.) emerged spontaneously and nowadays we can count on a wide variety of communication artefacts (videos, fanart, ezines, books, music, apps, etc.) easily fitting into the broad area of transmedia productions.

The philosophy of a total independence (from the market capitalization) favoured audience engagement and the audience engagement itself fed the idea of a possible alternative

market value: “engagement-based models see the audience as a collective of active agents whose labor may generate alternative forms of market value” (Jenkins et al., 2013, p.116).

In this sense what we can experience in the creation of transmedia artefacts is a remediation of a cultural production into another, from the point of view of the contents, from the definition of its “spreadability” across different supports (claiming Jenkins, 2014), from the aspect of market strategies. It is exactly this last point, giving recognition to market assets, that can determine the balancing of the project toward a top-down or a bottom-up asset (defining, consequently, the possibility of other opportunities). This tendency is very central in the adoption of strategies for the project, starting from the constitution of the team, to arrive at the definition of the plans and the policies to adopt in designing the final artefact(s).

What emerge in this remediation of two different models, where we can define “remediation” as the dynamic and selective translation of a model into another and vice versa, is a loop that continuously alternates the models by means of the convergence culture assets.

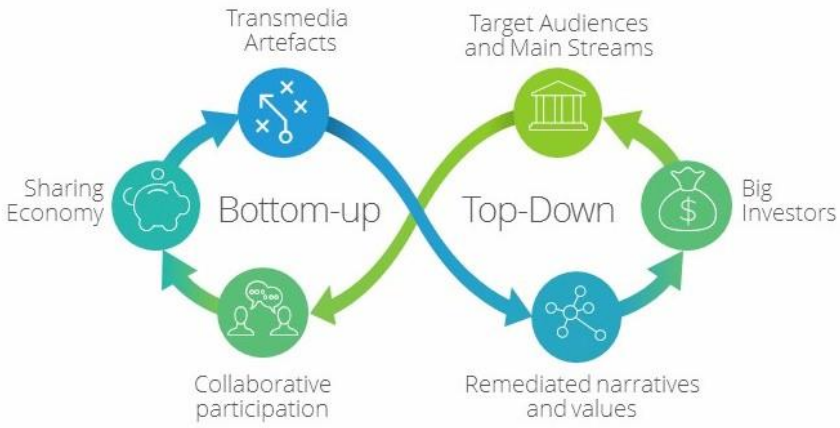

Figure 1 The loop of convergence culture determined by the continuum between the top-down participation and the bottom-up market strategies in a transmedia production

As we can see in fig. 1, the loop of convergence culture in a transmedia production is constituted by two interconnected spheres (bottom-up and top-down models) and it has on the opposite side two different market models: Sharing Economy and traditional Big Market investors. In the model of Big Investors, the audiences (Target Audiences) are merely the target of the capital strategists (defined in accordance with the mainstream artefacts), while in the opposite model, the audiences (Collaborative Participation) are the principal “makers”, the community in charge to decide the funding strategies and the related sustainable actions. If, on one side, Big Investors shape the audiences and the principal trends by the power of their market position, on the other side the participative communities can move from some of those streams (and often the communities rise on the

streams of Big Investors) to restart a new articulation of contents production and consumption, defining sharing economy activity and setting up the most appropriate production.

In a transmedia production this model starts to introduce a first concept of translation in terms of migration among different paradigms. The scheme does not pretend to illustrate a monolithic passage between the different steps, but it shows the principal tendencies of the fluxes that can determine a transmedia production and its life cycle.

Figure 1 also alludes to another important consideration: what has changed is not only the support but the processes behind the production, the reproduction and the content consumption.

What has emerged is a new mindset, an amniotic network constituted by the everyday environment, in which people define their sets of mnesic traces, personal experiences, unconscious patterns, and social relations. All of this absorbs the external environment by a process of mimesis that represents the osmotic layer dealing with different narrative "peers": Family, Friends, Colleagues/Employers, Neighbours, Accidental/Desired connections, Networked Identities. Narrative concepts such as plot, event structures, temporality have been questioned; as well as questions about how stories are produced and experienced have been debated in relation to new elements like interactivity, immersion, and agency. The impact of media and nowadays of social media on narratology and storytelling has also redefined the meaning of readership and authorship: authors have become an icon of themselves, a collective-minded producer self-perceived by their narrative experiences (de Kerckhove, 2003).

For these reasons, in a transmedia production what is necessary is to find elements grounded in the (narrow) community of the participants and in the processes of consumption/interaction to adapt any further experience (fanzine, collector's items, new story plots, etc.) based on the principal core of the artefact (a movie, a book, an event, etc.) in terms of development, content editing, and overall management, primarily as a social translation.

> the spread of all forms of media relies as much (or more) on their circulation by the audience as it does on their commercial distribution, that spreadability is determined by processes of social appraisal rather than technical or creative wizardry and on the active participation of engaged audiences. (Jenkins, et al, 2013, p.196)

In fact, in the Transmedia artefacts production and in the collective/connective consumptions of transmedia contents, the articulation of complex social patterns has redefined the possibilities of expression, participation, and definition of narrative lines.

Transmedia Design Translation.

If the definition of a transmedia artefact can often depend on the relation between participative public and traditional investors, it seems that the figure of designer is usually

devoted to mediate the needs of audiences in a capital-driven project, or to start up a reasonably independent experience with a narrow team of people involved. Apart from these two possible cases and from the wide variety of initiatives that grows on variants of these cases, when we speak about transmedia productions, we can consider the design culture under a different perspective. In accordance with Jenkins for example, the figure of (content) creators can be resumed according to his definition:

> "Content creators do not work magic, nor are they powerless. Creators don't design viruses, nor do they simply wait for something to happen. Successful creators understand the strategic and technical aspects they need to master in order to create content more likely to spread, and they think about what motivates participants to share information and to build relationships with the communities shaping its circulation." (Jenkins, 2013, p.196)

Moreover, Jenkins recalls also the human-driven content mining that allows having a successful production:

> "success in creating material people want to spread requires some attention to the patterns and motivations of media circulation, both of which are driven by the meanings people can draw from content. After all, humans rarely engage in meaningless activities. Sometimes, it may not be readily apparent why people are doing what they are doing, but striving to understand a person's or community's motivation and interest is key for creating texts more likely to spread."
>
> (Jenkins, 2013, p.198)

Close to Jenkins, but on another layer of analysis, Castells remarks on the diversity, the autonomy, and the production of meaning in the public mind as a turning point of our networked digital era:

> "we are indeed in a new communication realm, and ultimately in a new medium, whose backbone is made of computer networks, whose language is digital, and whose senders are globally distributed and globally interactive. True, the medium, even a medium as revolutionary as this one, does not determine the content and effect of its messages. But it makes possible the unlimited diversity and the largely autonomous origin of most of the communication flows that construct, and reconstruct every second the global and local production of meaning in the public mind."
>
> (Castells, 2007, p.248)

Positions such as those of Jenkins and Castells were already present in the early research about Media Literacy (Share, 2002; Jenkins, 2005; Hobbs, 2006), and in many different contributions from Translation Studies (Munday, 2009; Saldanha and O'Brien, 2013; Pérez-González, 2014; House, 2014) clearly underlining the cross-fertilization between the support of communication, the cultural codes of the different audiences, and the human environmental variables.

When we speak about a transmedia artefact we can intend a summa of different products related one to another, i.e The Johnny Cash Project (http://www.thejohnnycashproject.com/, last visited February 22, 2016), the movie Cosmonaut (facebook page at https://www.facebook.com/cosmonauta.pelicula, last visited

February 22, 2016), or a specific narrative of the product, i.e. my specific clip and music created inside the Johnny Cash Project (http://www.thejohnnycashproject.com/-#/explore/TopRated, last visited February 22, 2016), the Poetry Book of Cosmonaut (http://www.frostclick.com/wp/index.php/2010/10/03/poetics-for-cosmonauts-by-henry-pierrot/, last visited February 22, 2016). On one side we have to carefully consider the necessary dimension of interpolation among supports, cultural codes, and human environmental variables, on the other side, we have to reflect on the narrative(s) that will be developed and remediated. In this sense, in order to define the directions of the productions, we can summarize at least three different design lines conceiving a transmedia artefact:

1. A *new* transmedia narrative, *original*, with *no previous streams* from other artefacts, developed to offer multiple possibilities across different supports and other narratives.
2. A *remediated* transmedia narrative, inspired, derived or rewritten *from previous streams*, offering multiple possibilities across different supports and other narratives.
3. A *remediated* transmedia narrative, inspired, newly created or based upon a part of a *previous narrative item* (the environment, one character, an event, an object, a claim, etc.) offering multiple possibilities across different supports and other narratives (for example, building a connective transmedia historical record of an urban community based on the names given to its streets).

Apart from the (not so) obvious destination of the artefact, that is to say offering multiple possibilities across different supports and narratives, the definition of the entire transmedia artefact necessarily needs an operational framework of translation to face the complexity of the storylines (products, events, new plots, etc.). In these artefacts, one can generally define the process of translation mostly in terms of one specific activity: adaptation, reduction, language and graphic interpretation, software porting, etc. The deconstruction of a project in single actions meant to fasten the different phases of production is recommended and acceptable, but an overall vision of the project must not only summarize the single activities, but also define a protocol of translation based on the different layers that constitute the essential set of the transmedia artefact.

In order to define a flexible matrix for the translation of transmedia artefacts, this ongoing research proposes a combined qualitative and quantitative research method. It can be argued that traditional criteria of analysis cannot be applied in discussing transmedia artefacts, that digital products require a new methodological approach. C. Hayles insists on the necessity of studying the specific materiality of the support or better she proposes the MSA – Media-Specific Analysis (Hayles, 2004).

The method is organized around two deeply interconnected approaches: a) desk analysis of the narrative contexts and supports and b) (online) action theoretical framework of analysis

1. The desk analysis of the narrative contexts and supports aims at defining the best practices, cases, specific solutions, and similar artefacts to understand and to

position the transmedia concept or to move from the emerged patterns to design a first draft of the project. This analysis tries to establish typologies of artefacts and typologies of media/channels/supports; consequently, the theoretical models we will apply to analyze the cases spread across Semiotics, Translation Studies, Literary Theory (rhetoric) and aspects of New Media Literacy, Poststructuralist models of text analysis.

2. The (online) action theoretical framework of analysis (reinterpreting Houkes, Vermaas, Dorst, Vries) is a set of online activities based on the case studies to detect the relations among the behavior/engagement of the audiences, the possibility offered by different supports, the limits and the constrains of the environment, and the exiting layers of different storylines. This phase moves from a multimodal approach (Kress 2004) to map out the transmedia processes and to recognize recurring/emerging patterns in the translation from previous artifacts to new ones (remediation).

The application of such cross-methodology offers an analytical script to map out possibilities, needs, limits, milestones, and blind spots of the different levels of the translation process for transmedia artifacts. In figure 2 it is possible to see a sample of Transmedia Design Translation Chart, as a representational analysis of a specific case (The Cosmonaut), in which it is possible to summarize graphically the different patterns and the necessary phases for the design of a transmedia product.

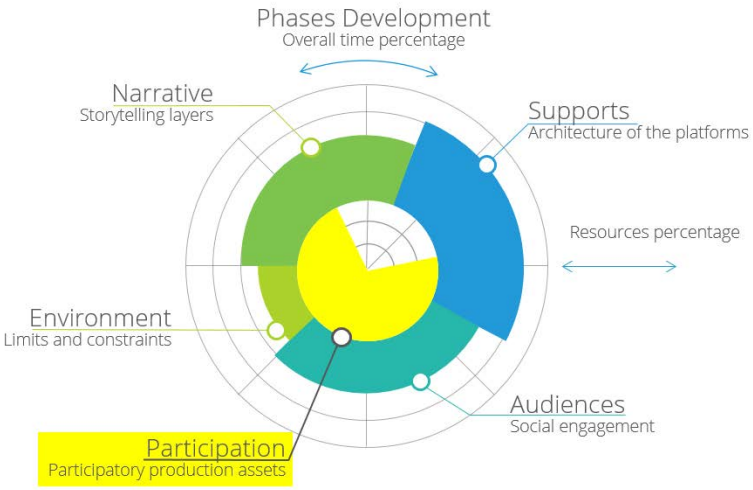

Figure 2 Transmedia Design Translation Chart. The figure describes a sample of the different phases and their relation with the overall resources involved. The case illustrated is The Cosmonaut.

This Chart results help to compare and evaluate different case studies. Every case is mapped out showing the principal phases that constitute the overall architecture of the transmedia artefact (audiences, supports, contents, and environment), the participatory assets and the resources adopted to define the final product. The different mix of the phases, resources, and assets traces the profile of potentialities, weaknesses and types of investment according to the product created. The comparison with the data retrieved from the action theoretical framework and, partially, from desk analysis, offers a rich portrait of every case. The

comparison between several cases, with different aims and different tendencies related to the phases, defines the principal guidelines and the more recent patterns to translate a narrative into another one, intending with the term “narrative” the set of the possible plots, forks, stories, apps, multimedia products, etc. What can be helpful in case of low level engagement, what platforms can improve meet-up sessions, what storyline to create a plot of a political fiction, etc. are a few questions related to the possibility of the Charts to offer flexible translation guidelines for technical elements, specific behaviour, narrative contexts, and more specificities in transmedia environments. The research and the analysis are still ongoing, but the final goal for the Transmedia Design Translation Chart is to improve the comprehension and the trends of transmedia phenomena, as unique artefacts as well as micro-universes of different cultural assets.

A case study: the Cosmonaut.

One of the aim of the research is to analyse and to classify several case studies according to specific drivers and to consider the different modalities of translation between the core narrative and the derivative artefacts, in their transmedia sphere of engagement and consumption. One of the most interesting case studies is the example of the transmedia movie *The Cosmonaut*.

The Cosmonaut is a project started in Spain (Collettivo Riot Cinema) in 2012-2013. It is a crowdfunded initiative (as a regular production and a movie investment able to raise more than 400.000 euro) and a crowdsourced experience (the original script was available online in order to recompose the storytelling and the users were able to download, lend, re-cut or use the film footage in any way they wished). The objectives of the project are to reach a high level of creative freedom (i.e. to tell a story without being limited by the format), to offer to the spectators a real choice (audience engagement), to obtain direct monetization (by means of different format) and to be opened to brand involvement. What is more interesting is the wide variety of narratives, experiences, communication artefacts derived from the original script and translated into autonomous and different stories, on multiple supports and channels, in a perfect transmedia environment. The transmedia universe of the Cosmonaut can be resumed as in figure 3:

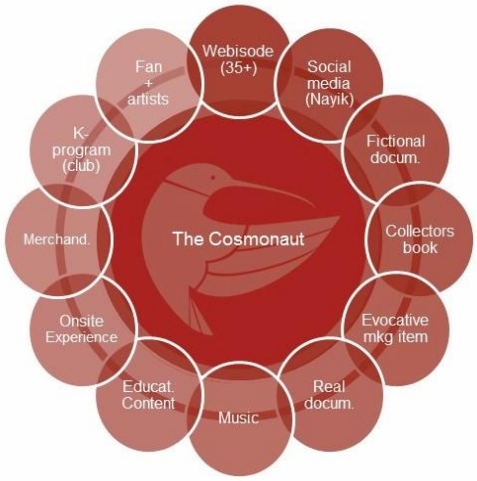

Figure 3 The visual representation of the transmedia world behind the Cosmonaut.

Figure 3 allows one to resume the "satellite" narratives in the following lines and to directly define the narrative categories adopted for a clearly heterogeneous transmedia world:

- Webisodes (35+) - expand parts of the universe of the The Cosmonaut that are less evident in the film, by presenting secondary plot lines... Webisodes are short episodes distributed only online, not necessarily strictly related to the main narrative, and they allow for creating different spheres of knowledge, relation, and engagement.
- Social media (Nayik) - through the use of 13 different Facebook profiles, with 7 main characters and 6 secondary ones, they create a fiction that will interact with the personal profiles of the fans who wish to join in. The use of social software allows for creating a second reality in a fictionalized environment.
- Fictionalized documentary (Hummingbird) - about a group of filmmakers who visit the set of "The Cosmonaut" in former USSR territories. They will interview people and follow ambiguous clues which will bring them closer to the elusive truth. This artefact, completely standalone from the main narrative, can expand the audiences and the narratives of the production.
- Collectors book - Evocative marketing item, Memento Album, Poetry for Cosmonauts
- Real documentary. The possibility to change the asset in the principal line of communication is an interesting example of convergent narrative with different audiences.
- Music - soundtrack, album inspired by the plot, transmedia sessions.
- Educational Content - special pack, workbook on indie cinema, different cuts.
- Onsite Experiences - theater + party, premiere.
- Merchandising.
- K-program (club).
- Fan+artists.

From the case study it is possible to retrieve a series of different experiences in several formats and oriented towards multiple audiences. All the narratives emerged from the principal core (we can say the movie “The Cosmonaut” in this case) can determine a simplified scheme of possible translations, according to the Transmedia Translation Design Chart presented in Figure 2.

This case is a very rich example of different level of translation from an original core (the Cosmonaut as a film) to other transmedia products. The possibility to plan, organize, maintain, and realize different immersive and participative experiences remediating just a few aspects of an original narrative it is an interesting challenge in terms of participative design and, in the case of the Cosmonaut, the result has been excellent.

Conclusions

The promises of transmedia narratives are today one of the most important and fertile segments of cultural production. The possibility of expression opened to everybody is not limited to those who have specific skills; the different markets move towards a form of convergence that transform audiences from passive spectators to active prosumers; the constant innovation of media, that become supports for sharing and exchanging: all these elements are milestones of a social and industrial revolution that the design culture is gradually practising more and more.

The continued growth of these artefacts and the need to find innovative production spaces have allowed for spreading the transmedia model, also if sometimes without rationalizing tools and guidelines for analysis, transformation, and remediation.

The proposal of the research presented in these pages wants to be a contribution towards a model of translation for transmedia artefacts.

Entrusting the designer with a task of research and development supported by powerful tools and scalable methods, and moving from a narrative form, that is mainstream, or isolated track, or new brief, the challenge is to ask the designer to build a project to translate all patterns examined over the research path, and turn them into a final artefact that can offer maximum responsiveness to the proposed objectives.

This task requires a change of perspective about some traditional models of content translation, media translation, and editorial translation about communication artefacts, but it allows for moving toward a frontier that is fundamentally changing the rules of the social, economic, and cultural consumption and production.

According to McLuhan, everybody can be an artist in the electric age (McLuhan, 1964) but even an artist must have pretty good consciousness of the world around to create something unique.

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About the Authors:

Matteo Ciastellardi, PhD, is Senior Researcher and he teaches Sociology of Media at Politecnico di Milano. He worked 5 years at the Internet Interdisciplinary Institute (IN3) directed by Manuel Castells in Barcelona. His research interests are Transmedia Literacy, Cultural Analytics and Hybrid Ontologies.

Derrick de Kerckhove is a former Director of the McLuhan Program at the University of Toronto. He subsequently joined the Faculty of Sociology of the University Federico II in Naples. Presently, scientific director of the Rome based monthly Media Duemila.

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Rules of Thumb: An Experiment in Contextual Transposition

Damon Taylor[a]*, Monika Büscher[b], Lesley Murray[a], Chris Speed[c] and Theodore Zamenopoulos[d]

[a]University of Brighton
[b]Lancaster University
[c]University of Edinburgh
[d]Open University
* D.Taylor2@brighton.ac.uk
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Abstract: This paper describes an experiment in 'contextual transposition', a mobile, inventive method developed from conversations between the authors during an interdisciplinary research 'sprint', where our interests in alternative mobilities and 'designing' socially just futures generated productive creative friction. The idea of 'hitching a ride' in automobility systems was mobilised and we embarked on a journey of 'contextual transposition'. Could one hitchhike in other contexts? To explore this question, we designed an experiment. In this paper we describe it and discuss how we have used contextual transposition as a method for design research.

Keywords: mobilities, social futures, design, contextual transposition

Introduction

Our experiment in contextual transposition grew out of the 2015 *ProtoPublics 'Sprint' Workshop: Prototyping Design Orientated Cross Disciplinary Research,* run under the auspices of the UK Arts and Humanities Research Council. The purpose of that workshop was to foster cross-disciplinary collaboration and innovative project ideation through facilitated serendipity. All attendees had been chosen on the basis of their track record in creative research through public engagement, albeit covering an extremely broad range of topics. Conversations on empirical, intellectual and ethical motivations for their work brought the authors together and animated them to work with the frictions between their diverse perspectives, existing engagements with publics, and methodologies. This brought diverse knowledges together, exploring design theory and cultural history (Taylor), mobilities, disaster, interdisciplinary design and mobile methods (Büscher), gender, generational

aspects to mobilities and mobile methods (Murray), network society, digital art and technology (Speed), architectural practice, design cognition, community led design practices and complexity research (Zamenopoulos). A strong shared commitment to public engagement in defining and 'designing' socially just futures inspired a decision to 'hitch up' for a collaborative project.

Contextual transposition emerged as a mobile, inventive method capable of extending existing creative and participatory design methods in a way that more effectively respects and leverages the practices and knowledges of the 'publics' researchers engage with. It also highlights how 'futures' are 'social futures', dependent on future social practices. Unless futures are inclusive and 'live-able' they will not take hold. Thus a critical focus was on exploring new ways of including diverse communities and shaping live-able future practices. The aim of the experiment in contextual transposition discussed here was to explore the potential of transposing the structural imperatives and practices of 'a' specific practice: hitchhiking – to another cultural context in a way that supports greater social justice. Housing was chosen as a context, because it is different from transport and characterised by significant inequalities. The key research questions were: What are the structural and cultural imperatives of the practice of hitchhiking? To what extent is it possible to transpose hitchhiking knowledge, methods and practices into other contexts? Does such a transposition allow individuals or organisations to exploit existent system affordances in new and productive ways?

In the following, we discuss a short and intense research experiment, undertaken between June and August 2015. We begin by examining the creative, transgressive momentum of hitchhiking, which motivated our enquiry. We show how thinking about hitchhiking revealed a potential for 'contextual transposition' as a mobile, inventive method for the 'design' of social futures. Following an outline definition of the method, we describe our attempt at practicing it. A discussion of the potential of contextual transposition concludes the paper.

Gathering Motivations, Methods, Momentum

2.1 Transgressive Infrastructuring

Hitchhiking, whereby individuals intervene in mobility infrastructures to get where they want to go, emerged as a significant practice alongside the growth of automobility in the twentieth century. When hitchhiking was sufficiently common to constitute a recognised mode of transport (albeit a transgressive one) the queues of students, soldiers, drifters and delivery drivers who stood by road junctions with their thumbs in the air, though they may not have known it, were capitalising on the affordances of the infrastructure of the automobility system (cars, roads, laybys, laws, and cultural practices) (Urry, 2004). The practice is a transgressive one, albeit without the measures of extreme policing that are evident in the practices of 'hitching' on alternative infrastructure systems such as stowaways on ships and and train hoppers on the railways (Walters 2008). Nevertheless hitching is

policed and this is one of the risks to be negotiated as hitchers act to repurpose the system to suit their needs and capabilities by re-casting it a resource.

To the research team – which comprised an architect, designers, a design historian, social scientists, hitchhikers and ride-givers – it seemed that such a practice offered great potential for creative research and in(ter)vention. The potential for a rediscovery of hitchhiking to become part of more sustainable models of travel was an obvious focus for discussion, but the transgressive momentum of the practice was conceptually generative beyond the realm of transport and mobility practices. Could people hitch other systems like healthcare, housing, education? That is, could they transpose the ideas, philosophies and practices of hitchhiking to repurpose other systems in ways that allowed them to address their needs and capacities, to take them where they wanted to go? Hitchhiking became fascinating, both as an empirical field for study and as a methodology for research creation and future-making.

The project did not seek to reinvent or redesign hitchhiking. In the digital age there are already a number of platforms that exploit Internet connectivity to allow individuals to arrange lifts in cars (such as *BlaBlaCar* and *Liftshare*). Nor was the objective to simply use hitchhiking as a metaphor for social action that depends upon (inherently risky) negotiated reciprocity. Instead, the idea was to explore how – through understanding and transposing hitchhiking and its role in infrastructuring the automobility system – individuals and organisations might generatively intervene in the infrastructures that hold other systems together.

Infrastructures can be conceived of as the structures that allow for much of our social lives to unfold (Larkin 2008). But Dourish and Bell (2007: 417) show that infrastructure and everyday life are coextensive, in that infrastructure as a concept 'encompasses not just technological but also the social and the cultural structures of experience'. This suggests that infrastructures become effective through practices of 'infrastructuring', a concept that highlights how infrastructures are not designed then used, but made in use, that some infrastructures enable more, some less 'control' and agency (Star and Ruhleder, 1996; Ehn 2008) and that they could be otherwise. Thus practices of intervention into infrastructures or, rather, infrastructuring, were identified as a rich territory for research and invention. The experiment aimed to map the structural dynamics, imperatives and practices of hitchhiking as a form of mobility system infrastructuring, and, to enable a process of 'contextual transposition'.

2.2 Contextual Transposition

The intention was to elaborate a process whereby knowledge, strategies, tactics and the everyday activities that make hitching 'a practice' could be mobilised, and applied as a mechanism for developing knowledge and insights in other contexts. The intuition was that there was value in moving a practice into a different 'register' of infrastructuring, because this opens up important social issues for creative in(ter)vention and augments existing cultural, participatory and 'infrastructuring' design methods (e.g. Greenbaum and Kyng

1991, Casakin 2002, Randall, Harper and Rouncefield 2007, Ehn 2008, Blaikie 2009, Sanders and Stappers 2014).

Thought experiments explored how one might, for example, 'hitch' a better ride in healthcare, education or housing systems. Hitching practices within automobility systems include 'knowing the territory' of motorway, road networks, and service stations and 'reading drivers' to understand their constraints, but also their (potentially exploitative) expectations (see Section 4 below for more). Hitching practices are themselves 'on the move', with practices such as 'slugging', the act of informal car-pooling, being incorporated from other configurations of mobility such as public transport (BBC, 2006). These dynamic practices shape the automobility system from within by finding cracks and holds for alternative routes and means of travel. Contextual transposition of these practices might offer patients, students or tenants new forms of knowledge and control of their systems, and it brings practitioners, designers and social scientists together in an endeavour of defining and 'designing' 'better' social futures.

Of course, the history of design is full of transpositions and abstractions, to the extent that they can be claimed to be a fundamental design principle. 'Cultural transposition', defined as the projection or mapping of ideas and knowledge from one situation to another, can be associated with cognitive process such as associative (e.g. Koestler, 1964), analogical (e.g. Leclercq and Heylighen, 2002; Casakin and Goldschmidt, 1999) or metaphorical reasoning (e.g Casakin, 2002). Indeed in psychology and design research all these practices have been widely studied as essential processes that underlie creative and design thinking (e.g. Gadwal and Linsey, 2010). In these studies, the emphasis is placed on the use of this type of reasoning as a tool for generating solutions to problems by preserving certain structural imperatives from one domain to another (Gentner and Markman, 1997; Gentner, 1983). The idea of contextual transposition in this study takes a slightly different perspective, however. Here the focus is on the potential for generating new insights or knowledge by overlaying two different domains together as opposed to attempting to generate solutions that adopt or adapt certain principles from one domain to another.

'Contextual transposition', as it is understood here, thus depends upon diverse traditions concerned with the relationship between social research, design and social, technical, and organizational innovation. These include participatory and collaborative design (Greenbaum and Kyng, 1991), ethnomethodology (Randall, Harper & Rouncefield, 2007), mobile and inventive methods (Büscher, Urry and Witchger, 2011; Fincham, McGuinness and Murray, 2010; Lury and Wakeford, 2012), generative, critical and speculative design research (Sanders and Stappers, 2014: Michael et al. 2015), research co-creation (Chapman & Sawchuk 2012) and engaged science and technology studies (STS) (Sismondo, 2008). The intention was not to conceptualize contextual transposition as a form of 'contextual design', which collects data about users' intents and desires for design (Beyer and Holtzblatt, 1998). Rather the approach is collaborative and practice focused. It builds out from co-creation of qualitative social research, which generates rich descriptions of contextures of practice (in this case hitchhiking). Theoretical and practice-based design approaches and collaborative

design activities with practice experts (hitchhikers and housing cooperative members in our case) accompany qualitative research with the aim being to support practitioners in the transposition of practices from one context to another. Transposition thus involves the collaborative, situated 'design' of practices, especially practices of infrastructuring (Star and Ruhleder, 1997; Ehn, 2008). Such a methodology allows researcher and practitioner collectives to explore and 'design' social futures; social in the sense of being, in important respects, '*in*' the social and material practices of infrastructuring that hold socio-technical systems like automobility, healthcare, education, housing together. Contextual Transposition is therefore a way of experimenting with defining and 'designing' social processes in 'better' ways by revealing unexpected openings that can be made use of.

2.3. In a Sprint

The timeframe of the project was less than three months, with everyone working on it alongside (and on top of) their normal everyday commitments. This created great momentum for intense, but circumscribed and speedy research. A small-scale ethnographic study of hitchhiking was set up. Concurrently, a historical and cultural literature review was conducted. Analysis of interviews and observations ran alongside design-oriented activities that reflected upon the material and attempted to develop support for an experimental transposition of insights.

The initial intention was to develop a 'hitching kit', a facilitating device that stakeholders could use to transpose hitching knowledge. The context of housing seemed useful because it is one where ownership of means and capacity for control is unevenly distributed (as it is in automobility systems) and creative ways of navigating the system might reveal opportunities for better social futures of dwelling. Moreover, members of the team already had access through other projects.

The hitchhiking kit was to be developed in conjunction with The Glass-House Community Led Design, based on the principles of generative design research (Sanders & Stappers, 2014) to support abductive reasoning (Blaikie, 2009). The final part of the project would be a workshop in which participants from housing co-ops would use the hitching kit as a tool for discussion of challenges, sharing of personal stories, and examination of issues of co-operative living that would hopefully reveal glitches and unexpected opportunities in the various systems such practices inhabit. Movement and 'invention' were to be integral to this workshop. The utilisation of mobile methods (Büscher, Urry and Witchger, 2011; Fincham, McGuinness and Murray, 2010) would enable embodied knowledge of (some aspects of) hitchhiking contexts, which was necessary to understanding its social practices, whilst moving in researching could also produce conversations and insights that would not be possible through static methods alone. Inventive methods (Lury and Wakeford, 2012) were needed to enable the creative leap of transposition in the interdisciplinary academic - practitioner collaboration.

Understanding Hitchhiking

Through purposive sampling, five people with experience of hitchhiking participated in the research. The data was then combined with mobile autoethnographies, which involved research team members hitching during the research. The study sought to understand why and *how* people did their hitchhiking. The material was transcribed and coded in an iterative manner, using a conceptual framework developed from literature review. It was thematically analysed and coded using QSR NVivo. This looked on the one hand for key aspects of hitchhiking as 'a practice' and on the other descriptions of how these aspects were realised *in practice*. These results were then interpreted by the team. Social research was augmented by wider cultural research, which included a study of historical material, narrative accounts in books, 'how to' literature, and short films posted on sites such as YouTube (of which there were many). In addition, designerly enquiries took place through drawing and prototyping .

3.1 A multi-facetted practice

This multi-layered enquiry produced a wealth of insights. The selective presentation of analytical forays below highlights aspects that seemed particularly promising for transposition. They mix descriptions of the practical accomplishment of hitchhiking with analysis of cultural dimensions and theory, with the aim of revealing the richness of hitchhiking practice*s* and hitchhiking as *a* practice.

Getting somewhere, reading drivers' intentions

"[I]t's a sensible way of getting about"[1]. People hitchhike to go to and from work, to go on holiday, or to get home after a night out, especially when other options are limited:

> We could not find a taxi anywhere and I think we were both wearing ridiculous outfits as you do in your 20's, you know, ... [Laughter] And we were walking along and I stuck my thumb out, I just said "I can't stand this, I really can't stand this, I'm going to die of hypothermia", stuck my thumb out and we got a lift.

With an instrumental orientation, hitchhikers use the affordances of the automobility system. The linearity of the network of motorways and roads mean that drivers' destinations can be guessed. Similarly, drivers can read hitchhikers' intention to travel a reasonable distance on the road they are on, so someone who will turn at the next junction will not usually stop and may even signal that they will be turning off. This is reminiscent of Goffman's (2009: 11) 'intention display', the nonverbal gestures that make the mobile practices of an individual 'readable' to others.

Reciprocities and obligations

When a hitchhiker enters a car, they can find themselves obliged to the driver:

> You're in hock to them, and I can think of one particular example where, you know, [I] sat with a lorry driver … [laughs] trying to tell me how brilliant Roy Chubby Brown is

[1] Unless inidcated otherwise, all quotes in this section are from participants who contributed to our research through interviews and a workshop.

> and trying to get me into his sort of vaguely, well not vaguely, overtly racist world view and to laugh at these particular things and of course I want the lift, you know, I don't want to say, "Well actually I'm not a racist or whatever," and then [for him to] turf me out of the vehicle, so I found myself, "Well I take people as I find them," just coming out with these sort of platitudes….

The obligation to conform may be, as the participant suggests, instrumental, but also relates to territory; it is more difficult to challenge in someone else's. Similarly they may be expected to provide entertainment:

> There was a lot of, you know, executives who did quite a bit of driving and were, you know, bored really, and I suppose, you know, that is a sort of reciprocal function of hitchhiking is that, you know, you get a lift but you provide entertainment, and conversation and help people pass a bit of time.

The gift of a lift is not free, and reciprocities are created and negotiated in the interaction.

Taking liberties, re-making inequalities

While reciprocity often works well, some drivers overstep their expectations: "you are vulnerable when you get into people's cars". That drivers would sometimes attempt to take sexual liberties was a common observation, doing things they would never do in a public situation. The 'ownership' of the space, the confinement of the car, the host/guest relationship, the side-by-sideness all play a role in producing an asymmetric, intimate situation that can be exploited. Imbalances of power, according to age and gender are significant here, but there is also asymmetry in the very act of asking for a lift. Hitchhikers lack autonomy in an automobility system defined by this very quality, they are dependent, excluded and seeking inclusion via the hitch. The power to stop and allow access to the automobility system sometimes seems to be understood to also grant other powers.

Making the world a better place

At the same time, many hitchhikers and ride givers explicitly contest the inequalities of the automobility system. There is a tendency for drivers who pick up hitchhikers to have hitched themselves (O'Regan, 2014; Chesters and Smith, 2001), and hitchhiking fosters reciprocal altruistic interaction "since it foregrounds informal (and frequently marginal) sets of social relations based on mutual aid, cooperation and trust" (Purkis 2013: 158). Purkis relates this to a broader reappraisal of the sociality of the gift. He argues that "the hitchhiker offers us a glimpse of another kind of modernity; of alternative structures and associations beyond those defined by political, economic and social hierarchies, mobile or otherwise" (Ibid). Demonstrating a reflective awareness of this imperative of altruism as a normative ambition, a number of interviewees highlighted ethical values as important:

> The world would be a better place if more people hitchhiked, if more people shared cars, and you know, you could maybe chart the decline of hitchhiking with the rise of, you know, rampant individualism in our society.

But what exactly is it about hitchhiking that enacts 'better' worlds, and how is this done?

Hitchhiking affords a lived acting out of the idea that "there is goodness in most people". Stopping is an altruistic act of sharing scarce resources, while being side by side fosters intimate conversations and tolerance in that it allows a glimpse into someone's life, sometimes across a gulf of socio-economic, political, or cultural difference. Hitchhiking allows for "occasioned encounters" with diverse others, which is a key driver of civility (Urry, 2004).

However, perhaps a more challenging question is how 'better' comes to be defined. It can be glimpsed, perhaps, in the definition of hitchhiking as "a sensible way of getting about, somebody is going there already, you may as well get in with them". Getting in on a journey is revealed as one way of making the world a better place by saving resources.

Managing Risk and Trusting

The 'How To…' guides to hitchhiking such as the iconic *Hitch Hiker's Guide to Europe* by Ken Walsh (1977) and *The Hitch Hiker's Manual: Britain* by Simon Calder (1979) offer a great deal of advice and practical suggestions as to how to mitigate the risks of hitching. By doing so they frame the way in which the practice was (and is) seen as an essentially risky activity. In more academic work, Chesters and Smith' (2001: 2), drawing from Giddens, suggest that there is a relationship of 'active trust' established when a stranger is accepted into the driver's space and an associated overcoming of anxiety, though this could be considered as an 'appearance' of trust (Goffman 2009) enacted in order to cope with the situation. Hitch-hiking may thus be seen as on the one hand a way of counterbalancing fear in a 'risk society', (Beck, 1992); and on the other as a lens through which to assess how risk is manifest and navigated at the scale of the everyday (Tulloch and Lupton, 2003).

Embodied practice and spaces of power

Hitchhiking is an embodied practice, intimately involved with symbol, gesture and performance:

> you also have to make a sign, I found one in one of my old journals, you know, saying "Arcachon si'l vous plait", always say please on the sign and always smile.

But the smiling performance transgresses spaces of power, too. Purkis (2013: 147) sees the hitchhiker as an anarchist theorist, proposing that such a figure "offers us a synthesis of theory and method; a traveller observing the landscapes of power through which they are moving, yet seeking alternatives to its hierarchies and formal economies through constant negotiation and exchange". One of the primary ways in which this creative transgression takes place is through navigation in a literal sense. The practice of hitching causes "ruptures within the linearity of most vehicle journeys" (Laviolette 2014:16). And, Laviolette argues, it emplaces alternatives within the body and the territory: "the road-scape is embedded with the hitcher's performance' and 'hitch-hikers are not separate from their surroundings" (Ibid) but active in their creation and reconfiguration.

Tactics: Know your territory and use your ingenuity

> You need to know a little bit about the sort of motorway network.

Hitchhikers often intimately know the routes that are available to them. Many accept that there may be detours and can improvise alternative routes or even destinations. O'Regan (2013: 41) argues that the performance of hitching makes what he calls "motorscapes" a "fluid space, an assemblage of signified features evolving in function according to the activities they need to perform." That is to say, space, meanings and uses are reconfigured as part of the journey. He states:

> Objects, amenities, other bodies and infrastructure are positioned according to their ability to meet the requirements of the practice. Service stations become a place where hitchhikers can replenish their bodies, interact with drivers and sleep overnight, the maintenance of sprawling transportation networks becoming a place of movement relations and exchange with other hitchhikers, drivers and service station employees. (Ibid)

Laviolette (2014: 7) refers to Carlson's 1972 "mini-ethnography" of female hitchers, which examined the plans women make as well as the risks and dangers they anticipate when hitch-hiking. Carlson observes that "the freedom to go where one pleased at any time was valued, but even more so when it is acquired by one's own ingenuity" Thus, as O'Regan (2013: 45) observes, hitchhikers can be seen to be "utilising cracks as they work through space" and their skills in "exploiting ambivalence and ambiguity" can be seen as "fleeting victories".

Getting in/Getting out

"How does one actually get in and out?" is, in its practical achievement, a complex question:

> You don't want to be at the top of the exit road because that's dangerous for cars to stop there, you need to be at a place where they can stop safely but also where you're not going to get picked up by the Police for standing on the motorway so there's all of that sort of thing about positioning yourself.

Then, actually getting in involves conversational openings and discovery of the interaction order in this car, with this driver. There are also crucial questions about when *not* to get in, sometimes requiring split-second assessment of risk, practices of risk avoidance and of turning risky situations around. When travelling in pairs, communicative rituals help:

> You'd just kind of look at each other and go, kind of nod the head a little bit or in one quick movement when they're not looking just kind of go with your head, to say 'no'.

Once in, knowing how to get out can be critical. Faced with a driver who was quietly "jerking off" as he was asking his female hitchhiker passenger "all sorts of questions", one hitchhiker says: I pretended I hadn't noticed because I was thinking "I've got to get out of this car". "Staying calm" while "frozen with fear" and carrying little luggage (which was another recurrent theme) enabled her to use the affordances of a traffic jam to jump out and run off.

Gaming Transposition

Building on these observations, we sought to find ways in which users of other systems could be supported in knowing their territory, navigating landscapes of power and

fashioning alternative routes. It quickly became apparent that rather than simply making a 'tool' that those involved in housing co-ops could use to transpose hitching practices, a more effective format would be a game. As Lloyd and van de Poel (2008) note, games can be very effective in providing a space in which practices such as negotiation, rhetoric, and strategy can be played out, at the same time that games can "illustrate the messiness and contingent nature of real-life processes" (2008: 436). Thus the hitching kit became an open-ended game, '*Hitch*' that allowed participants to build a 'road map' of their system and to explore alternative 'journeys' by 'hitching' an existing infrastructure in new ways.

4.1 The Structure of 'Hitch'

The researchers developed a game of three phases: two preparatory activities, and a final phase for the generation and analysis of alternative journeys. In the first phase participants would be asked to identify and discuss the 'challenges' and opportunities that characterise their system (i.e. housing cooperatives). To facilitate discussion during the activity and multiply the range of creative pathways they would then be divided into two groups and asked to select one particular challenge or opportunity that they wanted to explore: A constructive response to this challenge or opportunity was to be their 'destination'. The second phase was to set up the exploration: creating a hitchhiker's sign with the desired destination and a road map to represent the existing network or infrastructure of resources and actors (Figure 1).

Figure 1: *The 'Diversity' map created as a 'landscape' through which the team would 'hitch'.*

Phase Three was to centre on play, generating alternative journeys through the existing roadmap, including reflection upon ideas or responses to problems. The players would be asked to identify critical points in their roadmap and colour-code them. Then, using a

'chance wheel' they would move from the start position to the end point by passing through locations on the map as dictated by the wheel. With each 'move' the idea was that they would pick up a 'resilience card' that provided a description of hitching practices drawn from the ethnographic and cultural research (Figure 2). Each card bore a keyword from our analysis of hitchhiking, accompanied by a quote from the interviews. The cards would require the participants to reach their 'destination' and their roadmap 'through' hitchhiking practices, prompting transposition of lived 'infrastructuring' practices and enactment of the landscape, the actors, objects, and imperatives.

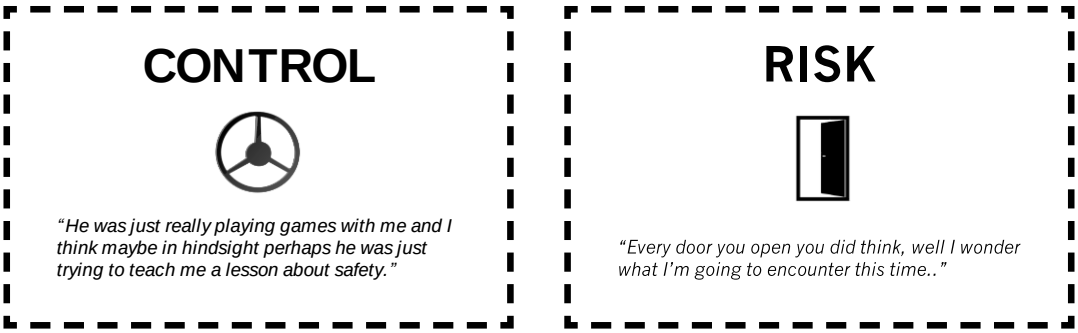

Figure 2: Hitch resilience cards

Participants would be asked to record their responses to each card as well as their routes on A4 paper. The aggregation of these A4 sheets was expected to generate a 'storyboard' of their journey from start to finish. Multiple journeys and therefore stories could be created.

4.2 Making and Playing Hitch

Participants were invited to a 1.5 day workshop based on their role as members of housing co-operatives or co-housing schemes. There were nine people from five different organisations: Brandrams Wharf, London Community, Sandford's, Rosa Bridge Housing Co-op and Sussex Co-Housing. The initial meeting point was at Gatwick Airport, where the group was picked up by coach to prepare the collaborative contextual transposition by engendering some of the practical experiences of hitching a ride (such as negotiations of getting in, host – guest reciprocity, and side-by-side conversations with strangers). The rendezvous point was chosen for practical and conceptual reasons because of its role as a transport hub. The next stop en route was a motorway service station, a pivotal node for the hitchhiker and a convenient pitstop for the 'transposers'. Here the group was introduced to the hitchhiking knowledge generated through the qualitative enquiries and the research team's interest in 'contextual transposition'.

Upon arrival at the University of Brighton, the participants began to make and play *Hitch*. It proved more difficult than anticipated to identify 'destinations', as end-points were not as clear-cut as expected in the game's development. Whilst one team relatively quickly came to 'diversity' as a desired end-point (having observed that cooperatives often tend to be white and middle-class), the other team eventually settled for 'Open to…' as a destination, looking

for a way to be more open to new ideas that would challenge the 'entrenched views' they saw as inimical to the operation of a good co-op. Once the destinations had been established, however, both teams fell with gusto to the population of their 'road maps', with extensive discussion and debate as to the salient stations and structures to be included. Once the teams began to 'hitch' their way through these infrastructures, the game really took off, as participants were able to reflect upon the nature of their experiences in relation to the randomly generated 'hitching' transpositions suggested by the resilience cards. Indeed, what quickly became apparent was that too little time had been allocated for this period of game play, and the session was extended into the next day.

Discussion

Serendipity led us to hitchhiking and an interest in 'designing' social futures. The concept and method of contextual transposition was, in one sense, an improvised response to the challenge of interdisciplinary research collaboration. However, what started as improvised analytical affinity turned into a highly generative approach when we put our analytical methodological approaches together and joined forces with practitioners at the coalface of 'systemic' contemporary challenges.

The overall reaction to the experience, as captured during the workshop and in subsequent feedback questionnaires, was very positive. Though it was noted that the actual knowledge of hitching itself was not necessarily particularly useful for co-operatives *per se,* the process of coming together through this had been valuable, that the 'meshing' of the two subjects in this manner had produced new and potentially useful insights.

Many of the participants suggested that the resilience cards were the most effective tools for reflection in the process. It was reported that the quotes drawn from the ethnographic research helped to open up conversation in a way that would probably have not been possible if they had simply been talking without such prompts. This observation may indicate the importance of grounding cultural transpositions into specific grounded instances (e.g. stories, pictures or objects) rather than solely using abstractions that are induced from a certain context (like 'time', 'risk' or 'reciprocity').

Conclusion

This research allowed a team drawn from a relatively diverse range of fields of knowledge and action to conspire in investigation and experimentation to see what value could be gained by taking the knowledge implicit in one practice and artificially situating it in another. Through a multidisciplinary research approach a 'good enough' knowledge of the structural and cultural imperatives of the practice of hitchhiking was developed and worked upon to render it useful in the development of a design intervention. From this the game *Hitch* was created and a scenario developed that would allow it to be tested as an agent of contextual transposition. In this way the researchers then set out to answer the question of whether

such a transposition can allow individuals or organisations to exploit existent system affordances in new and productive ways.

That the 'contextual transposition' of the knowledge implicit in the practice of hitchhiking into the field of social living through co-operative housing could, at the very least, be seen to function to produce new insights into the nature of the latter was seen as significant. This is because it reveals the nature of contextual transposition as a process that is distinct from the use of analogies or metaphors in such interventions. Analogies and metaphors suggest a structural 'homomorphism' (the preservation of certain structural characteristics) between different domains or contexts (Gentner 1983). But the value identified by the research participants of transposing knowledge and practices from one context to another indicated a slightly different process: that the transposition from domain to domain was not acting as a mechanism for preserving useful structural characteristics, but rather was acting as a springboard for generating new or previously unobserved structures within a new context; thus this was an exercise in infrastructuring in itself. That the participants reacted to the specificity of the hitching situation may also suggest that they engaged with the intrinsic aspects and imperatives of hitchhiking rather than a collection of abstract concepts such as reciprocity, risk or time. In this way this 'sprint' experiment thus suggests that further fruitful study may be made of the way in which high-level abstract concepts may be interpreted and explored within specific contexts and then transposed into new domains as an inventive method for future making.

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About the Authors:

Damon Taylor is Senior Lecturer in Design at the University of Brighton. His research is concerned with the relationship between materiality and intangibility in contemporary design practice, performative design, and the cultural history of pub interiors.

Monika Büscher is Professor in Sociology, Director of the Centre for Mobilities Research and Associate Director of the Institute for Social Futures at Lancaster University. She researches digital dimensions of mobile living and IT Ethics in disaster risk governance.

Lesley Murray is a Senior Lecturer in Social Science at the University of Brighton, where her research centres around urban mobilities. and includes collaborations with artists, architects, and creative writers. She has recently co-edited the collection, *Researching and Representing Mobilities*.

Chris Speed is Chair of Design Informatics at the University of Edinburgh where his research focuses upon the Network Society, Digital Art and Technology, and The Internet of Things.

Theodore Zamenopoulos is a Senior Lecturer in Design at the Open University. He is a professional architect with an expertise on design cognition, community led design practices and complexity research. His research focuses on the empowerment of people through design.

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Juxtaposing Chinese and Western Representational Principles: New Design Methods for Information Graphics in the Field of Intercultural Communication

Ruedi Baur and Ulrike Felsing*

Geneva School of Art and Design
* ulrike.felsing@multilingual-typography.com
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Abstract: This article examines knowledge graphics from the Chinese and Western cultures, which, in the course of globalization, are being increasingly loosened from their original cultural references. If it is assumed that at most pictographs, but not complex graphics, are universally understandable, "visual translations" must be developed for knowledge graphics if we are to transfer them into another cultural reference system. Using the example of a widespread graphic form—the tree diagram—the research presented here will explain specific representational principles and the cultural concepts on which they are based. Here, on the visible surface, formal correlations can indeed be observed. However, if we ask what conceptual structures the graphics are based on, we encounter two fundamentally different representational systems. The article focuses on the question of which design methods are capable of making the diverse relationships between these representational systems comprehensible.

Keywords: cultural reference system, knowledge graphics, visual translation,

Introduction: Translating Culture

How can "spaces of translation" (Bhabha, 1994, p. 25) be designed using a network of relationships between Chinese and Western representational principles? Spaces of translation are *open spaces*; they require that cultural differences be continually discussed anew. How does the viewer involve him or herself in this open process of discovery? The proposed design methods in the presented research respond to the growing cultural differences found in contemporary forms of communication. The aim is to practice a sovereign interaction with visual diversity and to thereby counteract the tendency of globalization to level differences.

In the design context, the term “translation” is applied in multiple ways when it comes to highlighting a content-related, formal, or medial shift from an “original” (see Baur, 2010; Dressen, 2009). In cultural studies, the term “cultural translation” (Buden & Nowotny, 2008, p. 14) is used, referring to two “contradictory paradigms of postmodern theory . . . : multiculturalism and deconstruction” (Buden & Nowotny, 2008, p. 14).

The multicultural perspective is based on the concept of the “uniqueness and originality of cultural formations” (Buden & Nowotny, 2008, p. 14), which, accordingly, are defined in terms of their culture rather than social or political commonalities. It sees the translation as an “*inter*-cultural translation.” The deconstructive perspective contradicts the concept of multiculturalism in the idea that “every identity has its origin in some sort of a prescribed essence”; it assumes that “identity is culturally constructed from the very outset” (Buden & Nowotny, 2008, p. 14). Homi Bhabha, one of the leading exponents of deconstruction, proposes instead the “concept of a so-called third space”, “a space for hybridity,” and thereby vehemently challenges the notion of “unified, original, and authentic identities” (Buden & Nowotny, 2008, pp. 20, 21). The basic idea behind the concept of hybridity is to comprehend difference as a constant renegotiation of boundaries. The spaces that emerge in such processes are “spaces of translation.” Which design methods allow such spaces of translation to be visualized? How can they remain open for a permanent renegotiation of differences?

Visual representations are always linked to specific aspects of a cultural reference system and therefore cannot be understood as “universal” (Goodman, 1997, p. 45). These aspects include the construction and functionality of the graphics as well as fundamental culture-specific conceptions, such as the continuity and homogeneity of Western diagrams, which is expressed, for instance, in a continuous chronological grid. In the present research context, “translating visually” means *making* the original graphics’ cultural concepts (that are not directly readable) *visible* in new drawings. In addition, 1) essential aspects of the traditional Chinese reference system were supplemented in the new drawing (see e.g., Figure 1). 2) To further highlight the essential aspects of the reference system, small-format schemata were developed and inserted above each of the individual illustrations. 3) Individual contemporary Chinese graphics were “translated back” into the traditional Chinese reference system, whereby contemporary stylistic means (e.g., color scheme) were retained. 4) Textual content was added to a selection of images from the 三才圖會 *Sancai Tuhui,* such that the specific orientation (rotation) and localization of the characters was adopted. 5) A few examples were left in their original form and supported in particular the juxtaposition of aspects from the Chinese and Western reference systems.

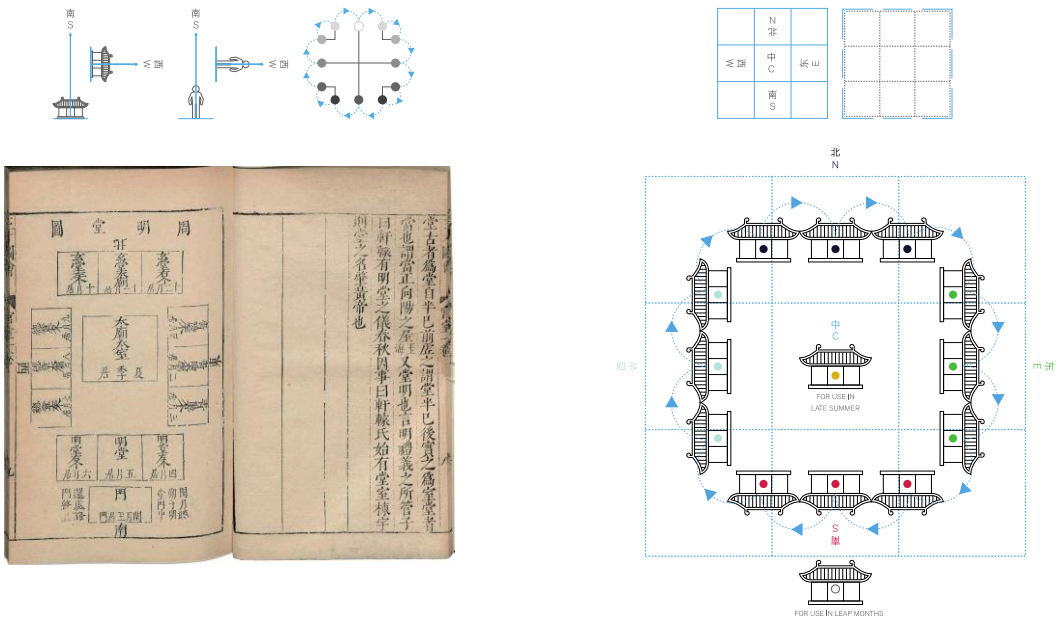

Figure 1 This is an example of the visual translation of the depiction of the 明堂 Mingtang (Hall of Clarity). The newly drawn info graphic shows parts of the reference system, namely, the five cardinal directions and the cyclical motion [of the emperor] among the twelve palaces, or months.

The redesign of the graphics was necessary to be able to compare Chinese and Western representation principles and to recognize and understand the substantial difference of their conceptual structure.

Most of the traditional Chinese representations examined here derive from the encyclopedia 三才圖會 *Sancai Tuhui* ("*Collected Illustrations of the Three Realms*"), a twelve-thousand-page trove of knowledge from the Ming dynasty (1368–1644). Other publications were also consulted, such as the 圖書編 *Tushu Bian* ("*Compendium of Diagrams*," 1623). For the juxtaposition with the traditional Chinese diagrams we chose a selection of the most diverse contemporary Chinese and Western diagrams offering both thematic and formal points for comparison.

Map of Correspondences

A "map of correspondences" was developed for juxtaposing the traditional Chinese and the contemporary Western reference systems. Here, we focused on the following core question: How can traditional Chinese representational principles be related to contemporary Western ones so that the definition of individual aspects of the reference frame as well as the dynamics of their interconnections are expressed?

The vertical columns on the right half of the map of correspondences feature traditional Chinese representational principles from the Ming dynasty. The vertical columns on the left half show representations from the contemporary Western reference system (see Figure 2).

Figure 2 Map of correspondences

Eight subjects are consecutively identified in the horizontal rows of the map of correspondences: 1. human body, 2. city and architecture, 3. geographical space, 4. space and orientation, 5. play and ritual, 6. time, 7. relations, and 8. classification systems. These topics are derived from the subject areas addressed in the 三才圖會 *Sancai Tuhui*. The order of their appearance was changed, however, such that the map now starts with the subject "man."

Through their organization in a map, the subject areas and tendencies can be registered at a glance; references and interconnections between the various levels are expressed more clearly and new spaces for interaction emerge. In the text flow of the published research, this map is "processed" in a linear fashion such that the horizontal rows are read alternately left to right and then right to left. This way, the reader does not fall so easily into a fixed, overriding standpoint, nor always begin on the left (as in the West) or on the right (as in China).

To emphasize particular aspects of the cultural reference systems, a schematic version of them was created for each representation. In small format, these schemata are placed above the individual illustrations and thus serve as a visual guide for the references between the aspects of the respective reference frames.

The traditional and contemporary examples are also clearly differentiated in terms of design aspects. For the traditional Chinese examples, the colours black and blue (for highlighting) are used, along with the traditional Chinese five colours. For the contemporary examples, a broader color spectrum and a coloured background are used.

In all areas of the map, various design forms are employed: (annotated) reproductions, visual translations, pictographic elements, and model-like representations. Different varieties of interconnecting text and image were developed in which individual, word-like components of the graphic are integrated into the image description, or text and image are completely interwoven, as in a "charticle." The interaction between image and writing is further increased due to the affinity between the pictorial quality of the graphic elements and that of the Chinese characters.

Thematic Constellations (Relationship Networks, Force Fields, Clouds)

The openness of "spaces of translation" can be visualized by the fact that comparisons can be realized as "networks of references" rather than as either fixed pairs (e.g. here, China/the West) or as a closed system. This openness also results from the polyvalence of the images, because an image seldom shows just one single aspect: "The image has no difficulty in bringing several, even contradictory attributions into play simultaneously: a sheer absurdity for the statement—I see the man as Giorgio, as a painter, as a living person, as painted or petrified sculpture. The various aspects, the divergent seeing 'as,' converges in the gazing at the person" (Boehm, 2003, p. 196). Even though this extreme versatility refers in particular to images of art, and knowledge graphics tend to strive for greater unambiguousness, the majority of depictions in this research can be examined and described from different angles.

This applies, for instance, to the diverse content exhibited by the knowledge graphic and to the representational principles it makes use of. But it also applies to the conceptual structures underlying the representational principles and to the various aspects of the visual translation in the graphics.

The knowledge graphic presents these different aspects simultaneously. In the description of the image, however, oftentimes only one single aspect is addressed in concrete terms. The graphic also appears only once, although, due to its polyvalence, it ought to be included in several places. In a fixed, systematic arrangement, this sort of multiple classification would not be allowed (see Michel, 1999, n.p.).

Dynamic organizational principles, like those depicted in the map of correspondences, allow for the formation of loose (open) constellations that can be repeatedly repositioned, depending on the aspect in focus. This way, the other aspects not expressly being described remain latently linked with the representation and can be reactivated through renewed observation. The schemata shown above the graphics invite the viewer to produce further references (other constellations).

Tree Graphics

The functional principle of the thematic constellation will be illustrated using seven diagrams based on a "tree-like structure" (Cancik-Kirschbaum & Mahr, 2005, p. 98). The tree diagram is one of the most widespread graphic forms in the history of almost any culture, as illustrated in Manuel Lima's study *The book of trees: Visualizing branches of knowledge* (2014). Lima shows that tree graphics have been used for over eight hundred years in the most diverse areas of knowledge: "Due to its expressive quality and natural branching scheme, trees have also become important communication tools, illustrating a variety of topics such as family ties, moral values, systems of law, domains of science, biological species, hard disk drives, database schemas, and online discussions" (Lima, 2014).

In the research presented here, tree diagrams appear as variations of a representational type that is present in both the Chinese and Western cultures but has different visual appearances. The diagrams appear as vertical and radial trees, and as a rectangular tree map. These initially describe the fundamental formal aspects, namely, the composition of the graphics indicating the reading direction: vertical, from bottom to top; radially, from the center outward; or even diagonally, from upper left to lower right.

General considerations are shown in the function underlying all the variations of the diagram. The variations are fundamentally based on the principle of division, or branching, by which a simple state is transposed into a complex one. Since this process is as elementary as counting, tree diagrams are found in all cultures.

Nonetheless—and now we turn our attention to the cultural reference systems—the same tree-like structure visualizes completely different cultural concepts. Traditional Chinese diagrams visualize qualitative correlations between elementary, opposing forces. These include, for instance, those between 陰 *Yin* and 陽 *Yang*, heaven and earth, light and dark, and good and bad. They are allocation ratios from which general structures can be read.

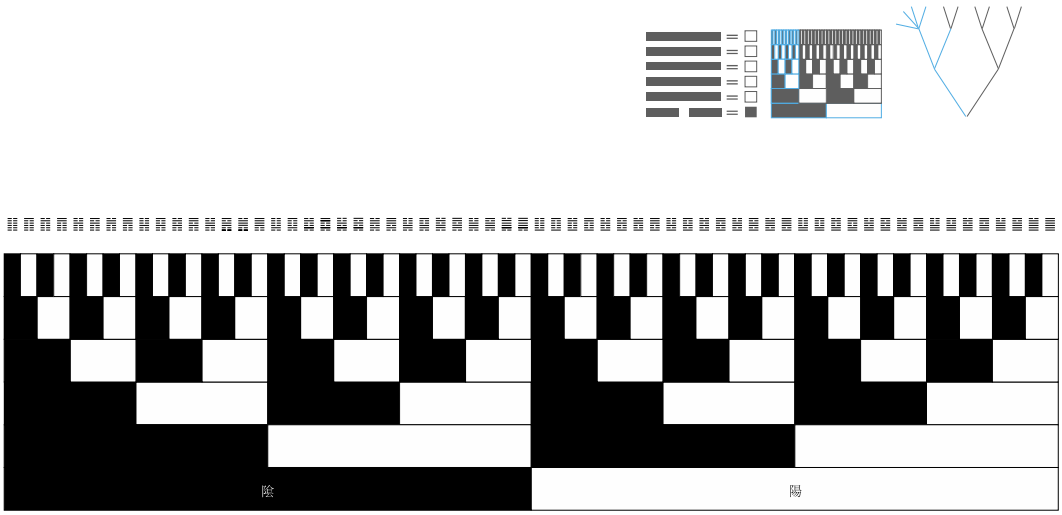

Figure 3　伏羲六十四卦次序 Fú Xī liù shí sì guà cì xù "Sequence of the 64 Hexagrams According to Fu Xi." The small-format schemata above each diagram highlight the essential aspects of the reference system and allow to compare the diagrams with each other.

This can be demonstrated at the diagram: "Sequence of the 64 Hexagrams According to Fu Xi." (Figure 3) This redrawing of an illustration from the 三才圖會 *Sancai Tuhui* shows the formation of the sixty-four hexagrams. In classical Chinese thought, the sixty-four hexagrams are understood as an abstract pattern of all the interconnections in this world. In the 易經 *Yijing* (Book of Changes, ca. 11th century BC), the sixty-four hexagrams are explained using concrete situations. The division into black and white shows the interplay between 陰*Yin* and 陽 *Yang* in its perpetual splitting from a whole into many parts. In ancient China, the diagram was understood as a basic pattern of the world. All natural designs were seen from the perspective of this tree structure, including the formation of the world from a primordial chaos. Accordingly, the entirety is always kept in mind when considering the individual components. The redrawing shows a total of six horizontal bars; below them, a space is left empty, indicating the formation of the duality from the 太極 *tàijí* (Supreme Ultimate) and the 無極 *wújí* (Infinite). In the first bar begins the division into 陰*Yin* and 陽 *Yang*. In Chinese, these are referred to as the 兩儀 *liǎng yí* (two principles). In the ongoing partitioning, the eight trigrams are formed in the bottom three rows. Further division results in the sixty-four hexagrams in the sixth row. While the black-white bars are rendered horizontally, the hexagrams are read in vertical columns. Characters inserted above each column indicate the corresponding hexagram. Accordingly, the hexagram 乾 *qián* (the Creative) appears above the first column from the right; in each bar below it we can decipher a white area. This corresponds to six yang lines: ䷀. The second hexagram from the right is 夬 *guài* (the Breakthrough); it features one black and five white fields, corresponding to a hexagram with one 陰 *Yin* and five 陽 *Yang* lines: ䷪. Since the columns are unmarked, the division into

columns is visually rather unclear. The advantage of this manner of representation is that it retains the complexity and openness of the whole.

While traditional Chinese diagrams visualize qualitative correlations between elementary, opposing forces, contemporary Western diagrams refer to empirical data. These are derived from objective measurements. Their representation in diagrams is presented as being proportional to reality. The most of contemporary Western diagrams are “proportionate,” which means that one value follows from another through multiplication with a constant, real factor. To visualize relationships proportionally, distinctions were made in height and thickness, as well as in brightness (via brightness levels), form, and color (via varied shades).

This can be demonstrated at a Treemap (Figure 4). A tree map makes it possible to visualize hierarchical structures. Above all, it enables the visualization of size ratios, since the areas of its rectangles are proportional to the size of the data units. Shown here is the “Tree map of products exported by China in 2009,” developed by the Harvard-MIT Observatory of Economic Complexity. The tree map was originally developed for representing the partitioning of a hard drive. In terms of its subdivisions, the two-dimensional structure is related to the Chinese diagram of the “Sequence of the 64 Hexagrams According to Fu Xi” (see Figure 3). Whereas the partitioning in the Chinese diagram is consistent, it is inconsistent in the tree map. The process of using partitioning to transpose a simple state into a complex state is as elementary as counting. Hence, tree diagrams are found in both Eastern and in Western culture.

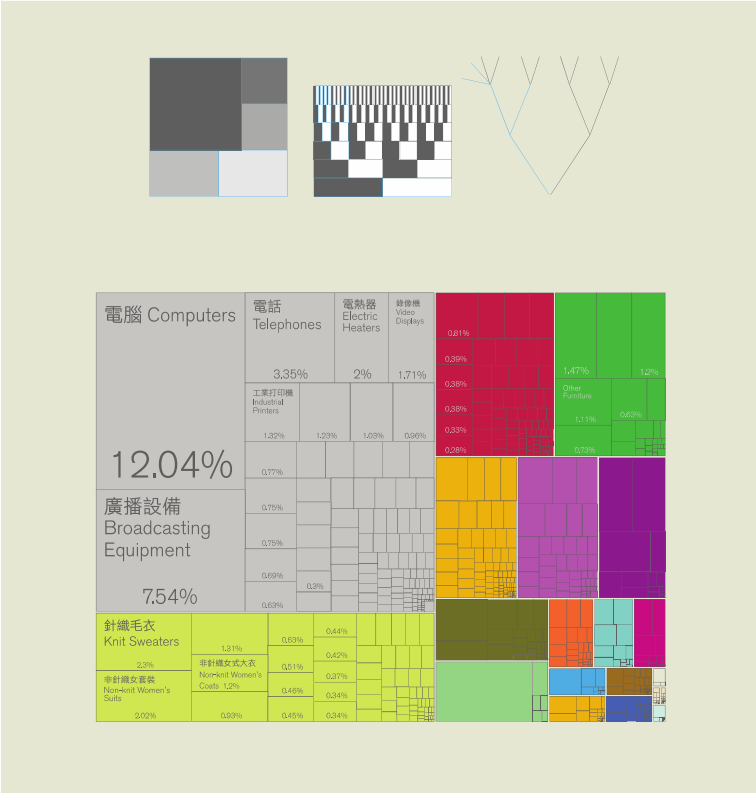

Figure 4 Treemap.

In the next two examples the tree structure stands out even more clearly. From a formal point of view these two diagrams look quite similar.

The "Scheme of the Formation of the Eight Trigrams" (Figure 5, left) can be compared to the diagram Figure 3, both show the growth of the elementary forces. This diagram shows the division of what was originally one entity (陰*Yin* and 陽 *Yang*) into polar opposites and their ongoing diversification through further partitioning. It corresponds to the first three bottom rows of the diagram "Sequence of the 64 Hexagrams According to Fu Xi" (Figure 3). Tree-like diagrams are based on an image of growth and are correspondingly organized and read from bottom to top.

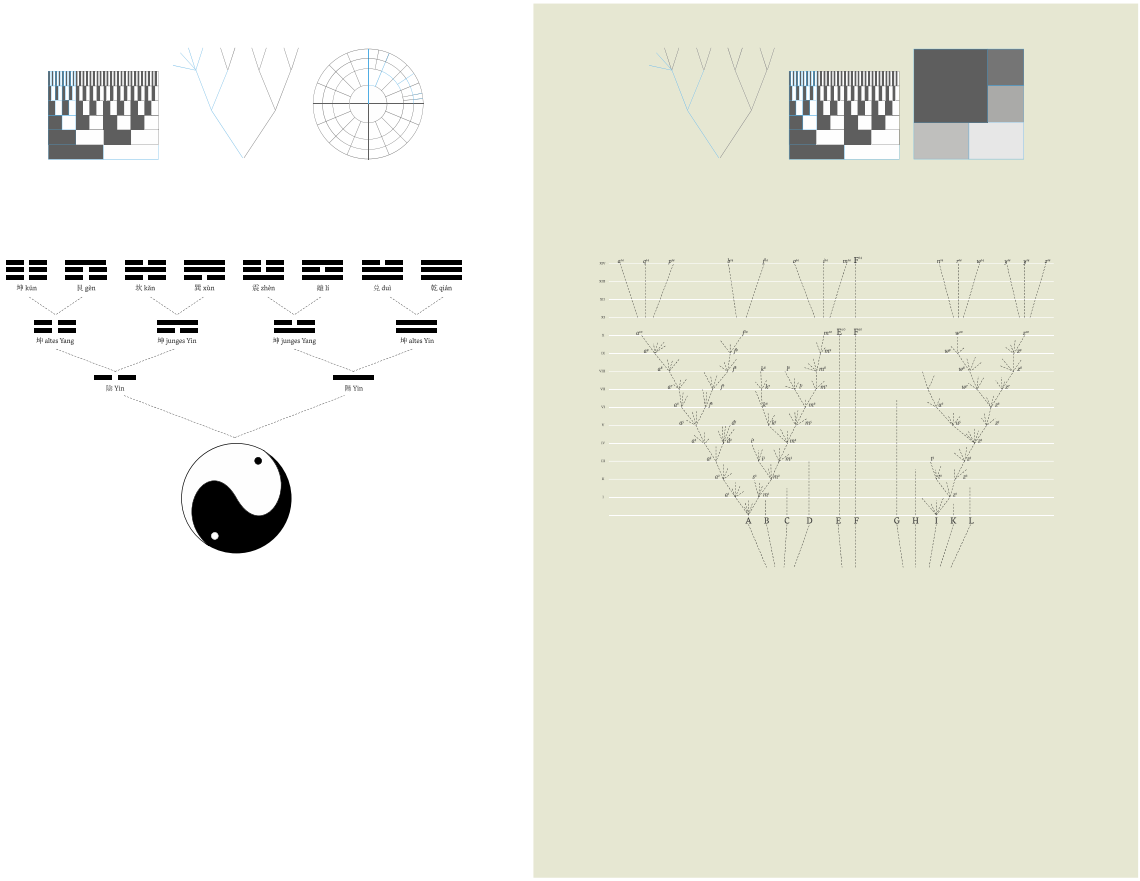

Figure 5 left: 八卦衍生圖 Bā guà yǎnshēng tú "Scheme of the Formation of the Eight Trigrams"; right: "Darwin's Hypothetical Diagram of Evolution."

This can be seen as well at the "Darwin's Hypothetical Diagram of Evolution." (Figure 5, right) In his work on evolutionary biology, Darwin developed the radical theory that all forms of life descend from common ancestors. "The sketch is to be read from bottom to top. . . . Everything in this graphic is abstract and hypothetical: The beginning of creation is open-ended; humans appear at a much later point in time. . . . The sketch is abstract and universal and does not refer to specific classes of organisms; the final phase is thus just as undefined as the beginning. What a biologist once criticized for only being a 'formalistic line of thought,' is from today's standpoint its advantage: it appears as a brilliant sketch of a

hypothesis that turned out to be more durable than the suggestive image of the genealogical tree." (Pörsken, 1998, p. 328). With this diagram, Darwin succeeded—more effectively than with concepts and formulas—in recording and conveying the complex relationships of his evolutionary theory.

Whereas Darwin positions the concrete process of evolution in an undefined prehistory, the Chinese diagram starts with the concept of a 太極 *tàijí* "Supreme Ultimate", beginning even more hypothetically before the original of the world. At the same time it makes the universalist claim that it is valid for all the world's circumstances.

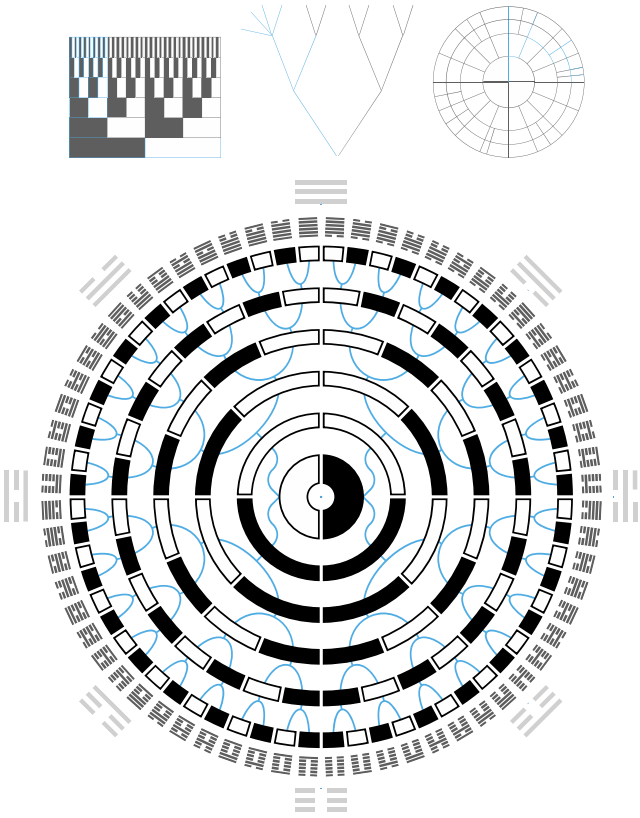

Figure 6 *先天六十四卦圓圖 xiāntiān liùshísì guà yuán tú "Circular Rendering of the 64 Hexagrams in precelestial Arrangement."*

Ming dynasty diagrams regard the world in a philosophical, speculative manner rather than in an empirical one. Darwin's scheme can be seen as an in-between position that wishes to proceed empirically but in fact presents everything as "abstract and hypothetical" (Pörksen, 1998, p. 328).

The tree diagram appears not only as vertical but also as a circular tree. This can be seen by the "Circular Rendering of the 64 Hexagrams in precelestial Arrangement" (Figure 6). The

image presented here is an interpretation of an illustration from the Compendium of Diagrams (1623). The representation is related to the diagram 伏羲六十四卦次序 *Fú Xī liù shí sì guà cì xù* "Sequence of the 64 Hexagrams According to Fu Xi". The elements depicted

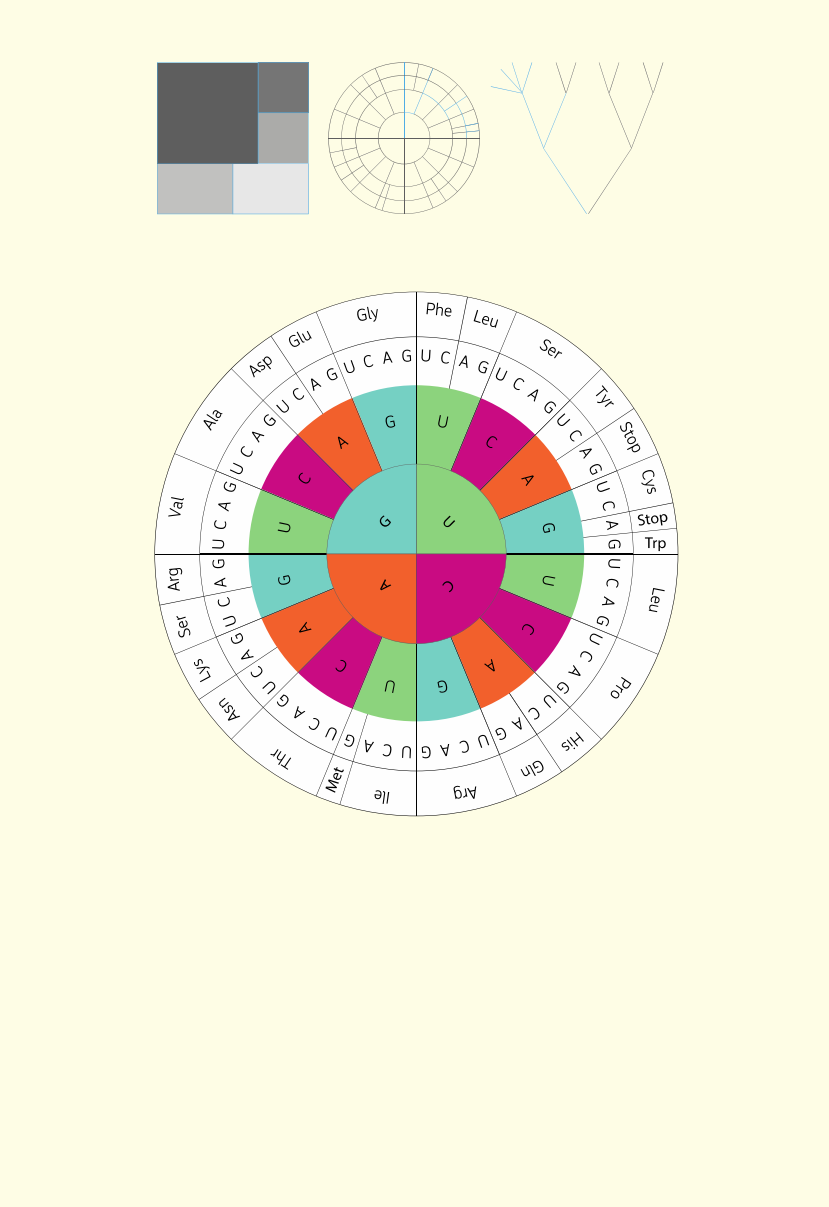

Figure 7 Rendering of the Genetic Code

linearly in the plane in that diagram are transposed here in circular form. Both diagrams illustrate the structure of the hexagrams using the principle of ongoing partitioning. In traditional China the circle is associated with the 天 *tiān* (heaven; i.e., time, spirit). The instances of white (陽 *Yang*) and black (陰 *Yin*) are read from the center outward and, on their outer edges, are additionally represented in the form of hexagrams with continuous lines (—, 陽 *Yang*) and broken lines (– –, 陰 *Yin*). The redesign of this diagram is

supplemented with fine blue connecting lines, which show the increasingly detailed branching.

The "Rendering of the Genetic Code" (Figure 7) is a circular tree diagram from the Western world. The representation shows how twenty amino acids are distributed among sixty-four codons. The names of the amino acids are indicated on the outermost edge. As such, the green sector (U), for instance, read clockwise, contains the base triplets UUU, UUC, UUA, and UUG. All living beings use essentially the same genetic code. The sixty-four codons in the genetic code of DNA exhibit a structural analogy with the sixty-four hexagrams of the 易經 *Yijing* (Book of Changes). Since the 1960s, attempts have been made to link these two "basic patterns of life" (see, e.g. Schönberger, 2000). Here, the DNA components of the four organic bases A: adenine, T: thymine, C: cytosine, and G: guanine are correlated with the four cardinal numbers of the Yijing: 6: old *Yin* (太陰 *tài yīn*), 7: *young Yang* (少陽 *shào yáng*), 8: *young Yin* (少陰 *shào yīn*), 9: old *Yang* (太陽 *tài yáng*). Various approaches to the concrete correlation exist.

In the Compendium of Diagrams we found another "Circular Rendering of the 64 Hexagrams." (see Figure 8) Here, again, the black fields represent 陰 *Yin*, depicted in the hexagrams as broken lines (– –) and the white fields represent 陽 *Yang*, rendered in the hexagrams as continuous lines (—). The division into black and white results from an ongoing diversification from the center outward: the innermost circle features a bisection in black and white, the second circle a four-part division, the third circle an eight-part division, and so on. Together, the three inner circular paths in the eight-part division yield the 八卦 *bā guà* (8 trigrams). The eight trigrams, as subsequently in the 六十四卦 *liù shí sì guà* (64 hexagrams), are therefore read in circle segments. In our redesign we supplemented the 陰*Yin* and 陽 *Yang* in order to show its relation to the periodical growth and decline of the elementary forces.

All the variations of the tree diagram are fundamentally based on the principle of division, or branching, by which a simple state is transposed into a complex one. A principle permits its visual translation in various forms of visual expression**,** dimension or media. This type of translation can be compared with "intralingual translation" while in contrast "cultural translation" refers to "interlingual translation." According to Roman Jakobson "Intralingual translation or rewording is an interpretation of verbal signs by means of other signs of the same language" (Jakobson, 1959, 233). Intralingual translation can be found in many visual contexts of traditional Chinese diagrams, for example in conjunction with 陰 *Yin* and 陽 *Yang*. Although today it is mainly known in a single form, its not a fixed emblem but a principle or concept. All these different 陰 *Yin* and 陽 *Yang*-diagrams demonstrate the idea of an oscillating fluctuating balance between elementary, opposing forces.

This variation of a diagram from the Compendium of diagrams (Figure 9) demonstrates the correlation between the formation of the 64 Hexagrams and the concept of time, which we have visualized by the phases of the moon. The phases correspond to the light and shadow in the sections of white (陽 *Yang*) and black (陰 *Yin*) in the main trigram. The 十二月卦氣圖

shíèr yuè guà qì tú "Depiction of the Energy of the 12 Months" (Figure 10) shows the relation of陰*Yin* and 陽 *Yang* and time (12 months) very clearly.

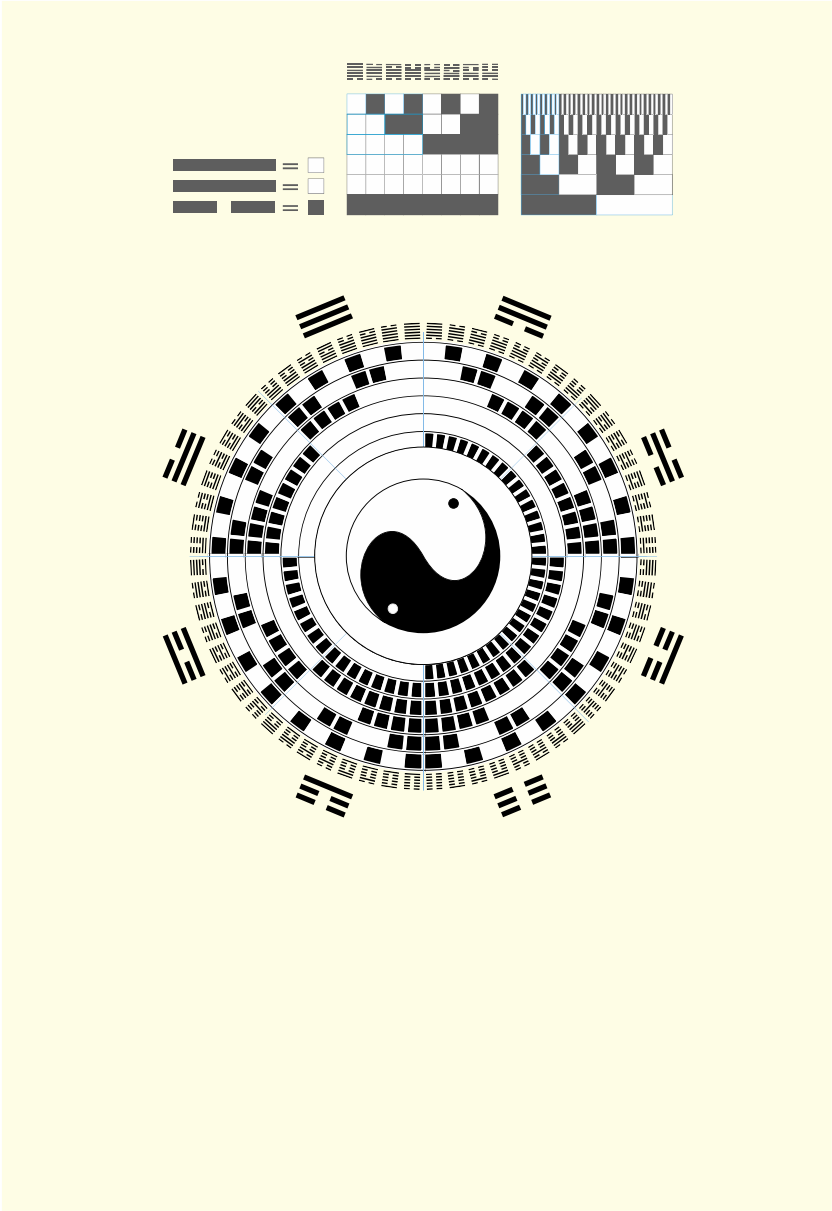

Figure 8 六十四卦生自兩儀圖 liùshísì guà shēng zì liǎng yí tú "Circular Rendering of the 64 Hexagrams."

The following two diagrams are more types of different 陰 *Yin* and 陽 *Yang*-diagrams that we have found in the Compendium of diagrams: 太極河圖 *tàijí Hétú* "Hetu-diagram with Yin and Yang-symbol" (Figure 11) and the famous 易有太極 *yì yǒu tàijí* "In the Transformations Lies the Great Primordial Beginning" (太極圖 *tàijí tú* Taiji-Diagram) (Figure 12).

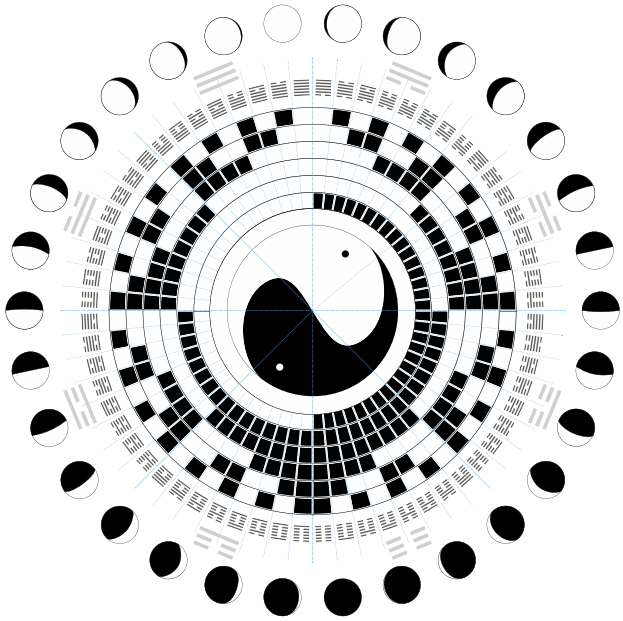

Figure 9 Variation of a diagram from the Compendium of diagrams

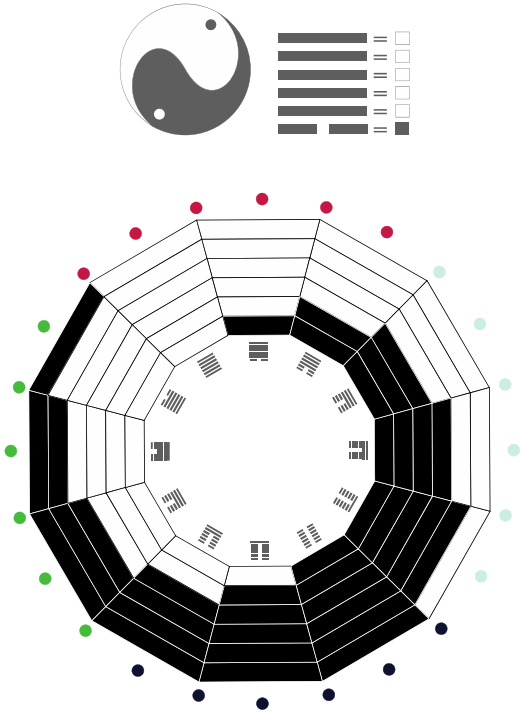

Figure 10 The 十二月卦氣圖 shíèr yuè guà qì tú "Depiction of the Energy of the 12 Months" shows the relation of 陰 Yin and 陽 Yang and time (12 months) very clearly.

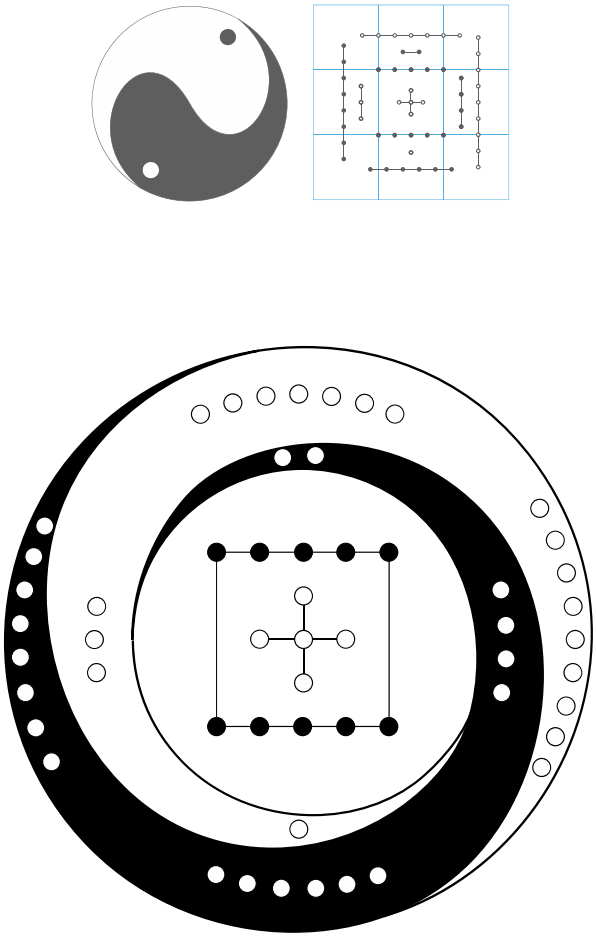

Figure 11 太極河圖 tàijí Hétú "Hetu-diagram with Yin and Yang-symbol"

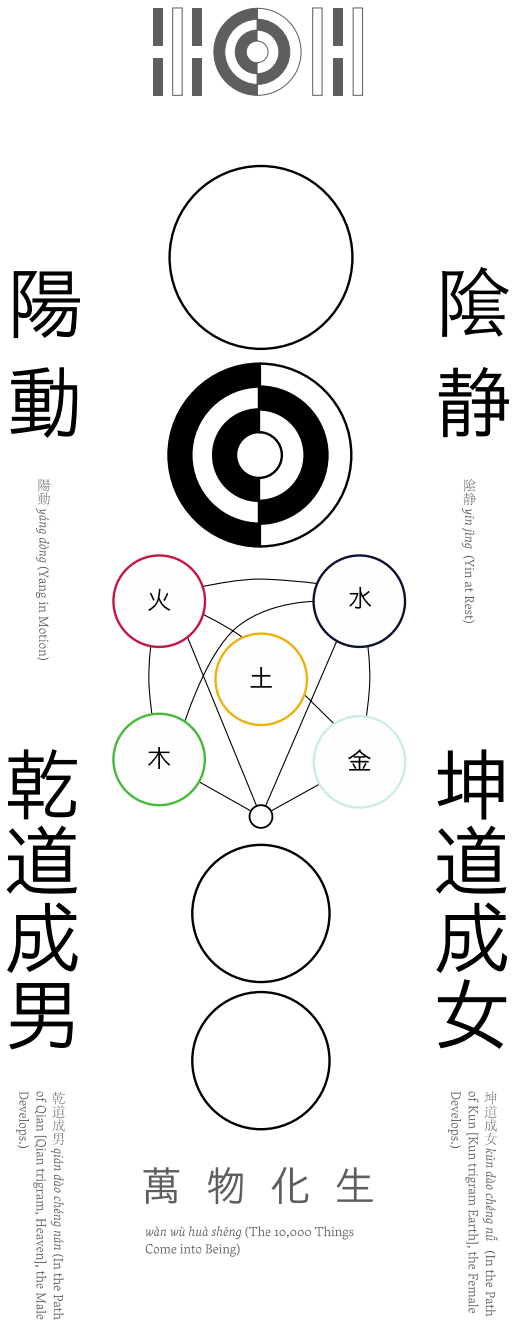

Figure 12 易有太極 yì yǒu tàijí "In the Transformations Lies the Great Primordial Beginning."

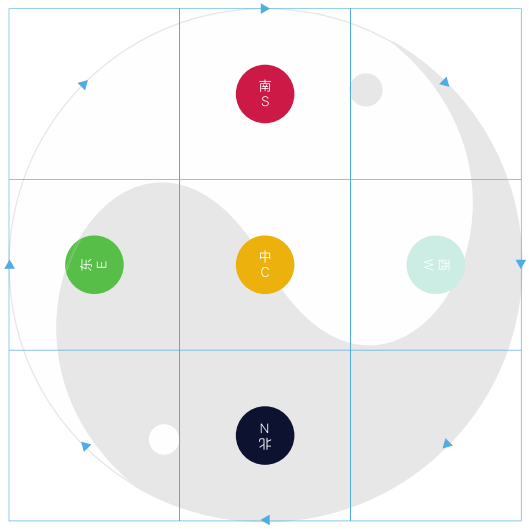

Figure 13 This scheme visualizes the central aspects of the traditional Chinese reference system.

This scheme (Figure 13) visualizes the central aspects of the traditional Chinese reference system. It basically consists of a combination of the square ("earth," space, material) and the circle ("sky," time, the intangible). The division of the square into nine sections ("nine palaces") forms the basic schema for the observation of space and therefore refers to both the division of the "world" and basically to any kind of space. In addition it recurs in the organization of the four cardinal points around the center, with the south above and the north below. According to Chinese custom, the southern perspective is the "correct," favourable perspective, so it is meant for the emperor, king, or anyone of higher rank (e.g., the head of a family). Time is always connected with spatial aspects, as well as with color. The five seasons: summer, autumn, winter, spring and mid-summer–are set in relation to the five cardinal points: south, west, north, east and center and to five colours.

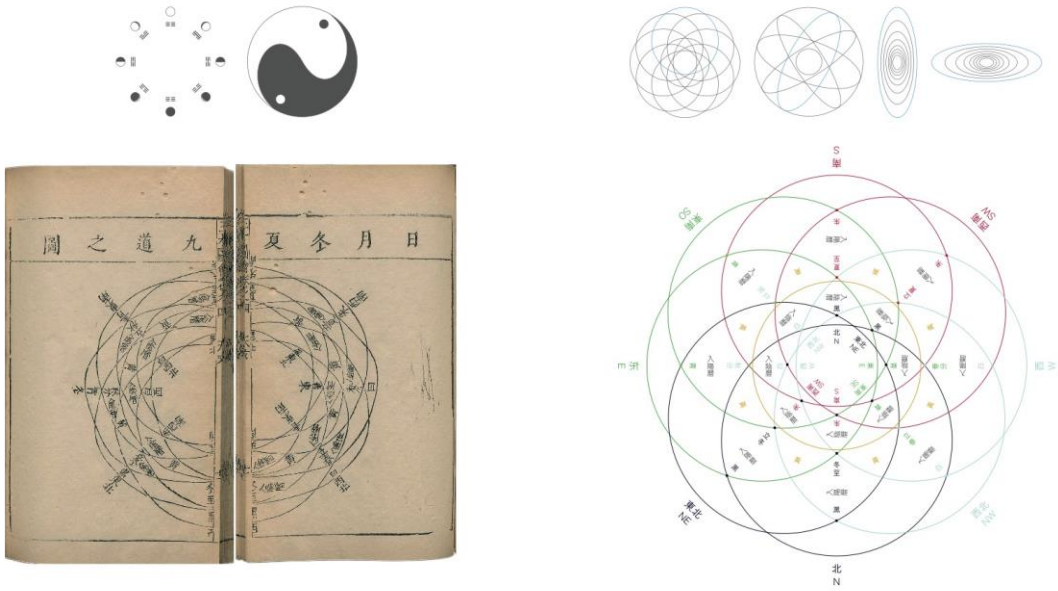

Figure 14 Redesign of the 日月冬夏九道之圖 rì yuè dōng xià jiǔ dào zhī tú "Scheme of the Nine Paths of the Sun and the Moon in Winter and Summer."

This can be demonstrated by our redesign of the "Scheme of the Nine Paths of the Sun and the Moon in Winter and Summer." (Figure 14) In the original diagrams of the 三才圖會 *Sancai Tuhui* written characters often identify colours (which means that the specific appearance of the color value remains ambiguous). In our redesigns we have visualized these color terms by using the addressed colours. This act of translation refers to "Intersemiotic translation . . . an interpretation of verbal signs by means of signs of nonverbal sign systems." The following example shows, that even intersemiotic translation is based on individual interpretation. The character 青 *qīng*, for instance, can mean "blue" or "green," sometimes even "black." The specific translation depends on the specific context. As we wanted to make all the redesigned diagrams comparable, we had to use color in a unified manner, like a color code (see Figure 15).

We had to simplifie the differentiations in order to show an incredibly strong concept of relation behind the diagrams. In traditional China nearly all areas of knowledge and life are connected by a system of correspondences. This system embraces a synopsis of qualities, and assigns the most diverse categories, such as seasons, cardinal directions, bodily organs, sensations, flavors and colours, to an established canon of equivalents.

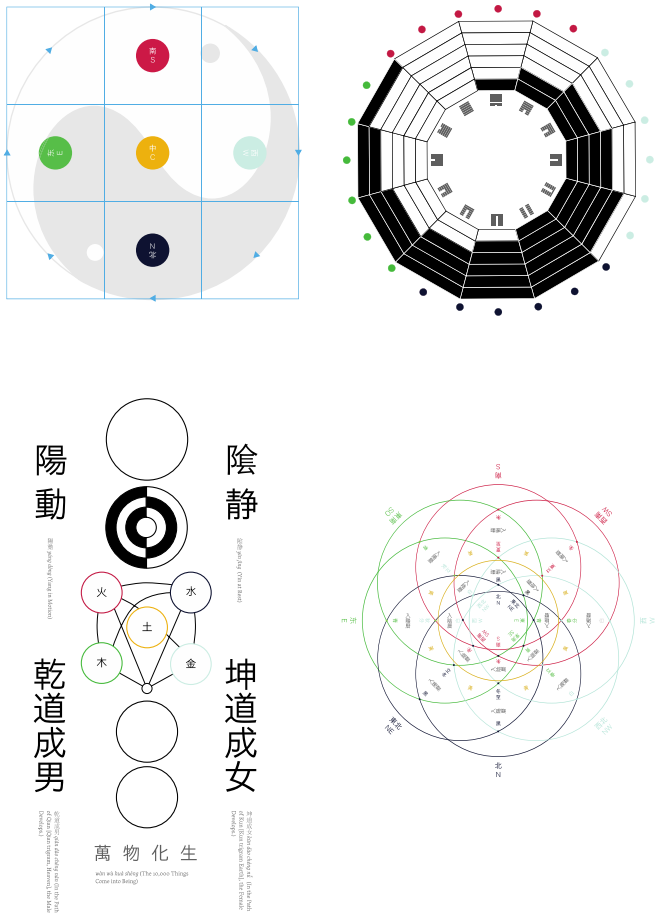

Figure 15 In order to make all the redesigned diagrams comparable, we used the five traditional colours in a unified manner, like a color code.

That means that red not only represents south, but also summer and fire; white (in the actual redesign light blue) represents west, autumn and metal; black represents north, winter and water; green represents east, spring and wood and finally yellow represents the center, the midsummer and the element earth. This can be demonstrated by an important diagram of the Chinese traditional medicine where the human body, with its organs and energy pathways, is set in correlation to cardinal points (space) and twenty-four annual divisions (time) (Figure 16).

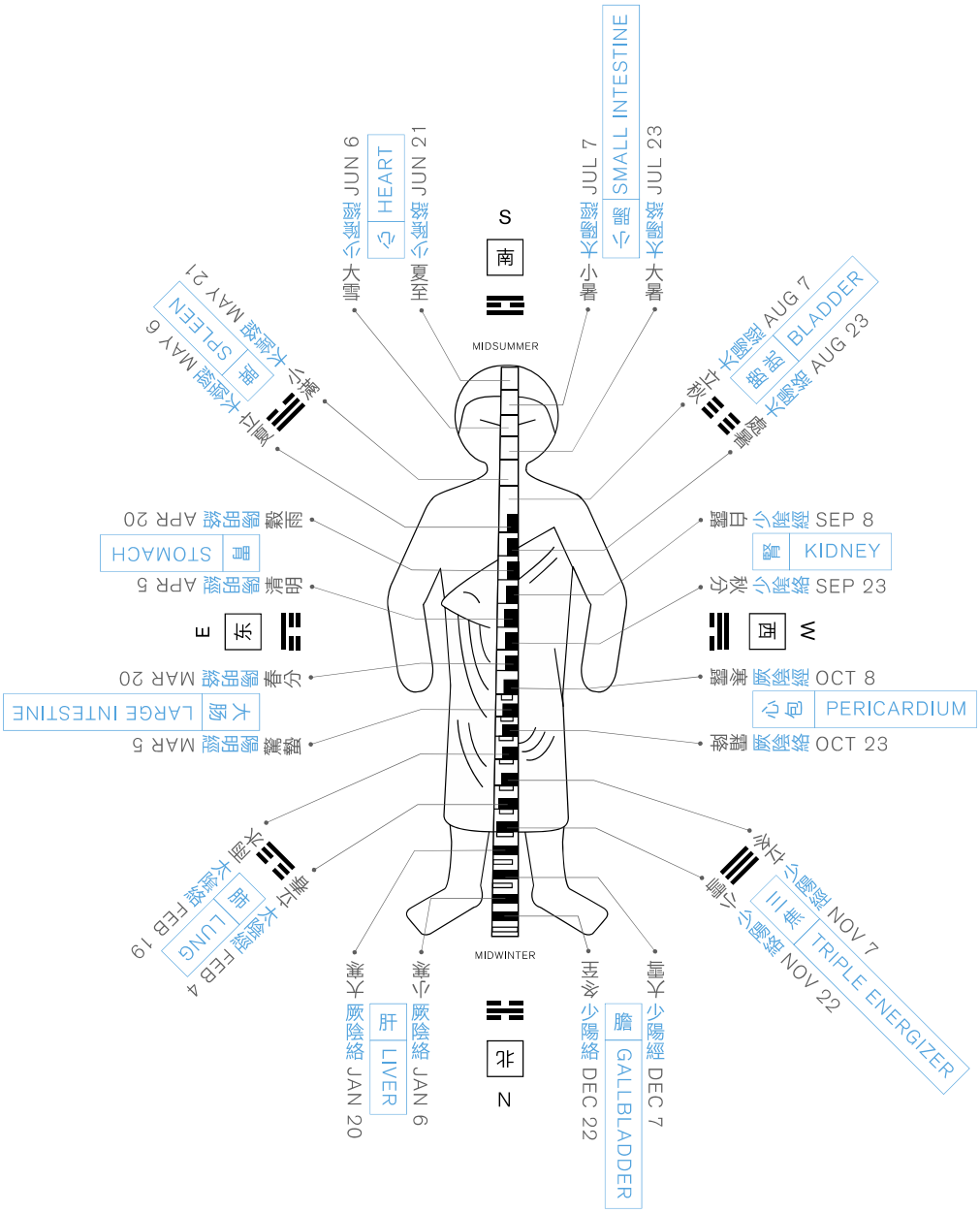

Figure 16 The rendering of 人面耐寒之圖 *rénmiàn nàihán zhī tú "Representation of the Cold Resistance of Human Faces".*

5. Concluding Thoughts

In the research presented here, the central meaning of translation is uncovering the conceptual structures that lie hidden beneath a visible surface. Here, the cultural reference systems that are not directly observable are set in relation to visible phenomena. As the anthropologist Clifford Geertz writes:

> The concept of culture I espouse, . . . is essentially a semiotic one. Believing, with Max Weber, that man is an animal suspended in webs of significance he himself has spun, I take culture to be those webs, and the analysis of it to be therefore not an experimental science in search of law but an interpretive one in search of meaning. It is explication I am after, construing social expressions on their surface enigmatical. (Geertz, 1973, p. 5)

As a society, we continually create this cultural web or reference system and at the same time are entangled in it. “We do not [think] in prescribed patterns . . . , but these patterns [are] a result of a development . . . that we define ourselves . . .” (Breidbach, 2008, p. 16). In terms of knowledge graphics, this means that we produce both the images and the conditions constituting image production and reception. When two cultures meet in a “space of translation and negotiation,” these constitutive conditions, that is, representational systems, must also be negotiable, otherwise an encounter cannot take place. Since “spaces of translation” are first constituted in the process of this negotiation (Bhabha), they can only be based on open—that is, unfixed—organizational structures.

The map of correspondences shows such dynamic organizational relationships; its depictions can always be explored anew in terms of the most varied connections and differences. It offers a wealth of mutual references between the two cultures that set the reader’s gaze into motion again and again.

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About the Authors:

Ruedi Baur examines concrete design questions in social contexts, fundamentally oriented toward the development of an accountable design approach. He was engaged in this capacity at the Institute for Design Research in Zurich, which he directed from 2004 to 2011 together with Stefanie-Vera Baur and Clemens Bellut. He specializes in the design of public spaces and has developed internationally recognized projects with Intégral Ruedi Baur et Associés. He is professor at the School of Art and Design, Geneva (HEAD); the École nationale supérieure des Arts Décoratifs, Paris (ENSAD); the Percé International School, Quebec, Canada; and the Luxun Academy of Fine Arts, Dalian, China.

Ulrike Felsing studied visual communication at the Academy of Visual Arts Leipzig. Her diploma thesis was awarded the Dresdner Bank Leipzig art prize, Ars Lipsiensis, and presented in the Signes des écoles d'art exhibition at the Centre Pompidou, Paris. Together with Ruedi Baur she directed the project "Researching design methods in the area of transcultural visual communication," which was funded by the Swiss National Science Foundation (2010-2015). As author she has researched and published on the subject of Dynamic visual identities (Lars Müller Publishers, 2009). Since 2010 Felsing has been a lecturer at the Bern University of the Arts.

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Elucidating perceptions of Australian and Chinese industrial design from the next generation of industrial designers

Blair Kuys[a]* and Wenwen Zhang[b]

[a] Swinburne University of Technology
[b] Beijing Institute of Technology
* bkuys@swin.edu.au
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Abstract: China is passing through a challenging transition: the labour-force expansion and surging investment that propelled three decades of growth are now weakening (Woetzel et. al. 2015). This is a natural stage in a country's economic development, yet it raises questions as to where the new sources of growth lie. Australia is experiencing similar issues. In Australia the economy over this same period has survived on mainly mining of natural resources mostly exported to China. This cannot be sustained and a push from a resource economy to a knowledge economy needs to start. Australian manufacturing has suffered significantly with high labour costs and cheaper offshore markets. This is where design should be fundamental to the national agenda and be used to keep manufacturing strong. China, on the other hand is in an opposing position where manufacturing has been strong, however the economy now needs new avenues to grow.

This study goes into detail about perceived issues associated with industrial design programs at a university level in both China and Australia. It then consists of a pilot survey targeted at Chinese and Australian industrial design students and recent graduates. This has been done to better understand the mindsets and opinion of the next generation of industrial designers, with an aim to better address issues that arise for government, universities and industry. The survey respondents are the people that need to act and push design in areas it hasn't been before. China and Australia are used in this pilot study as that is where the authors reside — and is where the survey data has been obtained — however, there are many countries in similar situations that could use this study as a base for further research.

Keywords: Industrial design, China, Australia, stereotypes

Introduction

Design is a global, multi-disciplinary profession that meets people's needs and draws from national and international resources. Good design requires understanding of social, cultural and economic needs in a cross-cultural environment.

The underlying problem this study is addressing is the lack of priority given to design in both China and Australia, and the misguided stereotypes that exist among the younger generation. Countries that have done this have seen a rise in national competiveness and shown that industrial design can be a much more powerful weapon strategically, as well as operationally than ever suspected (Lorenz, 1994). China and Australia need to look at exemplar countries — such as Korea, Germany and the US — to prioritise strategies to put design at the forefront of policy and government agendas.

The survey aims to better understand the mindsets of the next generation of industrial designers, as they will be the people in positions to truly develop change. The survey confirms many stereotypes associated with both China and Australia — which is to be expected — however, by questioning the next generation of industrial designers they will hopefully realise the importance of their role within their country to help strengthen their discipline and dispel myths and stereotypes.

Industrial design education – China and Australia

An identified concern with international design teams is how to successfully manage the process of reaching a shared understanding of the domain, the requirements, the object of work, the design process itself and the roles and commitments of team members. Design is, according to Bucciarelli (2002), “as much a matter of getting different people to share a common perspective, to agree on the most significant issues, and to shape consensus on what must be done next, as it is a matter of concept formation, evaluation of alternatives, costing and sizing.”

In an Australian Government report titled “National Statement for Engaging Young Australians with Asia in Australian Schools” (2006), it explains the importance of why Australian students need to link closely to Asia. While this report is directed at a secondary level, the same applies to tertiary education. The fact that many Australian universities are ensuring all students have the opportunity to engage with Asia at some stage during their degree reflects this importance. Australians require new skills, knowledge and understanding related to the Asian region, as Asia is an important economic partner, which is inextricably linked to the future growth of Australia.

The importance of Australians linking with Asia is to take advantage of a market that is geographically close and represents more than three billion people. Economic development in China and India in particular will result in unprecedented markets for Australia – and strengthened competition. Increased education and affluence in those countries mean new competing business and workforce capacity globally (National Statement for Engaging Young Australians with Asia in Australian Schools, 2006. p. 6). This is not a bad thing. Design is a

global profession and competition should exist in all corners of the globe, which will result in better, more competitive products, systems and services being produced. From an education point of view this gives greater importance for student exposure to other cultures in which one day they may work, or at least engage with in some form. Designer's work with clients, suppliers and manufactures from all over the world. The end users of their products and services are often in another country. Thus, the ability for design students to integrate cultural understanding and empathy through design projects is an important graduate attribute.

Australia needs to focus on developing a skilled and educated population, deal forthrightly with Asia and promote excellence if it is to be a leader in the Asian Century. The Asian Century presents many challenges and opportunities for Australians. Designers who graduate with an appreciation of Asian culture, influence and maturity, will enhance their skills and intellect to keep Australia at the cutting edge of a global knowledge economy, which it so desperately needs. Australia needs to prepare and position for a new Asia, one that is generating both new knowledge and new demands at a rapid pace (Prime Minister's Manufacturing Taskforce, 2012).

To contrast this with China, the Chinese need to broaden their scope and look outside their borders for inspiration. The government make it difficult for Chinese students to travel abroad to experience design from different cultures – however, the past decade has seen a more relaxed reform and Chinese students are slowly allowed more freedom to travel. For design, this is of particular importance, as learning from best practice around the world will hopefully strengthen design within their own country.

Design is rapidly expanding in China. The boom in Chinese design education and design related industries has grown significantly in recent times, however there are still many problems that need to be improved. In all issues, improving the design education and building an innovative social culture are the most important for Chinese students and designers, along with more support from the government. In the case of "Shanzhai culture" (imitation and pirated brands and goods), design is still prevailing in China and trying to find its place. The way this is done is by educating students about the importance of design and its impact on society. This is not taken lightly in China. The development of design education and industry in China is in its early stages of flourishing. In March 2013, "1305 Design" was officially announced as one of the general subjects in the Chinese education system by the Ministry of Education of the People's Republic of China, and design education reached an unprecedented point at a national level. Specific to industrial design education, there are 353 institutions offering industrial design (Engineer) bachelor degree and 346 institutions offering product design (Art) bachelor degree (http:/gaokao.chsi.com.cn). That's a total of nearly 700 institutions offering very similar degrees. The point of difference surely has to be greater international exposure and partnerships with quality institutions and industries from around the world. To contrast this to Australia, there are only 24 institutions offering industrial design programs — 19 higher education and 5 vocational education programs (http://www.hotcoursesabroad.com). Australia obviously has a much smaller population

(23.13 Million [2013] compared to China 1.357 Billion [2013]); however don't let the figures deceive you. China's population is nearly 59 times greater than Australia's. Per capita Australia has 2 times more industrial design schools than China, therefore creating very similar issues. One could argue that there are too many industrial design schools in Australia, which is reflected in the flat student demand.

With all the efforts in China expanding design education, a look at postgraduate education should now begin. Currently, the design education is predominately focused on the bachelor level, as the education tradition of China focuses on skills training and knowledge transmission, rather than scholarly research that has the potential to reshape the Chinese design culture. Moreover, since China implemented the policy of reform in 1978, more and more Chinese companies have grown to become world-class business groups, namely Haier, Lenovo, and HUAWEI. There is now a significant industry platform that requires design, making world leading design education of utmost importance. To be specific, there were more than 20,000 design-related companies and over 250,000 design practitioners in Beijing alone by the end of 2012 (http://www.bjkw.gov.cn). This is only going to expand making skilful, qualified designers in more demand.

In a keynote speech at the 2015 Design and Business conference in Melbourne, Australia by the Dean of Hong Kong PolyU School of Design, Professor Cees de Bont, he spoke of the significant impact Chinese trained designers will have on the global economy stating the following:

"Designers who primarily have good drawing skills or engineering skills will compete against many skilled, low paid, Chinese designers. Those who can integrate between technology and people will be in high demand, but will face that companies with a manufacturing background are not always open to adopting design-driven innovation (de Bont, 2015)."

This statement is also very true for Australia where a large majority of manufacturers are SME's who don't necessarily understand the value of design, or at least don't have the R&D budgets to invest in it. On top of this — and similarly in China — the government lack support for design-driven innovation. However, it is up to the future design leaders to influence change and convince these traditional fields of what design can bring and the return on investment it can make. The mindset has to change and the younger generation of designers is the prime target to do this.

One of the major barriers in China for developing the next generation of 'good' designers is the current selection process for students transitioning from high school to university. The current selection of design students in China is based on a general college entrance examination system. The difficulty of the exam is descending by the order of "Science and Engineering", "Liberal Arts" and "Arts and Design". This standard leads more and more high school students to choose "Arts and Design" as an *'easier'* way to pass the entrance examination, rather than a pursuit of their own interests. In order to get the easy approach, tens of thousands of Chinese high school students choose to participate in a half or one year full-time 'painting training' program without learning regular high school courses. After the

completion of this they take a general painting exam, called an “Arts Exam”, to get the qualifications to study "Arts and Design" in colleges. The phenomenon and rating system of college entrance examination mislead the public value perception of design. In addition, most Chinese high school students have an inadequate understanding about their future majors and as a result, many students and parents regard “Arts and Design” as a second-rate subject. This then spills in design schools where many only accept students from the "Arts and Design” approach; others accept students from both “Science and Engineering” and “Arts and Design”, however a lot of "Science and Engineering" students, with the preoccupation of design, are not willing to study industrial design as it is deemed second-rate. In most cases the students that end up studying industrial design are those with lower grades who were not successful to get into a science and engineering stream. The reluctant acceptance of an assigned major, as well as the feeling of “demotion” from Science to Arts, triggers their negative attitude towards the subject, therefore the problems of the entrance and major selecting system fundamentally undermine Chinese design education, and promote a vicious circle.

In Australia, it is a similar system, however rather than be categorised within a discipline area; high school students are ranked against their peers and given a score. This score is awarded out of 99.95 and titled the Australian Tertiary Admission Rank (ATAR). The ATAR is a percentile score given between “less than 30” up to 99.95 (in a minimum increment of 0.05), which denotes a student’s ranking relative to his or her peers upon completion of their high school education. This ranking is then used as a benchmark for admission into universities – the more prestigious the university the higher the entrance score, or the more popular the program, the higher the score.

The problem with this system is that each subject completed in high school is 'scaled' to reflect its difficulty due to the fact that some subjects require more time and effort, and have a higher difficulty level. This is understandable to an extent, however it undermines the importance of skills that the country desperately need. A majority of STEM subjects (Science, Technology, Engineering and Math) are scaled up which is good, however all art, design and humanities subjects are scaled down. This causes a similar effect to that of China where these subjects are taken as ‘easier’ options, which in turn affects their status.

For industrial design programs at Australian universities, many of the applicants enter purely on the basis of their ATAR score with no interview or portfolio submission. Therefore, someone who studies highly scaled subjects at high school regardless of if they have anything to do with design or not, can simply enter design programs at a university level – and will be welcomed as high achieving students who also have scholarship opportunities. Contrast to this is someone who may be very gifted in design but failed to reach the ATAR requirements for admission because all high school units were scaled down. This affects the pedagogical teaching methods in industrial design, as students have to follow a similar syllabus with different knowledge and skills. It makes art/design-background students struggle with the more technical engineering components of industrial design, and science/engineering-background students struggle with the creative/sketching side of

industrial design. It can be said that the university system should allow for this by ensuring the curriculum is understandable to all entrants, however, when they are currently being admitted which such vast skill differences this makes it very difficult.

Another thing affecting Australian industrial design programs is the lack of awareness of industrial design at a high school level. Product Design and Technology is a high school subject that is gaining momentum and is now offered in most Australian high schools, however, Visual Communication is still the default design subject in Australian universities, which directs most students wanting to pursue a design career into graphic/communication design at university. If governments start to promote the importance of industrial design and the influence this can have in industry, then it's highly likely schools will follow.

To conclude this section, entrance into industrial design programs in both China and Australia should be by merit and skill specific to the discipline rather than a score or a perceived 'easy' Arts exam. China obviously has the population to implement this quickly, however, Australia — with an open-capped university market and too many universities — may struggle to find enough 'good' students.

Survey

The aforementioned content that focused on industrial design education in China and Australia gives context to the issues that exist. In order to advance this research a pilot survey was conducted to better understand and elucidate issues from current students and recent graduates in industrial design in both China and Australia. By surveying both countries we can draw a comparison on similarities or differences that aims to present data that can be used for further research. The purpose is to identify the thoughts and opinions put forward by the next generation of industrial designers to understand their global awareness.

An initial focus group discussion to inform the questions in the pilot survey was considered, however due to the nature of this study the authors didn't think predetermining responses was appropriate. The insights given to the survey responses were initially kept open-ended to ensure accurate perceptions were documented. As this study is a pilot survey, the authors can now take the results to build upon in future work.

This pilot survey consisted of 30 respondents from China and 30 from Australia and was conducted over a 3-month period between July–September 2015. At present, the credibility of survey research findings is largely a function of response rate. Low return rates are presumed to suggest biases in data (Edith et. al., 2005). Because of this, the authors have ensured survey conditions were similar in both China and Australia and the response rate was the same. 30 respondents from each country present enough data in this pilot survey for further investigation.

The survey consisted of 10 questions focused on perceptions about Australian industrial design from Chinese respondents and Chinese Industrial design from Australian respondents. By understanding stereotypes that exist among the next generation of

industrial designers, we aim to highlight areas that need clarity for universities, students, industry, government and the general public to advance the design agenda. By doing this, we aim to promote industrial design as a legitimate discipline that should be taken more seriously.

Following are the 10 questions combined with both Chinese and Australian responses to provide comparison data and a summary concludes each question:

Options	Responses
YES	0
NO	30

Chinese responses (30)

Options	Responses
YES	14
NO	16

Australian responses (30)

Figure 1 Question 1. Have you travelled to Australia/China?

Since travelling abroad is still not a very common activity among Chinese college students, none of the respondents from China have travelled to Australia. This is obviously not to say they haven't travelled abroad, however for this study the questions are specific to Australia showing that no one within the respondents had knowledge about Australia from actually visiting. The Australian responses however showed that almost half of the respondents had experienced China, which provides greater cultural context to the Australian answers. This question helps contextualise the answers and clearly shows the lack of understanding about Australia from the Chinese respondents, whereas, the Australian responses by definition should have a better understanding of the questions related to China.

Options	Responses
15–18	0
19–21	0
22–24	11
25–27	17
28–30	2
30+	0

Chinese responses (30)

Options	Responses
15–18	0
19–21	7
22–24	14
25–27	1
28–30	5
30+	3

Australian responses (30)

Figure 2 Question 2. What is your age group?

The age distribution of Chinese respondents centres around 22–27, showing that they are predominately in their final year of study or recent graduates. All respondents from China have gone through the standard education system in China and completed undergraduate education majoring in industrial design. The data was collected from five different Chinese provinces showing a realistic view of the perceptions about Australian design.

The Australian respondents were spread across a wider age demographic with the largest concentration between 22–24 years of age. The surveys conducted in Australia were mostly

from industrial design undergraduate students towards the end of their degree, with a number of recent graduates working in an industrial design capacity. All respondents were residing in Melbourne at the time of the survey.

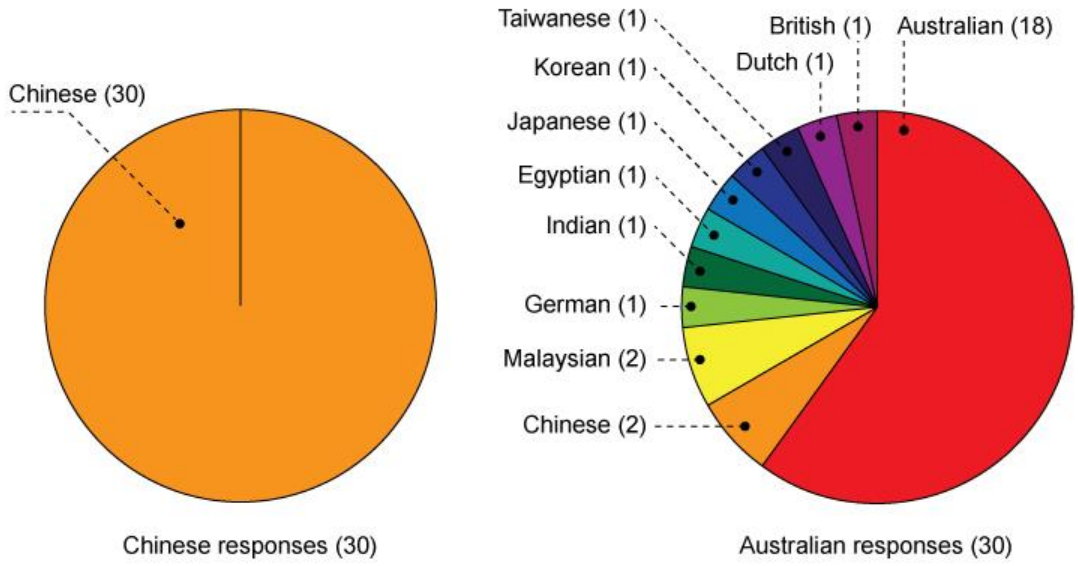

Figure 3 Question 3. What is your nationality?

This question has presented statistically significant data showing a clear difference between China and Australia in respect to the cultural make-up of the society. Melbourne, Australia — where the Australian-side of this survey was conducted — is well known for its multicultural society, which this question has validated. Nearly half of all respondents are not Australian citizens showing true diversity and global relevance to this survey. Among the respondents in the Australian survey two were from China, which presented certain bias towards those responses, however, worth including.

To further emphasise the multiculturalism of Australia, statistics from the 2011 Australian Census show 27 per cent of Australians were born overseas. The proportion of these that were born in Asia has grown from 24 per cent in 2009 to 33 per cent in 2011. This equates to almost 1.75 million Australians who were born in Asia (National Statement for Engaging Young Australians with Asia in Australian Schools, 2006. p. 6). This is a good thing. A diverse cultural society brings many challenges but also brings many benefits. For design, it brings different ways of thinking and different desires that could lead to better quality, globally significant outcomes.

For China, no respondents were citizens of a different country. This makes the Chinese responses consistent, however may lack global awareness.

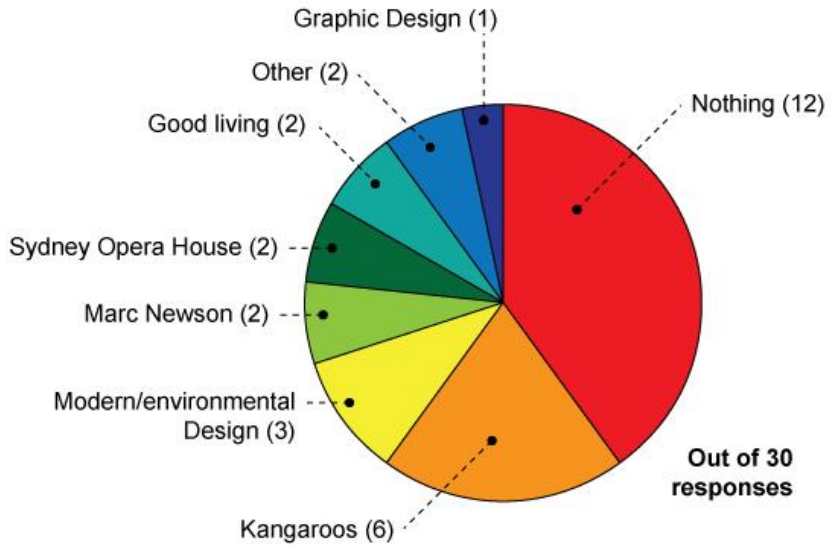

*Figure 4a Question 4. What is the first thing that comes to mind when thinking about **Australian** industrial design? (Responses from Chinese survey).*

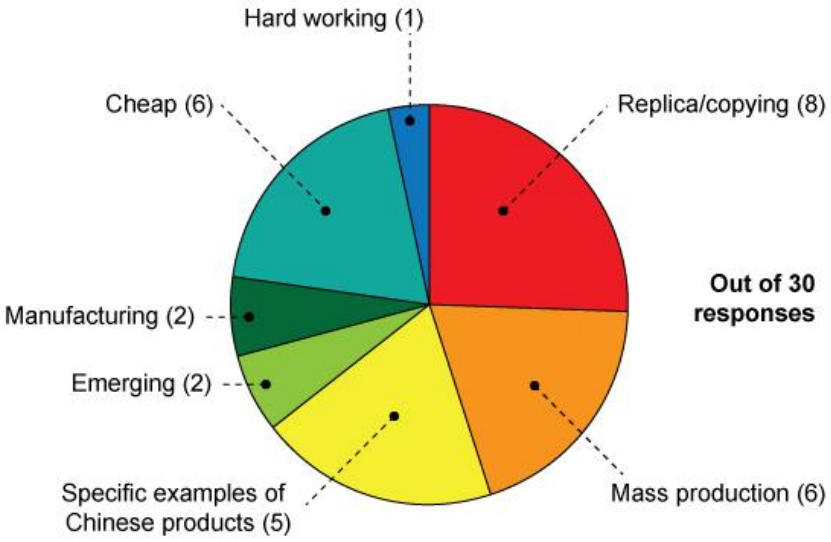

*Figure 4b Question 4. What is the first thing that comes to mind when thinking about **Chinese** industrial design? (Responses from Australian survey).*

The impression about Australian industrial design from Chinese respondents suggests that most Chinese design students and practitioners do not have a clear image about Australian design. Only two respondents mentioned Marc Newson because he had just joined Apple at the time of the survey. This phenomenon is partly due to the absence of Australian design introduction in Chinese design education, as well as the lack of prominent design identity in Australian industrial design.

However, Australia is recognised in China as a 'mega diverse' country whose design theories and practices show concern for the natural environment. In order to develop a recognisable design style, the ecological and whole-human concern may become the identity of

Australian design from a Chinese perspective. Rather than ‘kangaroos’ or ‘nothing’ that dominates two-thirds of the responses.

The respondents from Australia were mixed with positive and negative responses. There was a large focus on manufacturing and mass-production, which is something Chinese industrial designers need to take advantage of. The negative was almost half of responses mentioned replica/copied products and cheap manufactured outcomes. These are the stereotypes that can certainly be changed by concentrating on truly innovative products with a lot more attention to quality.

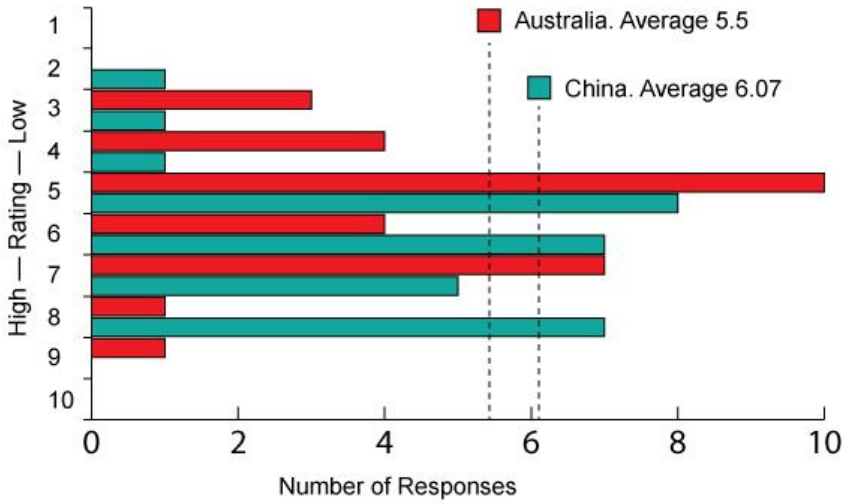

Figure 5 Question 5. On a scale of 1–10 (1 being the lowest and 10 being the highest), how do you rate Australian/Chinese industrial design on a global scale?

According to the Australian industrial design evaluation given by the Chinese respondents, ‘5’ was rated the most giving an overall average of just over 6/10. It indicates the appreciation of Australian industrial design from Chinese, even when they just have a vague understanding about it. On the one hand, Chinese believe that the developed Australian economy, technology and education can provide a fertile ground for innovation and design. On the other hand, there is a lack of satisfaction and trust in Chinese design education and industry among them.

Australian respondents gave an average score 0.5 lower than Chinese respondents but still resulted in a satisfactory score. It is interesting to see a spike on the rating ‘8’ in the Chinese respondents when evaluating Australian industrial design, suggesting that Australian industrial design is good, but minimal knowledge exists to provide a more informed answer.

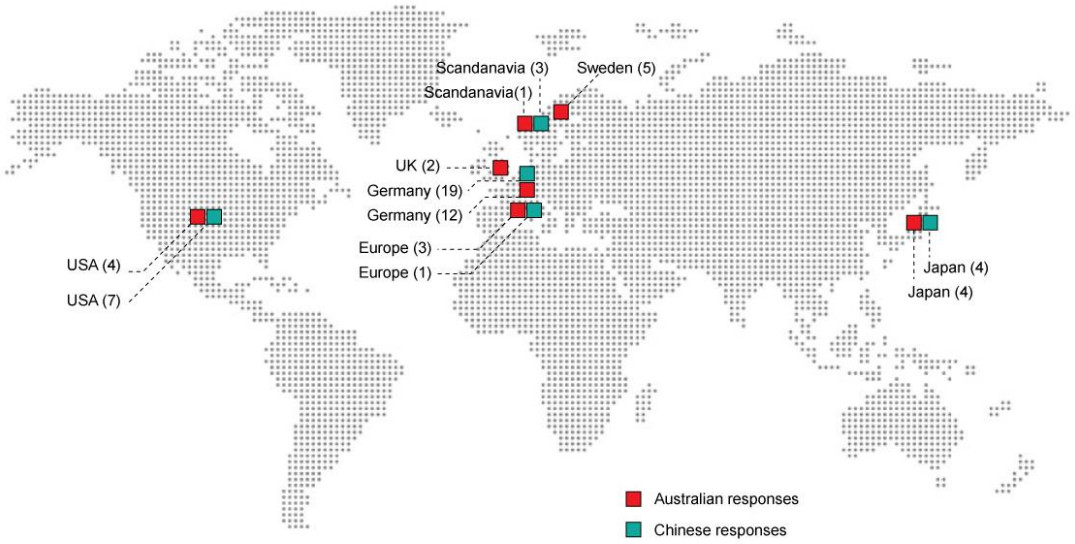

Figure 6 Question 6. What country do you associate with having the best Industrial design?

Germany is the clear stand out in this question, which dominated the responses from both the Chinese and the Australians. This was followed by the USA, Scandinavia and Japan.

German design generally won its name among Chinese and Australian design students for two main factors. First, Germany is well introduced to Chinese and Australian design students from design history such as the Bauhaus, and more recently premium automotive brands such as Porsche, Audi, BMW and Mercedes – to world class design awards, namely Red Dot and iF. Moreover, as the originator of modern industrial design, Germany has a mature design education system, clear design characteristics and high quality precise manufacturing. The close connection and communication between its education and industry ensures its success and reputation.

The USA is well known by both countries as a leader in the global economy and technology, and its advanced commercial design and well-developed education are leading the design trends. Japanese design and Scandinavian design are famous for their unique styles and well-accepted design theories, which perfectly integrate regional culture to modern design.

All countries mentioned above have common properties as follows:

- Design culture, heritage and theory
- Mature education system
- Industry and government resources
- Economic and market support
- High quality manufacturing
- Knowledge-based economy
- Recognisable designers and designed products
- Strong connection between universities and industry

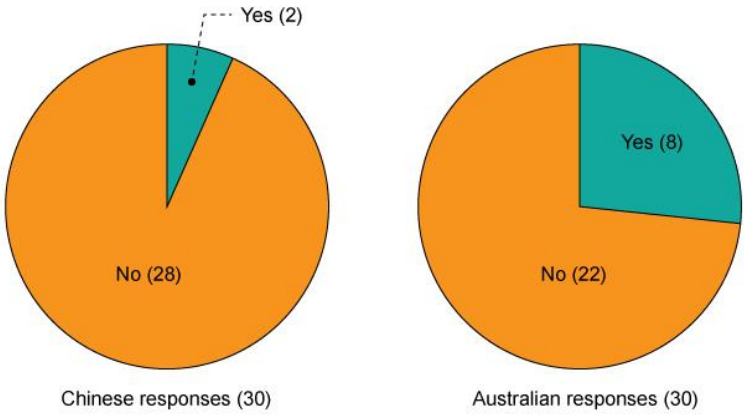

Figure 7 Question 7. Can you name a famous Australian/Chinese Industrial designer or product? If so, who or what?

This question clarified the intentions of this survey by showing that minimal awareness on industrial design exists in both countries. The two responses for China were Marc Newson who recently joined Apple, and a majority of 'Yes' responses from Australia were associated with replica products that don't necessarily respond to the question correctly. However, both Chinese citizens that responded in the Australian survey mentioned Chinese designers who they were aware of. It is clear that more work needs to be done by both countries to expose the quality design that occurs on a global scale. This will help alleviate many stereotypes and grow the awareness of industrial design on a global scale.

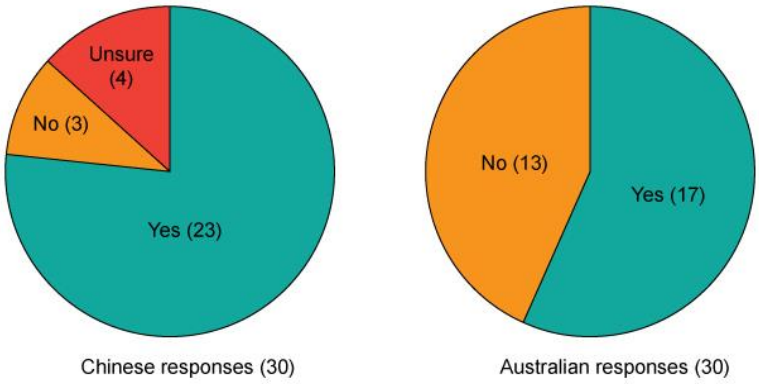

Figure 8 Question 8. Do you think Australia/China produce world-class Industrial designers? Why?

Generally, based on four main reasons, Chinese design students think Australia has the potential to produce world-class industrial designers. First, Australia is a developed country with a good economic foundation to support design innovation. Australian design also has a relatively mature education system and resources and high design acceptance on a global scale. The issue is there is just not enough of it.

Therefore, nearly 77 per cent of Chinese respondents believe Australia has the ability to foster superb industrial designers. While the doubts of others come from the consideration of manufacturing capacity, market size and design features.

A relatively positive response is seen from the Australian respondents also. Over half suggest that China has the ability to produce world-class designers. The main reasoning was because of the strong manufacturing base and the large population. There was a belief that with more people comes more problems, and with more problems there's more industrial designers to find solutions.

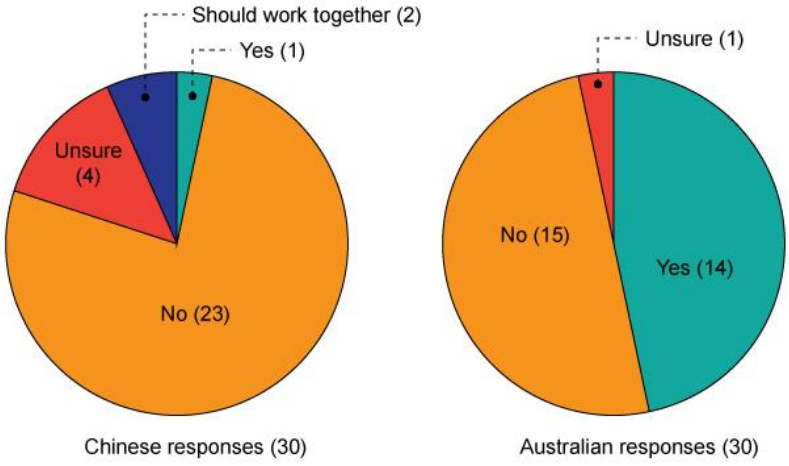

Figure 9 Question 9. In relation to Industrial design do you see Australia/China as a threat to China/Australia? Why?

While Chinese people confirm their appreciation of Australian industrial design, 90 per cent of respondents did not regard it is a threat to Chinese design – the remaining did not give a clear attitude. Partly because of the influence of traditional harmony culture, the majority of respondents believe China and Australia can provide mutual promotion to each other in design. In the era of globalisation, Chinese design practitioners act much like learners than warriors. Any innovations and breakthroughs in other countries can be a learning motivation and target. So, most Chinese people think that Chinese industrial design and Australian industrial design will not form a competitive relationship, but a friendly and cooperative relationship.

In order to give an opinion, other respondents evaluated the two countries' situation and prospects in industrial design. The number of people, who think Chinese industrial design is more promising than Australian, is nearly the same as their dissidents. The result, frankly, indicates the improvement in self-confidence of Chinese design among Chinese design students and designers.

The result for Australian responses was very different. Nearly half agreed that China is a threat to Australian design and the general consensus was that with China's large manufacturing base and much cheaper labour design will grow in China and may take Australian companies and designers along with it. This is a realistic phenomenon that may

occur, which gives greater importance to Australian industrial design and what is should stand for.

Options	Responses
Improved design education	18
Stronger emphasis on creativity and innovation	18
Government design agenda	14
Greater support for design start-ups	12
Larger design industry	10
Improved design identity	7
Better manufacturing sector	7
Improving design awareness	1

Chinese responses

Options	Responses
Less copy/originality	8
Greater exposure to international design	8
Better quality/improved styling	8
Greater focus on innovation	5
Unsure	2
More sustainable	1
More passionate approach	1
Respect for intelegual property	1
More publicity	1

Australian responses

Figure 10 Question 10. What do you think is needed to improve Australian/Chinese Industrial design?

The above respondents are self-explanatory and provide an indicative list of areas for further research. Particularly the dominance of improved education, stronger emphasis on innovation and a government agenda from the Chinese responses regarding Australia, and the issues with copying products, exposure to international markets and improved quality for the Australian responses regarding China.

To summarise the survey it is clear the Chinese respondents took a more rational look at the development of domestic design, and then started to change focus from criticising “Shanzhai Culture” to exploring the definition and future of Chinese design. Respondents suggest that Chinese designers tried to rethink traditional culture and to find Chinese design DNA from heritage. Indeed, the frame of Chinese design is getting clearer, from architecture, products and a booming fashion industry – let’s hope this continues for industrial design.

In Australia, the survey portrayed a similar sense that Australian design has minimal impact on a global scale. There were more Chinese respondents associate Australian design with kangaroos than actual designers. It is obvious Australia is strong in certain areas and has a

global presence as a nation that produces quality natural products, however, from a design point of view a lot of work needs to be done. There is no reason Australia and China can't be a world leader in industrial design.

Conclusion

While designers in China are as reliant on economic, political, and cultural conditions as that elsewhere, Chinese designers are also extremely focused on building and maintaining their brand image – an area where they recognise their lack of experience (Tsui 2009). In a highly competitive environment, start-up funding for new independent designers is hard to come by. Their most likely routes to finance are private family funding or relationships with manufacturers to develop small clothing lines as an example (Tiziana et al, 2012). In Australia there is also a lack of support for start-ups and the ability to take 'risks' is not common practice. This is where government plays a key role by assisting (financially) start-ups to firstly survive and secondly make a profit. By doing this, the culture of innovation will grow and enable greater exposure to design-led innovations.

It is clear from this study that both China and Australia are experiencing commonalities and both should look at prioritising design for economic stability. While both countries are financially strong, the reasons for this are on a slow decline making it more important to act now on the next source of growth.

The focusing question is whether and how China can be transformed from the maker of products designed elsewhere in the world to an original source of design. The answer to this question will be determined, at least in part, by the form that design education in China takes in the future (Buchanan, 2004). What will make the difference for Chinese industry in the future is the quality of design thinking that distinguishes its products and makes them desirable abroad and at home (Buchanan, 2004).

The same can be said for Australia to alleviate the pressures of a declining manufacturing workforce. Australia has clever — world-class — manufacturing, however, without clever design intervention this will continue to disappear to cheaper offshore markets.

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About the Authors:

Blair Kuys is an Associate Professor at Swinburne University of Technology, Melbourne, Australia and is currently Department Chair of Interior Architecture and Industrial Design. Blair completed a PhD in 2010 and has been instrumental in promoting the benefits of industrial design to industry.

Wenwen Zhang received her B.Eng. degree in industrial design from China University of Mining and Technology, Xuzhou, China and is currently researching and studying as a graduate student in industrial design at Beijing Institute of Technology, Beijing, China. Her interests are in cross-cultural industrial design studies and has research and practice experience in China, Australia, and Germany.

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Translating picturebooks: Re-examining interlingual and intersemiotic translation

Anne Ketola

University of Tampere
anne.ketola@uta.fi
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Abstract: The paper explores picturebooks and their translation, analyzing the three Finnish translations of *The Tale of Peter Rabbit* by Beatrix Potter, all of which are based on a different illustration version. The paper approaches picturebook translation from the viewpoint of Jakobson's (1959) renowned classification of translation types, namely intralingual, interlingual and intersemiotic, focusing on the latter two. First, the paper examines the idea of book illustration as intersemiotic translation, analyzing how the illustration versions differ in recreating the story. Second, the paper provides examples of how the translations of picturebooks are, in fact, negotiated from the combination of verbal and visual information and therefore suggests that the translation of a picturebook does not fit into Jakobson's typology as such; instead, it is, to certain extent, a combination of interlingual and intersemiotic translation. The paper therefore suggests that the types of translation should not be considered as exclusive of each other.

Keywords: picturebooks, multimodality, interlingual translation, intersemiotic translation

Introduction

Picturebooks often travel from one country and culture to another. The translator of a picturebook receives a source text and converts it into a target text that is understandable for target culture readers. One of the largest differences between the translation of picturebooks and, for instance, traditional novels is that picturebooks are pronouncedly multimodal; their message is created in the intrinsic interaction of words and images. From the translator's point of view, a picturebook can hence be thought of consisting of two separate parts, *the verbal source text* and *the visual source text,* which nonetheless operate seamlessly to create the text's overall meaning. The translators of such texts interpret information offered by two separate modes.

When presented together, the words and images of a picturebook afford new kinds of meaning. As picturebook scholar Perry Nodelman (1988) states, the information offered by the words of a picturebook change the way the reader construes the meaning of the images, and the images change the way the reader interprets the words. This gives us a reason to suspect that visually presented information might, in some cases, alter the way in which the words are translated in multimodal texts combining words and images. If the image, in one way or another, changes the meaning of a certain word with which it is presented, the translation of the word might no longer be what could be considered as its most obvious "word-for-word" translation.

The paper examines the three Finnish translations of *The Tale of Peter Rabbit* by Beatrix Potter. *The Tale of Peter Rabbit* is an exceptional picturebook in the sense that it has been re-illustrated dozens of times. The publisher of the book failed to register the book for copyrights in the United States when they first started marketing the book in the country in the early 20th century. Therefore anyone could compile a new set of illustrations and market the book without restrictions (Mackey, 1998). Out of the various illustration versions, three have been translated into Finnish. The original book (Potter, 1978/1902), illustrated by Potter herself, was translated in 1967, a version illustrated by Cyndy Szekeres (Potter, 2002) was translated in 2003, and a slightly abridged version of the story illustrated by Lisa McCue (Potter, 2005a) was translated in 2005. Reading the same verbal story coupled with three different illustrations provides quite an exceptional opportunity to examine whether certain words are afforded different kinds of meanings when presented together with different images.

This paper examines picturebooks and their translations in the light of Roman Jakobson's (1959) typology of different types of translation, namely intralingual, interlingual and intersemiotic translation, focusing on the latter two types. The aim of this paper is two-fold. Firstly, the paper sets out to examine Pereira's (2008) idea of book illustrations as an example intersemiotic translation. Pereira suggests three ways through which book illustrations may translate verbal information: by reproducing linguistic elements in the illustration literally, by emphasizing specific narrative elements and by adapting the images to a specific ideology. Following Pereira's example, the paper analyzes how the different illustration versions of the book differ in recreating the story. Secondly, and more importantly, the paper sets out to examine if the images of a translated picturebook have affected its translator's word choices. In the light of examples drawn from the translations of *The Tale of Peter Rabbit*, the paper re-examines Jakobson's description of types of translation by considering where the translation of a multimodal source text such as a picturebook would stand in this typology. The translation of a book from one language to another would traditionally be considered as an obvious example of interlingual translation. However, the paper aims to demonstrate that the translation of a picturebook includes elements of both interlingual and intersemiotic translation separately, as well as a combination of them both–a type of translation not represented in Jakobson's classification as such.

Interpreting Jakobson's typology

Roman Jakobson's translation typology identifies types of translation in the following fashion:

> 1. "Intralingual translation or *rewording* is an interpretation of verbal signs by means of other signs of the same language.
>
> 2. Interlingual translation or *translation proper* is an interpretation of verbal signs by means of some other language.
>
> 3. Intersemiotic translation or *transmutation* is an interpretation of verbal signs by means of signs of nonverbal sign systems." (1959/2000: 114)

Following Jakobson's description precisely, intersemiotic translation involves converting *verbal* signs into signs of a *non-verbal* sign system. Examples of this would then include translating verbal text into music, film or painting. What needs to be emphasized is that, according to Jakobson's original idea, the direction of this procedure is not reversible: Jakobson perceives intersemiotic translation as interpreting verbal information by means of, for instance, illustrations, but not the other way around. However, within subsequent research, Jakobson's idea seems to have been slightly misquoted. For instance, Weissbrod (2006, p. 42) quotes Jakobson's intersemiotic translation as translating "a sign" into another semiotic language, Torop (2002, pp. 598–596) quotes it as "the interpretation of the signs of a sign system with the signs of another sign system", and Kaindl (2013, p. 261) as "the transfer between sign systems". Torop and Kaindl both mention translating images into verbal language as an example of such practice. All of these authors report quoting Jakobson directly; yet, they do not comment on why the definition has been revised.

It was not Jakobson himself but others who broadened the notion of intersemiotic translation. For instance, Toury (1994, p. 1113) defined intersemiotic translation as translation involving two different sign systems, "whether one of them is verbal or not". The difference between this definition and Jakobson's original is significant: according to the original typology, translation always involves verbal language or, to be more precise, always has verbal language as its starting point. The difference between these definitions hence comes down to how we define translation itself. Broadening the definition of intersemiotic translation–and, consequently, of translation itself–allows us to move away from the traditional notion of translation as *language* mediation (cf. O'Sullivan, 2013; Kaindl, 2013) and allows for a more inclusive and in-depth discussion of translation as *information* mediation. Therefore the present paper, too, opts for a broader definition of intersemiotic translation, defining it as conveying information from one sign system to another.

Picturebooks and translation

3.1 Picturebooks as multimodal source texts

Following Jewitt (2009b), the paper posits that all modes of a multimodal text are of equal importance: the words and images of a picturebook play equally important roles in creating

the story of the book. What this means is that when studied separately, each mode of a multimodal ensemble is incomplete and cannot represent all meanings present in the multimodal whole. Research addressing the translation of multimodal texts should, for this very reason, always cover the analysis of each of the modes involved.

As stated above, picturebooks combine two different modes, the visual and the verbal, images and written language, but how does this affect the readers of picturebooks? Lemke (2002, p. 303) discusses what he calls "the essential incommensurability" between different modes: A verbal text is never able to produce the same and only the same meanings as an image, and vice versa. In Lemke's words, this incommensurability inevitably leads to *genuinely new meanings* being created in the combination of modes (ibid). When we read picturebooks, it is possible for us to find meanings that are present only when the two modes are presented together; meanings that are not present in either mode alone. It is then possible that the genuinely new meanings created within the multimodal source text are conveyed to the translator's interpretation of the verbal text and, moreover, to the translation choices the translator makes.

3.2 Picturebook illustrations as intersemiotic translation

As Pereira (2008) aptly remarks, book illustration and creative fields of translation, such as the translation of poetry, share similarities. Both require a re-creation of the elements of the verbal source. Moreover, both reflect the artistic conventions of the time of the production. Lastly–and, for the purposes of the present discussion, most importantly–both involve procedures such as addition, omission, explicitation, condensation. Both the illustrator and the translator make choices, emphasizing certain elements of the source while downplaying others. Pereira suggests three ways through which images can translate words: illustrations may literally reproduce linguistic elements (referred to as *literal intersemiotic translation*), they may emphasize specific narrative elements, and they may adapt the story to a specific ideology or artistic trend. The paper will now assess Pereira's ideas by analyzing the illustrations on the first spread of the each illustration version of *The Tale of Peter Rabbit* to see how they differ in creating a pictorial setting for Potter's story.

Pereira suggests that literal intersemiotic translation occurs when linguistic elements–*referents*, whether concrete or abstract; shapes, colours, and so on–are "fully (or mostly) reproduced in the picture" (2008, p. 109). Pereira claims that by depicting the characters and events described in the verbal text and not changing any of the details, the illustrator offers "a faithful description" of what is expressed verbally (ibid. p. 111). It is easy to imagine how, for instance, an image of a rabbit and the verbal label "rabbit" would appear as reproductions of the same information. However, I claim that this is only seemingly so. As Nodelman (1988, p. 193) asserts, the words and images of a picturebook convey "the same" information only very superficially.

Let us consider, for instance, how the rabbit mother is represented in the opening illustrations (represented by the sketches in Figures 1–3). All of the illustrators have depicted the rabbit mother, also mentioned in the verbal text. One could therefore claim that the

verbal information has been translated intersemiotically in a literal manner and that the mother is faithfully described by pictorial means in each of the illustrations. Yet, comparing the illustrations with each other quickly reveals that each offers a rather different depiction of the character. Potter's drawing (sketched in Figure 1) depicts a realistic-looking animal; a dam, vigilantly watching over her young.

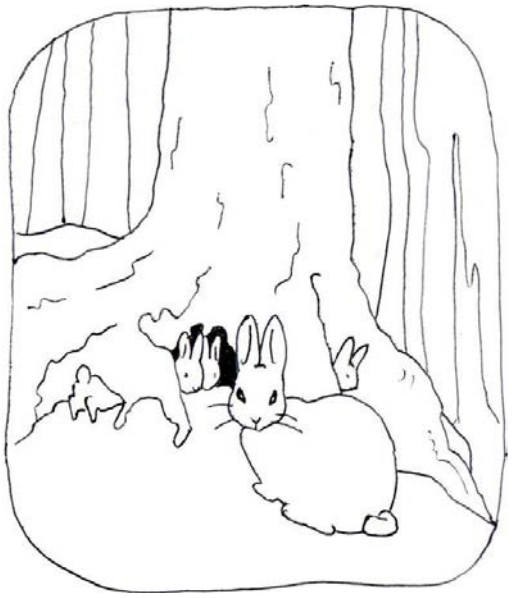

Figure 1. A sketch representing the opening illustration by Beatrix Potter, presenting the rabbits as realistic-looking animals.

The two other illustrators offer a more caricature-like depiction of the character. McCue's illustration, represented by the sketch in Figure 2, presents the mother with a scarf on her shoulders, smiling as she watches her children.

Figure 2. A sketch representing the opening illustration by Lisa McCue, depicting the rabbits dressed in simple garments.

Szekeres has taken the stylization the furthest (sketch in Figure 3). Her character is anthropomorphised to the point of resembling a furry little human. The character's clothing–a long dress and an apron–could even be said to endorse a somewhat stereotypical gender role. To sum up, there are countless ways of converting verbal information into a visual form. As the visual representations may differ from each other radically, it might be counterproductive to claim them all as *literal* translations of the verbal. The paper therefore suggests that literal intersemiotic translation is quite problematic as a concept.

Figure 3. A sketch representing the opening illustration by Cyndy Szekeres presents humanlike characters living in a fully equipped home.

Pereira's second claim is that illustrations may emphasize narrative elements of the verbal text, such as points of view, actions, themes, and so on. This undoubtedly seems to be the case with the illustrations analyzed in the paper. Those familiar with *The Tale of Peter Rabbit* will remember the way Potter's story depicts Peter as the rascal son of the family; his sisters are more obedient, perhaps even passive characters. While this information is not yet available verbally on the first spread of the book, there are hints of Peter's personal traits on the re-illustrations of the story. In McCue's illustration, Peter is hanging from a branch (the small rabbit wearing a jacket on the right-hand side in Figure 2). While Szekeres' depiction of Peter (on the far left in Figure 3) is more subtle than McCue's, her illustration, too, represents Peter as more active than the sisters who merely hold toys. In Potter's original drawing, it is impossible to even distinguish between the rabbit children. The underlying theme of the disobedient child is hence emphasized in the re-illustration versions.

Comparing the way in which the rabbit children are depicted also exemplifies Pereira's third claim, namely that the illustrations may bring about a specific ideology and values to the story. As with the rabbit mother, Potter's illustration–presenting the rabbit children as realistic rabbits–provides in interesting comparison to Szekeres' drawing. The way the illustrator depicts the girls in neat little dresses and aprons and the boy with his arms in the

air, the jacket carelessly unbuttoned, hints at stereotyping of genders: the girls are serene and obedient, the boy is wild and lively.

All in all, picturebook illustration is an illustrative example of intersemiotic translation. As with the translation of verbal texts, no illustrator will produce the exact same translation as someone else. Each illustration version represents the events differently, creating a unique visual context in which the verbal story is interpreted. In other words, the choices made by the illustrator affect the way in which the translator interprets the verbal source text, as discussed in the following section.

Analysing the translations of *The Tale of Peter Rabbit*

This section of the paper presents the analysis of the three Finnish translations of *The Tale of Peter Rabbit*. The aim of the analysis was to elicit whether the images of a picturebook may have affected its translator's word choices, as could be expected based on the above discussion on how picturebooks convey information. The method of analysis employed for this purpose, multimodal comparative analysis, is adopted from Garavini's (2014) research on picturebook translation: the original and the translated picturebooks were first read separately, analyzing the word–image interaction. The second stage of the analysis involved comparing the verbal source text with its translation, focusing on any apparent changes or manipulations of the text. In the last stage of the analysis, these changes were compared to visually presented information to determine whether the images provided a motivation for the changes made.

The analysis strongly suggested that the transfer of information from one language to another had involved the processing of information conveyed by the visual sign system. The analysis identified three different ways in which the illustrations had affected the translation process. First, in all three illustration versions, there were instances of contradiction of information between the illustrations and the verbal text: the illustrations contested the verbal text by presenting some details of the story in a manner not consistent with the verbal text. It seemed that the translators had felt the need to modify the verbal text in order to avoid contradiction in the translation. The second and third category have to do with the fact that illustrations offer a significant amount of detailed information about the characters, settings and actions in the story, hence enriching the translator's interpretation of the verbal story. The second category represents examples of how the translators had verbalized information conveyed only by the illustrations. The third category includes examples of how the illustrations had specified the meaning of certain words, resulting in translation solutions that are more precise than their source language counterparts. The categories are presented with examples below.

4.1 The illustrations contest the verbal text

The comparison of the verbal source and target texts revealed a series of changes and omissions which, in the following stage of analysis, turned out to be related to a contradiction between the information presented in the visual and verbal modes: the verbal

source text expressed something in one way and the visual source text expressed it in a way that was contradictory to the verbal. An example of such contradiction is the word "blackbird" in the book illustrated by Szekeres: the birds are labeled as black in the verbal source text but they are presented as brown in Szekeres' illustration. These instances of contradiction had been approached using various strategies. It hence seems that the translators may have felt the need to modify the verbal information in order to avoid contradiction in the translation.

One strategy that had been used to eliminate the contradiction was moving from hyponyms to hypernyms: translating the item with an equivalent more general in meaning so that contradiction between image and verbal text no longer existed. The translation of the word "blackbird" in Szekeres' illustration version is an example of such a strategy. In the translation of the book, the word "blackbird" (*mustarastas*, "the black thrush" in Finnish) had been substituted with the name of the superordinate species (an expression with a more general meaning), "thrush" (*rastas*). The translator hence avoided naming the colour altogether, and contradiction between word and image was eliminated from the translation. In other words, the information conveyed by the signs of the verbal system was conformed to the information conveyed by the visual.

The second strategy used to eliminate contradiction of information was simply omitting the item that was presented differently by the two modes of the multimodal source text. The third strategy employed for the purpose was ignoring the information presented verbally and replacing it with the information presented visually–replacing the information conveyed by the verbal system with the information conveyed by the visual system. An example of such translation strategy can be found from both McCue's and Potter's illustration versions. Interestingly, the contradiction of information in these examples is culture specific: the species of firs that grow in different parts of the world look different. The cones in McCue's drawing (sketch in Figure 2) could not pass as fir cones in the target culture: the species of firs that grow in Finland have elongated cones that point downward, while pines have cones that are round and sit upright–exactly like the cones in the drawing. The cones in the actual illustration are small, but the cone motif is repeated in a larger size in a vignette along the borders of the page; in other words, the shape of the cones can hardly go unnoticed.

Further, the firs that grow in the target country have branches that start quite close to the ground and hang downward, whereas the branches of pines only grow in the upper third of the trunk. The branchless trunk of the tree in Potter's drawing (sketch in Figure 3) is therefore more likely to be interpreted as that of a pine in the target culture. Both translators have replaced the verbal information ("fir") with their interpretation of the visual ("pine", *mänty*). Even though the translation solutions conform to visual information, they may still be thought of as being based on a verbal sign: the verbal source text item has simply been replaced by information extracted from the illustration. The following category, on the other hand, represents translation solutions that have no counterparts in the verbal text whatsoever.

4.2 The illustrations are verbalized

The comparison of the verbal source and target texts revealed a range of target text items which did not have equivalents in the source text. These additions turned out to be closely associated with visually presented information, since most of such items proved to have an equivalent in the visual source text in the third stage of the analysis. This means that the translators, either consciously or unconsciously, verbalized information that was presented only visually in the multimodal source text.

An example of such an addition can be found from the translation of Potter's original book. Potter's illustration in this part of the book presents a white cat, sitting on the edge of a pond in the middle of a garden. The cat is staring down at the pond in which orange fish are swimming. The verbal source text reads: "A white cat was staring at some gold-fish". The sentence has been translated as "*Lammikossa uiskenteli kultakala ja lammen rannalla istui valkoinen kissa sitä vaanimassa* [A goldfish was swimming in a pond and on the edge of the pond there sat a white cat staring at it.]" The translation includes information which has no counterpart in the verbal source, but may be extracted from the visual source text. In other words, the translation of the sentence has involved complementing the message of the verbal system with information derived from the visual system. Illustrations offer a significant amount of additional, (seemingly) superfluous information about the characters, settings and actions in the book, and some of this information had been explicitated into verbal information in all of the three translations. These additions are obviously not necessary in order for the target culture reader to understand the text. Moreover, one may ask whether changing the text in such a way is beneficial for the translation: the firm ring of Potter's carefully chosen words seems to be lost in the wordy Finnish version.

4.3 The illustrations specify the meaning of the verbal text

Comparing the verbal source and target texts also indicated that various target text items were more precise in meaning than their source text equivalents. The motivation behind these specifications of meaning became evident when these items were compared with the visual source text. Again, the illustrations offer a significant amount of detailed information about the settings and actions in the story. When verbal signs are complimented by the details of the visual signs, the combination of visual and verbal information may result in a meaning more precise than what the verbal signs express alone.

A clear example of such specification of meaning are the translations of the word "plant" in a scene where Peter Rabbit knocks over a couple of plants. In two of the illustration versions, the word is presented together with an image of distinctively small plants that grow in pots of clay (in the third illustration version, this scene has been omitted both verbally and visually). The word "plant" has been translated into Finnish as "seedling" (*taimi*) in one translation and as "seedling pot" (*taimiruukku*) in the other. Visually offered information may be suggested to have specified both translators' interpretation of the particular source text item: the combination of verbal information ("plant") and visual information ("small"/"growing in a pot") has clearly specified the meaning of the item.

As well as nouns, the data offered various examples of verbs that had been translated with expressions more precise than the original. A particularly illustrative example of such modifications are the translations of the verb "to eat" in a scene where Peter Rabbit eats vegetables. In the three illustration versions, the action of eating is presented in rather different ways. In Potter's original illustration, the rabbit is eating two radishes at a time, with its head tilted back and eyes half-closed with pleasure. Szekeres has depicted the scene very differently: the rabbit is holding a radish, from which only one small bite has been taken. It seems to be staring into the distance and its mouth is tightly closed. In McCue's illustration version, the action of eating is depicted as the most animated of all. The rabbit is leaning against a cabbage with its face beaming with delight. It is holding two radishes, one of which it is just about to take a large bite of. It is surrounded by half-eaten radishes and French beans.

The different atmospheres of the illustrations have also been conveyed to the translations: in the translation of Szekeres' illustration version, where the action of eating per se was left to little attention, the verb "to eat" is translated with the expression "to taste a little" (*maistella hieman*). In the translations of McCue's and Potter's illustration versions, which depicted the action of eating as fast as well as delightful, the verb has been translated as "to gobble" (*ahmia*) and as "to relish" (*herkutella*), respectively. One could claim that the combination of verbal information ("to eat") combined with visual information ("take pleasure in eating") results in a translation more precise in meaning ("to relish"). In these cases, the information coming from the visual and the verbal source text combine to define and delimit the meaning of a particular item. The visual and verbal information become semantically associated, and their concurrence delimits the meaning of the whole.

Conclusions: Fitting picturebook translation into Jakobson's typology

The words and images of a picturebook convey distinct but related aspects of meaning. When presented together, they–discreetly but effectively–repurpose each other. The choices made by a picturebook illustrator will therefore affect the way the reader interprets the verbal text and, consequently, how the translator of the book will transfer the story from one language to another.

The aim of the paper has been to propose that the translation of picturebooks does not entirely fit into the translation typology presented above, which defined interlingual translation as translating verbal signs by means of some other language and intersemiotic translation as translating from one sign system to another. The translation of the analyzed books had been interlingual in the sense that most verbal signs of the target text were based on a verbal sign in the source text at least to some extent. On the other hand, their translation had also been intersemiotic in the sense that the translated texts included information only present in the visual source text; a clear example of transfer of information from the visual sign system to the verbal. Some of this information had no equivalent

whatsoever in the verbal source text–the information had simply been added–and some of it had replaced verbal information in order to avoid contradiction.

However, the analysis of the data also strongly suggested that the transfer of information from the multimodal source text had often involved negotiating meaning from the combination of the different sign systems. The verbal signs had been adapted and adjusted by extracting details from the visual signs. Largely similar observations have also been made about the translation of illustrated technical texts (Ketola, 2015; 2016). This aspect in the translation process of an illustrated text represents a combination of interlingual and intersemiotic translation: translating a message created in the combination of a verbal signs and another sign system, namely images. This type of translation is not represented in Jakobson's classification as such. This is not to say that the typology is insufficient; rather, it suggests that the types of translation should not be considered as exclusive of each other.

Translation studies has traditionally considered its subject as a predominantly verbal activity, ignoring the other accompanying multimodal elements of texts (Kokkola & Ketola, 2015, pp. 219–221). The message of multimodal texts, such as illustrated texts, comics and audiovisual material, is created in the interplay of various modes. The translation (and subtitling) of these texts is therefore never a purely interlingual operation. Translation is a richer interpretative process than traditionally assumed: the process of interpreting verbal signs by means of other verbal signs–determinately labelled as "translation proper" by Jakobson–is often enriched by information derived from modes other than the verbal.

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About the Author:

Anne Ketola is a PhD candidate at the University of Tampere, Finland. She is also a co-author of the forthcoming monograph *Revoicing Picturebooks*, examining the role of visual information within picturebook translation.

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Long Kesh: Site - Sign - Body

Ola Ståhl

Linnaeus University
ola.stahl@lnu.se
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Abstract: This paper engages with the former prison at Long Kesh in Belfast, Northern Ireland, and, in particular, with the republican inmates' protests in the 1970s and early 80s. Addressing the penal institution itself, its architecture, interior designs and the rituals implemented there, the paper argues these were not only designed but involved on-going design processes to which inmates responded by the developing a complex design practice involving the site itself as well as their bodies and the way these are made to signify within the semiotic regime of the penal institution.

Keywords: design, politics, bodies, semiotics

The Camp

Dealing with the events at Long Kesh prison in Belfast leading up to the 1981 death of hunger striking Provisional IRA prisoner (henceforth, PIRA) Booby Sands, Steve McQueen's film *Hunger* (2008) engages a set of concepts and practices that pertain to today's thematic: violence, the body, semiology and design. Broadly speaking, these can be divided into two categories: those that involve topography and spatiality (architectural- and interior design) and those that involve the body (what I will refer to as sema-somatic design processes). It should be added, however, that these categories do not constitute closed entities but intersect at various points as bodies are situated in spatial topographies and spaces are inhabited and used as stages for acts and rituals of psychological and corporeal violence. This paper will trace this interstitial space between body, site, semiology and design through the events at Long Kesh depicted in Steve McQueen's film.

The infamous prison at Long Kesh, also known as The Maze, was a British penal institution in Belfast, Northern Ireland, housing a large, paramilitary population, both Loyalist and Republican. I should add that I use the word penal institution, or prison, with some caution in this paper. Certainly, Long Kesh was considered a penal institution by the British

government but given the state of exception that defined the situation in Northern Ireland at the time, Long Kesh, alongside other penal institutions in Northern Ireland, would perhaps be better described, following Giorgio Agamben, as operating according to the logic of the camp. In the *State of Exception* (2005), although his main concern is admittedly a more contemporary political situation, Agamben describes a situation not unlike the one in Northern Ireland during what has been euphemistically termed "The Troubles." Writes Agamben:

> "Faced with the unstoppable progression of what has been called a "global civil war" the state of exception tends increasingly to appear as the dominant paradigm of government in contemporary politics. The transformation of a provisional and exceptional measure into a technique of government threatens to alter – in fact, has already palpably altered – the structure and meaning of the traditional distinction between constitutional forms. Indeed, from this perspective, the state of exception appears as a threshold of indeterminacy beween democracy and absolutism." (Agamben, 2005, pp. 2-3)

In other words, sovereignty, as Judith Butler eloquently puts it in *Precarious Life* (2004), can "under emergency conditions in which the rule of law is suspended […] reemerge in the context of governmentality with the vengeance of an anachronism that refuses to die" (Butler, 2004, p. 54).

Now, the state of exception was, indeed, a defining feature of British rule in Northern Ireland during this period, and much in the same way as the current so-called "global war on terror" has rendered the state of exception permanent opening up to the establishment of detention centres – yet another euphemism – such as Guantanamo Bay, The Troubles, considered a state of exception, made possible the construction of penal institutions across Northern Ireland. In such situation, prisons become "camps," following Agamben's definition of the camp as a direct reflection of the state of exception:

> "*The camp is the space that is opened when the state of exception begins to become the rule.* In the camp, the state of exception, which was essentially a temporary suspension of the rule of law on the basis of a factual state of danger, is now given a permanent spatial arrangement, which as such nevertheless remains outside the normal order." (Agamben, 1998, pp. 168-169)

Interestingly, in a situation such as that in Northern Ireland during The Troubles, resistance tends to take forms that Howard Caygill in his reading of Carl von Clausewitz refers to as "vaporous" (Caygill, 2013, p. 61). As opposed to conventional military forces, which seek to form a solid body and eliminate chance and irregularity, the paramilitary avoids, by all means, forming such a solid body as it can easily be recognised and struck down. Instead, the paramilitary should be as vaporous as possible and, furthermore, use chance and irregularity to its advantage (Caygill, 2013, pp. 61-62).

In many ways this holds true of paramilitary activity in civilian Northern Ireland, but within the topography of the penal institution – what Agamben refers to as "the camp" – resistance takes a different form. The collective body of militant inmates is far from vaporous. It already constitutes a solid measurable body. It is recognised and marked as such within the

regime of the penal institution that divides it into the regular, disciplined and individualised units so aptly described by Michel Foucault as the result of a practice of "partitioning":

> "Each individual has his own place; and each place its individual. Avoid distributions in groups; break up collective dispositions; analyse confused, massive or transient pluralities. Disciplinary space tends to be divided into as many sections as there are bodies or elements to be distributed. One must eliminate the effects of imprecise distributions, the uncontrolled disappearance of individuals, their diffuse circulation, their unusable and dangerous coagulation." (Foucault, 1991, p. 143)

Certainly, Long Kesh is a prime example of such partitioned space that somewhat paradoxically renders the bodies of inmates a collective mass in uniform clothing and with shared patterns of behaviour and simultaneously breaks the collective body of militants into distributed individual units prevented, at all times, from "dangerous coagulation," that is, from forming a collective. The political collectivity of militant inmates, in other words, is broken down by individualising each prisoner, whereas another collectivity is being constructed – one consistent of identical units in a uniform mass.

In *Formations of Violence*, Allen Feldman explores this in detail in his analysis of the cells and interrogation rooms at Long Kesh and Castelreagh, referring to these spaces as a "sensorium of death" (Feldman, 1991, p. 128). In these spaces, all heterogeneity is eliminated. There are no differences. Blank white walls. Anonymous chairs and tables. Fluorsescent lights turned on permanently. Even time is suspended – clocks stopped, slowed down or manipulated in other ways. The only interruption is interrogations and beatings at irregular intervals. In one of the interviews Feldman conducted with PIRA militants, this is described as follows:

> The ceiling itself is pure white. The paneling around the door is light gray and the door is white. High in the top corner of the wall there's a circular light. It sits out there about three inches from the wall. The light has a circular red plastic rim around it. It is controlled from outside the cell. It can be dimmed or brightened at their will; invariably when you are showing signs of activity they'll dim it. When you're beginning to relax or to sleep the light is brightened. (Feldman, 1991, p. 125)

Another PIRA inmate paints a similar picture of the cells:

> You're in a cell with the light on all the time, painted white ceiling to floor. You're naked, and you think hours have passed and it's only an hour. They strip you of everything. (Feldman, 1991, p. 133)

These are very deliberate forms of interior design meant to simulate death by removing prisoners from any sense of time and space. The interrogation rooms are specifically designed to resemble the cells. In the words of a former PIRA militant:

> The interrogation rooms are roughly the same dimensions as your cell. There's no protuberances or breaks in the interrogation rooms, except there is a desk. Like your cell, everything is painted white. (Feldman, 1991, p. 125)

This is not, of course, unique to Northern Ireland and Long Kesh. We find similar strategies implemented and refined in prison structures ranging from Stuttgart-Stammheim to Abu Ghraib and Gunatanamo Bay. What is interesting about Long Kesh, however, is that here

resistance is re-articulated as a struggle to recreate the collective political body inside the regime of the penal institution by whatever means seem viable. In this paper, I will put forth the argument that the form this struggle takes involves the manipulation of sites, signs and bodies in a set of sophisticated sema-somatic (*sema*, as in sign, *soma*, as in body) and topographic design processes.

Blankets, Naked Bodies

Using Long Kesh as a setting, Steve McQueen's film explores precisely this: the different means of struggle and resistance involved in the escalating conflict between paramilitary inmates and the authorities inside the prison structure itself considered a reflection of the wider conflict between Republicans, Loyalists and the British armed forces in Northern Ireland. It takes as its starting point, the British government's decisions to revoke what was known as the paramilitary prisoners' "Special Category Status," a judicial term which meant the inmates at Long Kesh were considered political, not criminal, prisoners, thus protected by the Geneva convention.

The reason the British government revoked Special Category Status in Northern Ireland was, of course, in large part to criminalise and de-politicise the inmates and thereby also the conflict itself, and one of the most important consequences of the annulment was that prisoners would now be forced to wear prison uniforms – a marker, in many ways, of the subjugation of the criminalised body and the criminalised subject. The republican prisoners resolutely refused to oblige, and in protest against the shift in status, they opted instead to remain naked or to wrap themselves in blankets. An act, thenceforth known as "going on the Blanket," which also gave rise to the concept and the image of the Blanketman frequently seen on political posters and flyers at the time.

What appears increasingly evident, is that design here is explicitly linked to politics. Not only is the prison itself as an architectural structure a design that functions explicitly to partition, prevent collectivity, and control and discipline the body of the prisoner, the prison uniform is furthermore a garment designed to signify the subservience of a uniform, criminalised mass of bodies rendered docile. This certainly links design to authoritarian politics, but it does not exhaust the link between the events depicted and design. More profoundly, the use of the blanket as an item of clothing becomes a design practice by which to *counter* the power invested in the prison uniform. In much the same way, the very *nakedness* of the nude body of the prisoner, stripped from his clothing, becomes a design choice – a counter-design – by which to subvert the power the prison authorities, considered an extension of the colonial authority (i.e. the British government) in Northern Ireland, exerted over the body of the individual prisoner as well as the collective body of the prisoner community as a whole. 'We had the blanket and we were naked,' a PIRA prisoner reports in an interview, "[t]hat became our badge" (Feldman, 1991, p. 160). Another PIRA inmate uses similar terminology:

> "Right away we knew that we as political prisoners were not going to wear prison uniforms which were symbolic of a criminal. The suit itself didn't mean an awful lot. It

> was just material. The suit of clothes doesn't make the prisoner, but it was symbolic." (Feldman, 1991, p. 153)

As the tension between the authorities and the prisoners escalate, these complex links between power, politics and design not only become clearer, they also become more explicitly linked to the semiological practice of the encoding of the body.

Confronting the prisoners' protest, a system was implemented by the authorities designed specifically to regain control over the prisoners' bodies. The prison uniform is not simply a garment that carries certain significations in itself. It is in effect a way to sema-somatically encode the body of the prisoner, and to control its meaning within the penal system. Refusing to wear the uniform is a counter-measure intended to take back the control of the body and its encoding. Considered a design choice, using the naked body or the body wrapped in a blanket, deprived the authorities of that level of control, transferring it instead to the prisoners themselves as a political collective.

The system implemented by the authorities in response sought to regain control over the prisoners' bodies by employing a tactics of violence that would not only injure the body of the prisoner, marking it with cuts and bruises, but furthermore render it entirely visible. Prisoners were taken to the showers or to an open space at the intersection of the prison wings, spaces that topographically came to function as stages, where inmates were restrained and subjected to ritualistically performed beatings and, significantly, repeated cavity searches using medical equipment and mirrors.

A former PIRA prisoner describes this ritualistic re-coding of the body as follows:

> "That morning at seven o'clock you could hear all the screws of the block filing into the yards and from there into the circle. You could hear the gates being locked. They all gathered in the circle and they began beating the batons against the bars […]. They started beating the batons slowly against the bars in a steady rhythm, then it gets louder and louder and faster and faster until it builds up to a crescendo. (…) You hear the sound of bolt locks shooting, opening the cell door, getting nearer. (…) On this day they set the examination table at the top of the wing in the middle of the landing. You were grabbed by the arms, and the two screws would run you toward it. Your towel is ripped off so you're naked. You're runned until you're slammed by the waist into this rectangular table, which forces you to bend over. There's the table and the sponge with the mirror for the anal search. You're ordered to spread-eagle over the mirror. You refuse to comply so they kick you down over it. Your anus is searched. A torch shined up your anus, your mouth, your nose and in your ears." (Feldman, 1991, pp. 186-187)

Allen Feldman argues that this, "colonization of the prisoner's body was intended […] to divorce the prisoner from what little sense of somatic mastery he had managed to retain in prison" (Feldman, 1991, p. 174).

A colonization of the body, indeed, rendering its most intimate interiors visible. Feldman speaks of this in terms of a ritual that uses the technical paraphernalia of the medical exam but that actually constitutes a reversal of the meaning of the nakedness of the prisoners' bodies. "The prisoners' refusal to wear the uniform," Feldman continues, was the "first

interruption of optical circuits. The guards responded by transforming nakedness into an obvious surrogate tool of visual degradation in place of institutional clothing" (Feldman, 1991, p. 175).

The relationship between penal institutions and visibility outlined by Feldman is, of course, something that has been dealt with extensively, notably by Michel Foucault in *Discipline and Punish* (1991), and the violent opening up of the body clearly constituted a way for the authorities at Long Kesh to regain control over the body by the means of visibility and opticality. This doesn't, however, fully engage with the semiotic register of these rituals. It is not simply a question of colonisation and opticalisation but also of colonisation and encoding or, in this case, re-coding. The nakedness of the "open" body is no longer the nudity or part-nudity strategically chosen by the prisoner himself in an act of defiance but a forced nudity, and a more profound one, turning the body inside out, rendering its most private spaces entirely public and visible to the authorities' gaze. This is an act of sema-somatic design that at once controls a body, renders it visible *and* renders it the sign of the absolute authority of the prison regime. Power and authority over the collective prisoner body has been restored. Its nakedness no longer signifies defiance but subservience. This is a design process that involves the manipulation of the body and the way it is encoded, the way its materiality is not only made optically exposed but is made to signify – and the way in which its encoding can be subject to translation processes, if we allow ourselves to think the concept "translation" beyond the act of faithful interpretation as a practice of manipulation. It is the translation of the body, *the carrying across*, as it were, carrying the body across or between different signifying sites within the semiotic regime of the penal institution that is at stake here. Nakedness as a sign of defiance is thus translated, by the semiotic re-siting of the body, as a sign of subservience.

There is a strange affinity, worth exploring briefly, between the etymology of the word translation and the events at Long Kesh in that the notion of "translation" is somewhat peculiarly related to the "carrying across" or transportation of the remains of saints. The corporeal remnants are moved from one site to another, they are re-sited, much in the same way as the bodies of paramilitaries at Long Kesh are being re-sited in the signifying regime of the penal institution. In the act of re-siting, however, something else occurs, a differentiation, a splitting or displacement of meaning that could perhaps be referred to as a reciting – not with an "s" but with a "c" – given the etymology of the word "cite," having to do with a summoning forth. Translation, then, as an act of simultaneous re-siting and reciting. There are no etymological links, I believe, between site with an "s" and cite with a "c" – but if we allow ourselves to think of translation as a "carrying across," a carrying between sites, that is, a re-siting, does it not also and immediately involve precisely a citation, as the summoning forth of something other?

The paramilitary bodies are then both re-sited, semiologically, and recited in that their positioning within the semiotic regime of the penal institution summons forth a differentiation of the meaning of the collective body of prisoners. This becomes even clearer as the escalation in violence continues at Long Kesh with sema-somatic design processes

that involve the function and meaning not just of the body itself, but its waste, odour, its affects, within the topographical structure of the prison complex.

Dirt, Odour, Faeces

Now, these design strategies could be referred to as somatic, or sema-somatic, in the sense that they involve the semiotic en- or re-coding and re-siting of the body for purposes that are political and have to do with relations of power within the penal system and, in a more general sense, in 'postcolonial' Britain. As the conflict grew in intensity, however, these strategies gradually started to involve the topographical, spatial structure of the prison itself.

Initially, this took the form of what is known as the "no-wash campaign." In response to the violence, the repeated cavity searches and various other manipulative strategies implemented by the prison authorities, prisoners began to refuse to wash. On one level, this can be seen as another attempt at regaining the control of the body and what it signifies, the washing and the refusal to wash being yet another recoding within the scheme of manipulations at work within the prison complex. As we have seen, these are questions that reside at the very heart of the politics of the prison. On another level, however, it involves the spatiality and the ambiance of the architectural space that is the prison. Although not a physical alteration of the prison design, the sight and stench of the unwashed collective prisoner body becomes part of the designed environment, giving the prisoner a measure of control not only over his body but also over its impact, its effect – and its affect – within the prison as a topographical configuration. In one simple gesture, the prisoners challenged the prison regime's control over their bodies *and* over the prison's interior spaces.

It is clear, then, that both sides of this conflict gradually developed more advanced design strategies, on the one hand, to restrict, restrain, control and encode the collective prisoner body, and, on the other hand, to resist, subvert, and re-code that same body within the physical and semiological structure of the prison.

Now, the spatial and architectural dimension of this escalation in violence reached its peak in the events that followed the "no-wash campaign" and soon came to be known as the "dirty protest."

Throughout the conflict, the violence of the prison authorities continued and, in fact, increased in that more strategic forms of violence were being implemented. Requests to visit the lavatories were being ignored, or, when allowed, followed by beatings. All furniture in the cells, except for mattresses and blankets, were removed. Clearly, these measures were a continuation of the prison authorities' attempts to control the inmates' subversive bodies and the spaces they inhabit. To refuse a prisoner the use of the lavatory is, effectively, to control what enters and exits the body, and to force a prisoner to degrade himself by urinating and defecating on himself or in the space he inhabits. To remove all furniture apart from a rudimentary mattress is to use interior design – the stripped down, bare cell – to deprive prisoners of any sense of personal value. These are essentially two design processes: the sema-somatic control and encoding of the body of the prisoner and

the spatial and architectural establishment of a topography conducive to control and encoding – a stage for ritual proceedings and choreographies involving clothing, cavity searches, urine and excrement, and beatings.

However, when the authorities sought to exert their power over the prisoners by controlling what exits and enters the prisoners' bodies and cells, the inmates responded by taking back control over their bodily functions and what they signify. Inmates started collecting their faeces and urine to mix together into a paste to smear on the walls of the cells. Not only did this act allow for the prisoners themselves to control their bodily functions – not to ask to visit the lavatory, not to risk the beating – it also involved inverting the meaning of the urine and faeces from being a sign of subhuman degradation – the prisoner who had soiled himself in his cell – to being a sign of resistance and struggle.

As prisoners smeared their faeces on the walls of their bare cells, decorative patterns and Gaelic writing were used in what must be considered a political form of interior design altering the meaning of the materials (faeces and urine) and the spatial design of the cell itself. A former Irish National Liberation Army inmate at Long Kesh explicitly refers to this act as design:

> "The food was very bad, and some of that was going on the wall to dry with the excrement because it was inedible. Guys would be making designs on the wall with porridge and the excrement." (Feldman, 1991, p. 170)

Turning to Gilles Deleuze and Félix Guattari and in particular to the plateau in *A Thousand Plateaus: Capitalism and Schizophrenia* (1988), that deals with signifying regimes, might help us understand this process of the encoding – recoding of the body better. The colonial system would then be considered a signifying regime with a despotic centre – the heart of Empire – that renders the colony signifiable as, simultaneously, inferior copy and abject receptacle of all that is excluded and ascribed a negative value, what Deleuze and Guattari refers to alternately as "the excluded," "the exile," and the "scapegoat" (Deleuze & Guattari, 1988, pp. 115-116). However, the exiled or excluded scapegoat is not necessarily an obedient one. Rather, it is one that opens up lines of subjectificiation, potentially anti-colonial ones, turning the negative sign into one affirmative of militant, political subjectivity. This is the moment of translation, the re-siting and reciting of the body, the turning of the sign that is also the summoning of a new political collectivity. In a very profound way, this is the meaning of "the badges" and "symbols" spoken of by Republican militants: the blanket, the naked body, the dirt, the odour, the urine, the excrement, the porridge. They are all involved in a sophisticated, sema-somatic design process intended to summon forth a new political collective within the prison regime.

Effectively, these design strategies allowed prisoners to regain control of their bodies, their bodily functions, to invert the meaning of excretion, and to subvert the spatial design of the prison. In fact, the design process at stake here effectively rendered diffuse what in prison architecture is perhaps most fundamental: the border between the inside and the outside of

the cell. The counter-design of the collective prisoner body renders this border partially permeable by the means of odour. As a former prison wellfare officer reports:

> "During the Dirty Protest you never really got accustomed to the stench and the atmosphere of the place. For a prison officer who was in for a twelve-hour shift and who then went home, he would usually have to spend about four hours trying to get the smell off his uniform and his body and then go back into that situation twelve hours later. […] The prison officers did feel defiled because it extended into their private lives, their bodies their sense of cleanliness, their marital relations, and their relations to their children." (Feldman, 1991, p. 193)

Corpses

However, it was not only excretion, what *exits* the body, that was used to subvert the power of the authorities at Long Kesh. Significantly, the conflict culminated in a similar approach to what *enters* the body. Providing food, or nutrients and liquids of some kind, is not only a requirement to keep prisoners alive, it is a way for prison authorities to control the prisoner community. Providing spoilt or low-quality food, or no food at all for a period of time, is a mode of control. Providing food in certain temporal patterns – at certain regular or irregular times of the day and night – is another means of control. As the conflict between the PIRA prisoners and the authorities escalated, the decision was eventually taken that prisoners, one at a time, should go on hunger strike.

Now, a hunger strike can be seen as an ultimate form of sema-somatic design. In much the same way as the strategies dealt with above – the "no-wash campaign" and the "dirty protest" – it is the control of the body and its meaning – its encoding – that is at stake. The prison authorities' attempts at controlling and encoding the bodies of the prisoners – from the uniforms, to the cavity searches and beatings, to the restricted lavatory visits – consistently met with resistance from the prisoner community: the naked body, the body wrapped in a blanket, the unwashed body, the cells smeared in excretion – these are all design measures to counter the design of the prison structure itself in all its manifestations. The hunger strike is but the most extreme form of this struggle. Prisoners on hunger strike take control back over their body, what exits it, what enters it, its spatial dimension (the physical disappearance of the body) as well as its temporal dimension (its death). Taking control over the life and death of the body, the hunger striking prisoner renders a prison regime whose authority is based on the totality of its psychological and corporeal control over the community of inmates, entirely powerless. The harder the prison regime tries to exert its authority, the more powerless it finds itself facing the counter-designs of the inmates, the ultimate form of which is the sema-somatic design of the hunger striking prisoner.

The ramifications of this conflict, staged as it were within the confines of the prison structure itself, had a lasting impact across and beyond British society. It is telling, indeed, that at the time of his death, the first PIRA hunger striker, Bobby Sands, had been elected a member of the British parliament. The link between design, the body's encoding, and politics at Long

Kesh spilled over into the murals, protest marches and funerals of Belfast and Derry, as well as the grand halls of Westminster. Strategies and practices to do with the manipulation of the body and the spatial topography of the prison had become means by which to manipulate the larger territory of Northern Ireland and, indeed, the political system of the United Kingdom.

What I believe the case of Long Kesh illustrates, is the ways in which design practices are involved and instrumentalised in socio-political process of discipline and control. We need to recognise the structures and practices of manipulation we see implemented at Long Kesh as having to do precisely with design. Far from the solution-centred discourse of much design research, we need to develop approaches and perspectives that deal with design as manipulation, repression, subjugation, and exploitation - from an historical as well as a contemporary perspective. Ranging from the various designed environments constructed to make us consume (the very deliberate and sophisticated designs of shops and shopping malls, for instance, or the layout of airports forcing travelers through a physical barrier of shops once they exit security), to so-called "hostile" designs and architectures such as the infamous Camden bench, to practices of "negging," a dating strategy in which a man systematically uses negative judgments in order to undermine the confidence of "target" women (Noys, 2015), what we find are carefully considered and sophisticated designs that effectively function as forms of manipulation of bodies, environments, behaviours, encounters, and so on and so forth. Understanding this is crucial not just because it allows us to explore the links between design and politics but also because it opens up to an engagement with that other register of design practice and thinking we see at Long Kesh; that is, design as resistance, struggle and dissent. In an increasingly unsustainble society, design cannot continue simply to insist on making pretty artefacts or finding practical solutions that fits the economical and sociopolitical system that causes the problems. Design needs to take a different route. This is, of course, complex and it involves several different trajectories of thought and practice. What we see in the case of Long Kesh, however, is that design *can* function as a form of resistance, a form of struggle. It can facilitate and work as a forum for radical dissent. And it can be locally effective. Following the death of Bobby Sands, a further ten PIRA prisoners died in the hunger strike at Long Kesh. Although Thatcher's conservative government never formally reinstated "Special Category Status," it was merely a nominal refusal intended to show that the government did not give in to "terrorists." By 1983, each demand the prisoners made had been met by the British authorities.

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About the Author:

Ola Ståhl is an artist and writer with a particular interest in sociopolitically engaged practices and creative-critical writing. He often works collaboratively in transdisciplinary constellations. Holding a PhD from The Univeristy of Leeds, he is a senior lecturer in design at Linnaeus University, Sweden.

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SECTION 7

DESIGN FOR DESIGN – THE INFLUENCE AND LEGACY OF JOHN HESKETT

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Introduction: Design for Design The Influence and Legacy of John Heskett

Tore Kristensen and Sylvia Liu
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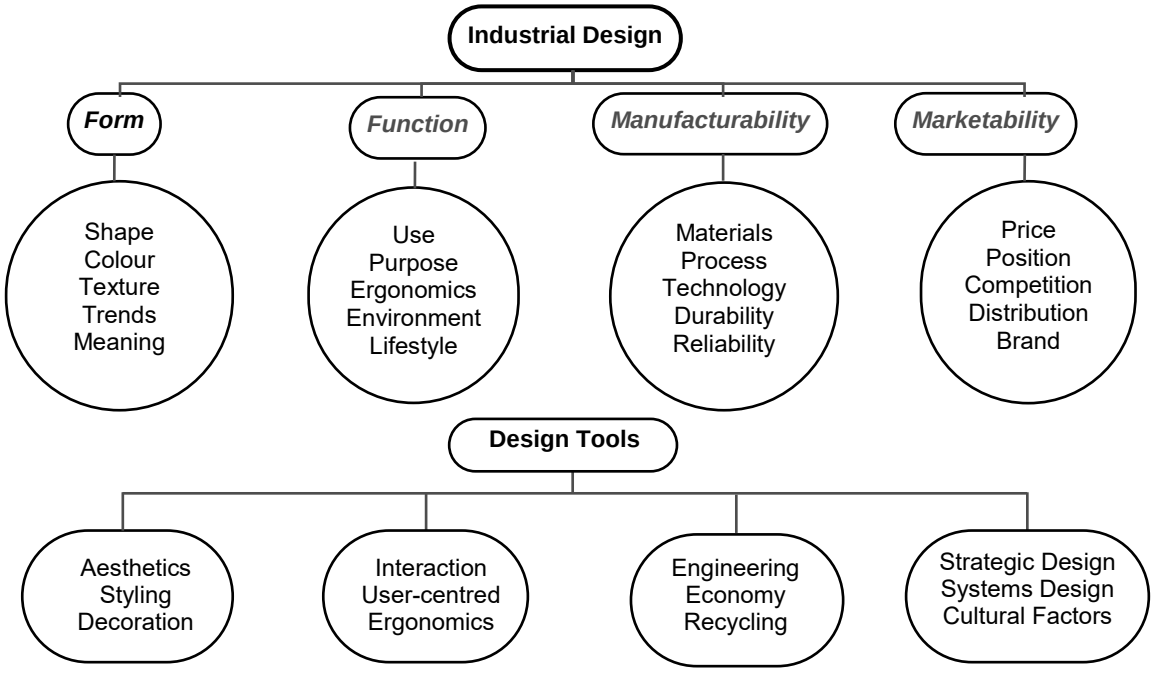
Economic background for design studies

Since the early 1990s John Heskett was very clear about which traditions in economics were useful and which were not. As the extracts or versions from the seminar manuscript "Design and the Creation of Value" published in this volume begin to show he never saw neoclassical theory as very useful. The theory mainly applied an aggregate market view based on the assumptions of rational choice. Neoclassical economist may speak of “the consumer”, but they mean an average of prototypical personae rather than the individual in flesh and blood. To deal with design as Heskett does means to focus on design *'as the human capacity to shape and make our environment in ways without precedent in nature, to serve our needs and give meaning to our lives* (Heskett 2005, p. 5) Although an assumption is that our environments may be rational, neoclassical theory seems unable to grasp the concepts of design. Neoclassical theory assumes rational action because the number of consumers and firms are high and the typical consumer is assumed to behave rationally. Problem solving and meaning must be highly individual although there may be a common need for nutrition, heat, sustainable surroundings etc., but the way they are materialized is highly individual. People use individual expressions to create and express their identity. Neoclassical economics seem unable to support this. An attempt would probably rely on comparative statics of *Cobb Douglas* growth theory modeling design as an investment that is assumed to reduce the costs or increase consumer utilities (e.g. Kaldor 1961). To identify design in such a framework is impossible and so far no serious attempts have been made. Heskett would have found such attempts highly improbable.

Design as a Complex Business Activity



As the figure shows, design in business is a very complex issue because, while design in a creative context is restricted to shape, color, context, texture, trends and meaning and with aesthetics, styling etc as the main tools, design in business means much more. Issues of Form and Function have been well documented before Heskett add *Manufacturability* and *Marketability* into the picture. The understanding of manufacturing and marketing is far beyond what even today (2014) is taught in many design schools. While the tools of aesthetics etc were established, user-centered interaction, drawing on cognitive psychology and ergonomics, engineering economy, cultural factors and economics and business factors are still considerable challenges to designers and their education, Vice versa, many of the design tools and dealing with form and function as well as the finer details of manufacturing, marketing and branding is alien to business schools.

Maybe it was the tradition of the London School of Economics, which hosted the Austrian economist Friedrich August von Hayek over several periods that gave John an impetus to look elsewhere. He found in the Austrian school the beginnings of an economics that might be more capable of encompassing design as an economic factor. In contrast to the neoclassical approach, which assumed comparative analyses between various equilibrium states of the economy, the Austrian school was process oriented. The economic system and its role in dealing with resource allocation were seen as a fundamental knowledge base distributed in small bits among a large population. Integrated in this view was a fundamental aspect called *method individualism.* It meant that in principle all kinds of behaviour should in principle be explainable as the action of a single person with her/his values, options and opportunities (Elster 2007). Having such an explanation one could aggregate into social

networks, as we would call it today, or simply markets and social structures. The knowledge needed includes consumer valuations, embedded as problem solving and meanings in products, environments, artefacts and systems (Hayek 1945).

As seen in von Hayek's articles on the emergence of markets from 1937 and 1945, this meant that the focus could be on the individual user or customer and that markets were the aggregate emergence of the efforts of many actors acting in a kind of uncoordinated, but still concerted action-each pursuing their own targets. This would give a rationale for the importance of design as a necessity for each person to be involved with. Meaning implies that design also connects people.

Economics of design

A concern is that design is not well accounted in neoclassical economics. He met this point of view by U.S. Department of Commerce officials and Council of Competitiveness and listened to important people who did not recognize the value of design in economic terms. The reason is the static – comparative nature of the neoclassical models and their failing ability to deal with problem solving and in particular the non-existent, imaginable.

The value statement that flowed from this approach was expressed in profound clarity by the Austrian management guru and immigrant Peter Drucker:

> "Quality in a product or service is not what the supplier puts in. It is what the customer gets out and is willing to pay for. A product is not quality because it is hard to make and costs a lot of money, as manufacturers typically believe. This is incompetence. Customers pay only for what is of use to them and gives them value. Nothing else constitutes quality". (Drucker 198)

This was a quotation that Heskett repeatedly presented in his speeches: it grasps the point, essential to any economics of design, that quality and value were very closely associated.

Heskett's first reference to the term economic value comes from Adam Smith (1776) who distinguishes between value(s) in use vs. value as exchange. In practice, economists tend to disregard this since does not make much sense in economic reasoning. Also the Marxian concept of work as a foundation of values is disregarded, but covered by the Drucker quote above. In the 2008 article however his aim is to assess the contributions of economic theories to explore the value of design. The exchange value is usually identical to the market price, the amount a customer (not user) is willing to sacrifice.

In this article Heskett quotes the Austrian economist Carl Menger (1871) for stating that value is not a quality of the object per se, but an element of consciousness of men. This qualification, which is later affirmed by another Austrian economist, Von Wieser, Von Mises and even adopted by a more neoclassical economist Kelvin Lancaster (1966) in his theory of consumer choice. This means that value itself is of a subjective nature and no unique scale can determine its quantity according to a fixed scale. The Drucker quote indicates that it is the customer or user who decides what is quality.

Heskett starts by attributing the theories of growth to Joseph Schumpeter (1950). This makes sense as Schumpeter is the founder of much modern theory of growth in an evolutionary perspective. His direct followers were among others Romer and Nelson. Heskett (1993) quoted Schumpeter when explaining how the term “creative destruction” could denote radical change in habits, patterns of consumptions, satisfying needs etc.

Strategic design

A basic concept for strategic thinking in design was Hesketts categorization of strategic decisions as regular (or incremental) vs. innovative and product focussed vs. corporate focus. While the model was not published, he often presented it and it is available in several presentations.

The innovation vs. regular business distinction is concerned with resources in general. No company can be fully occupied by innovation all the time. Companies need to explore their opportunities and threats in order to commit resources to adapt to the coming challenges. In a stable environment this may happen less frequent and there is more available time and resources to build exploitation and accumulation. Design competencies may play a very important role in both exploitation and explorations. Innovation is investment, which means holding back financial resources in the hope they may yield better payback. To make the best investment strategic explorations are essential, and investment may indeed include new designs. The regular business is harvesting earlier investments.

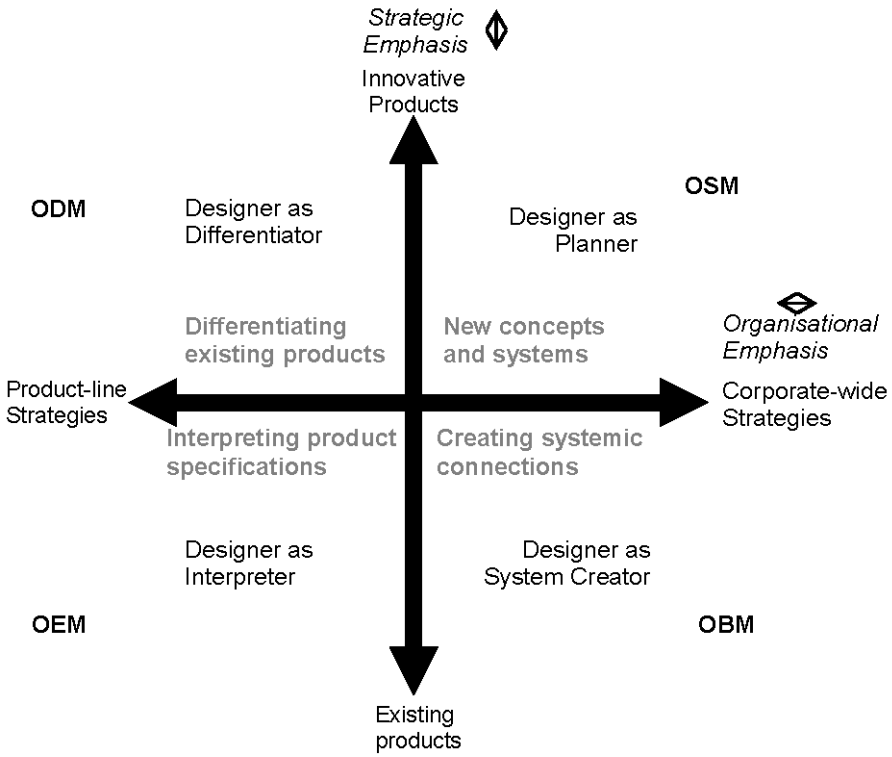
In exploitation design perform its traditional assignments of sketching, modelling and building products, artefacts, services, and experiences. I exploration periods, design skills may provide the ability of “seeing” threats and opportunities, weak and strong signal, using sketching techniques for scenario building and exploring various sets of consequences. Design skills and methods may support the managerial approaches by delivering clear and nuances, taking care of some uncertainties and ambiguities that traditional managerial methods become short.

The horizontal distinction concerns perhaps an important historical reading; the 2000 borderline. This means a sort of change between the age of mass production and the age of digitalized production.

Jay Doblin and the Doblin group who was associated with IIT Institute of Design extended their focus to become corporate. In the 1990s considerable analyses, examples and success stories were built around this new focus. The brief logic is that in order to organize and manage the complexity of increasingly *organic* (as contrasted to the traditional hierarchic and mechanical firms), communication, motivation, problem finding and solving has to build on *concerted action* involving the whole organization. Evidently a concerted action was mostly needed when innovation was required. Companies in a pure regular or incremental act would still be able to keep its stable systems.

The syntheses of this Heskett built into a two by two matrix. The full model is shown here.

Different levels of design practice



The four fields have been labelled OEM (originally thought of as O*riginal Equipment Manufacturer*), because the prototype was a company taking orders for sub-supply of parts for larger companies who would assemble the complete product based on modular designs. The design challenge for these firms was to interpret product specifications and adapt them for the production system in order to secure effective production or at least to reduce the cost to make a profit. Many such companies like the one's Heskett often referred to like in the reference to the large number of companies in the Pearl River Delta who work as sub-suppliers, producing for other companies. Their hope for the future was the get their own product, to move from the left lower corner to the upper corner, ODM (labelled *Original Design manufacturer*), developing whole new concepts and systems including customer education, services, integrating the whole company. This means developing their own products, to employ design for products. It also means developing marketing research, distribution networks and marketing management. This would require investments and explorations and most likely the acquisitions of new skills and managerial competences. Perhaps the pursuit for these companies would stop here, or it could, if successful lead to aspirations for a corporate focus where cross-disciplinary teams and branding would issues would work for the new concerted action.

Innovations were seen in the context of OSM (or *Original Systems manufacturing*). It was here the inspiration of the IDEO and Doblin Group was strong and often realized in prosperous companies such as Google, Apple, and other. The big trick of this trade was to exploit the innovation into branding (OBM or *Own Brand Manufacturing*) where markets were *domesticated* to create loyal long term customers with little wish to try the

competitors offers. The solution was rarely to change the whole company from an innovative- into a stable brand mode, but to keep a steady pace in innovative departments, while branding would work elsewhere to deal with customers.

What remains today of John Heskett research for Economics of design?

How important, and how well do John Heskett explain the value of design in business. We know that John often spoke to business people and that his messages got well through. We still see that many business people are not on par with the understanding of design. The founder of SONY, Akira Morita, himself educated an engineer, claimed that he thought a designer could easily become a marketing practitioner, but never the other way around. There could be several good reasons. The selection and education of the two is very different. A design is supposed to command a visual understanding and expression. Marketing students may be educated in research, but rather based on reason based approaches like hedonic scales, where the prospective customer is asked to suggest a numeric valuation. The calculation of numeric values may not itself be a challenge, and Heskett was very much aware of the possibility of using statistics in so-called qualitative studies (personal communication). However, much use of statistics drops the essential focus on the individual and many marketing people are asking “how many” (people will demand own new product), rather than “how much” it means for the individual and taking the extra round to understand whether those with a strong favour is a minority or majority.

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Doing qualitative studies, using statistical reasoning

Gorm Gabrielse and Tore Kristensen*

Copenhagen Business School
*tk.marktg@cbs.dk
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Abstract: The paper describes some experimental studies where qualitative assessments have been conducted. However, they have not been done using conventional qualitative methods. The sample is bigger, typically 135 and the methods for data collection was based on a bipolar non-numeric scale, developed by L.L. Thurstone in the late 1920s. In this case, the responses have been registered on an iPad where respondents are instructed to move a cursor between two extreme values. The advantage of this is that the data are kept at an individual level, the responses are set by a moving hand, which enables an embodied response rather than intellectualization. The actual studies demonstrate how design studies also may give insights into how well markets work, depending on the variation in the market. In a market with big variation, a message is less likely to penetrate the market than in a homogenous market.

Keywords: qualitative method, experiment, market penetration

Introduction

Among the last discussion we had with John Heskett was the methodology of design research. Heskett contributed with many insights in design using both theoretical and empirical methods. John was indeed a competent theoretician, and still he was more an Aristotelian than a Platonist. This means he preferred theories developed via empirical research and often close to practical ways of doing design.

Designing is very often itself a form of experimentation by which we means concepts are developed and via trial and error one find how well a particular design does in a practical setting. Obviously many research methods are also used. In some cases design are investigated by marketing research with those standards and sometimes with the growing standards of design research. These methods may in general be labelled qualitative and among the preferred are focus groups, ethnographic observations, various interview techniques etc.

In this paper we suggest a methodology developed in sensorics, often associated with food research and aiming at experiments to judge whether a particular taste, color, feeling of substance is working well. John saw clearly the advantage of using such methods for design research. However, many experimental methods are characterized by the used of statistics and very often the focus on aggregate data such as comparing a core group with an alternative group to see if the averages in the two groups differed significantly from each other. The challenge with this is that while averages may be meaningful if you consider how rich people are and how much they are willing to spend for a particular issue, the likings or preferences cannot be seen as averages. It makes no meaning to say the average preference for a chair is such and such. We accept that often the expression is that such and such a fraction of a population prefer one design to another. But also in these case, we have a suspicion that the full story is not told. People have individual preferences. This is an obvious reason for using qualitative methods like interviews.

However, could there be a way to solve this, to use statistical methods as they are often seen as more reliable or even valid than qualitative interviews by people outside the sphere of design?

We believe that is so and we will, in John Hesketts spirit explore how we may use such statistical methods for qualitative studies, emphasizing that people do not have average preferences for design; they are individuals.

Next section contains some conceptual explanations of how we regard designs from a cognitive viewpoint and stage designs for further explorations.

Our approach

Most studies in marketing operate at a market level, which also becomes frequently the condition for design work. This means that the aggregate or weighted average consumer is the focus. Having already made this aggregation as the “top-down approach” indicates, it is not feasible to take the individuals apart and explore how they differ. This is so because already the concepts and the methodology is founded at the aggregate level. The differences have been eliminated and replaced by an assumed normal distribution. We depart from that and start our investigations at an individual level. This means, in the “bottom up” approach we keep the individual variation or differences intact for further analysis. We base our concept and methodology at the individual level. Only then, understanding what happens for the single individual we can eventually aggregate to see the consequences at a market level. We explore a procedure that enables the marketer to estimate the effect of a marketing message like a mission statement in a logo at the level of a single individual. This is a prior to market test, with its own realism. The procedure can easily be extended to products, where both quality and price (willingness to pay) are issues and it can also be used as a follow-up after the round of pre-test.

We want to explore the implications of consumers being different; and we want to quantify differentness or simply individuality. We want to investigate about more or less differences between people in a market.

Statistical reasoning

A common statistical reasoning in a market context is concerned with a top-down approach, where the analysis ex ante has stated a condition that certain criteria are likely to characterize the sample or population. The reasoning is then concerned with the number of people e.g. belonging to certain categories or segments. If the challenge concerns aggregate data or analysis at such a level, this may be satisfactory. On the other hand, a designer often aims at considering individual needs. If this is the case, the average may be an insufficient approximation, because it means dropping important information from the investigation-information that could mean a more flexible and varied design. It may mean additional challenges, but it is better to face these challenges in the design process than learn that potential customers dropped the product altogether. To satisfy individual users, real individuals should be considered. And statistical methods and reasoning is useful in keeping the trace of the individual.

Method individualism is argued by e.g. Elster (2000) as a foundation for social theory. Everything should be explained at an individual level. Also Ziliak and McCloskey (2008) share this view, indicating that relying on aggregate phenomena may create inferential constructions. That is explanations that may be statistically significant, but does not refer to real events or individuals. Concepts like median voters, average consumers may be examples of constructions that may not be identified in a real setting. This means choices should be explained at an individual level. This means from the outset that we are not measuring how many people belong to a certain segment, but how much they value a particular quality in a choice situation. This is central when considering demand. This issue will be considered when we introduce examples of statistical reasoning.

The presentation will introduce a set of examples concerned with studying the variation in various markets and their significance. The contrast will show how much is lost by assuming that an average user will be sufficient to cover the full variation. In particular, the so-called “long tail”, which is an asymmetric distribution, will show that some users are very far from the average and the average solution for them would be highly unsatisfactorily.

Cognitive models may explain spontaneous order

Designs are perceived and managed in the mind of the prospective customer. This means that the perception takes place at an individual level. We assume a problem-solving and active perceiver rather than a passive response. Rather than to test every aesthetic element independently, everything is seen as a whole and measured according to an idiosyncratic (or random) processing. In the case of a logo, the situation concerned is not so much the actual product as the producer or marketer who wants to signal a brand or just availability. The

user or customer uses a logo to inform themselves about possible offers and to make a choice (Henderson and Cote 1998). This is complementary to the marketer who informs by the intentions of the visual elements, often expressed as a mission statement. For the user or customer, the availability of the logo is an affordance, enabling them to make a choice and subsequently experience the benefit from a choice of an artefact, object, service or experience.

Since a market transmits information, it may also become a cognitive mechanism (Clark 1996) and people may use the information to create knowledge According to him Johnson (1987), pervasive features of bodily experience of the environments comes from the perception of the human body and forces dealing with movement, keeping a position, using the body for practical purposes. This Johnsons (1987) refers to as *containment* and *boundedness* in bodily experiences and writes,

> "Our encounter with containment and boundedness is one of the most pervasive features of our bodily experience. We are intimately aware of our bodies as three-dimensional containers into which we put certain things (food, water, air) and out of which other things emerge (food and water wastes, air, blood, etc.). From the beginning, we experience constant physical containment in our surroundings (those things that envelop us). We move in and out of rooms, clothes, vehicles, and numerous kinds of bounded spaces. We manipulate objects, placing them in containers (cups, boxes, cans, bags, etc.). In each of these cases there are repeatable spatial and temporal organizations. In other words, there are typical schemata for physical containment." (p. 21).

The proper term for this is image schemata, describing the repeated and often stereotypical action (p. 65). Several image schemata are more complex than this indicates, and it also makes sense that human beings need to name them to create meaning for themselves and to share with others. With image-schemata as the elementary building bloc, metaphors and metonyms provides the naming (Lakoff 1987, Lakoff and Johnson 1999). Terms like force, move, transport, fall, fly, take off all rely on image schemata and using metaphors we are able to refer to specific instantiations. Also formal or propositional models serve this function by setting standards for measurement and human scales of everything. Both outside and inside markets, humans may communicate using tacitly agreed standards like an inch, a foot, intimate distances, dancing, references to other language areas (likings) and focus of particular issues (the Hill or Number ten) of complex objects as well as being there, doing bodily things. As Woody Allen has stressed, "80% of success is just being there".

What constitutes a good experience? When is a design good for the person who has the experience? A process view is proposed to indicate that a good design is "easy on the mind", Mayvis and Jervis (2001) who adds a mediating variable, "fluency" meaning a logo perceived with a minimum of cognitive work. Cognitive work is typically measured by response times, how fast or easily respondents can get the message (Reber, Winkielman and Schwarz (2004).They claim that what is easy on the mind may be preferred or simply found more beautiful that alternatives requiring more struggle. The concept has also been used in connection with branding (Lee and Labroo 2006). This is where logos come in. Logos promise

that the company behind will deliver something valuable in the future, given that the customer accepts to buy, pay and pick up the goods. Logos are setting expectations by communicating certain visual (and verbal) key figures that refer to the product, artefact, system or experience.

With designs, we enter into a language where certain signs, symbols, shorthand, figures are used to communicate general offers and values of the company, affordances or how the people behind may enable to customer or user to take advantage of their objects, artefacts, services and experiences.

The aesthetic elements are known as gestalt forms. Henderson and Cote (1998) use these well-known principles researched during the history of aesthetics by Gestalt theorists such as Gombrich (1972) and Arnheim (1974). They were simple principles shown to attract attention and to create beauty. Gestalt phenomena are considered to be of a biological and even universal validity (Ramachandran and Hirstein 1999).

The designers' perspective

The design seen from the perspective of the designer or company using design?

With Searle (1969) we may say that to design and communicate a logo is a locutionary act that is the basic act of producing a performative (Searle 1989) or meaningful utterance e.g. a verbal or visual statement within a community. Such an utterance sets an expectation or hopes for the future. A design has a purpose, referred to as an illocutionary act, which means to express a statement that promises (or primes) a message (future satisfaction) to a receiver, hopefully a prospective customer.

Finally, perlocutionary act is the effect of the utterance, what the customer hears and perceives. How does the individual perceive the meaning of the logo? For an individual a rich content may mean that the perlocutionary content is close to the illocutionary; or the interpretation is close to the intent.

Meanings may be embodied, that is experienced and often with limited conscious deliberation. Zajonc (2003) have explained that in order to make a judgment, respondents need not be conscious deliberation about the perception. A reason for the many logos most people actually know is that they have been exposed to the many times in their lives and probably accepted the quality of the product or brand.

Treating the user or consumer

Most market communication, including logos (Henderson and Cote 1998, Veryzer and Hutchinson 1998, Hynes 2009) treat the prospective customer as a respondent. We take a different approach looking at the active problem solving customer who looks for affordances (Gibson 1978) and enablers in the design.

A choice depends on deliberations and personal negotiations of values, such as exchanges of gains and losses, the explanations and story of why the choice of design is based on perception of prospective problem-solving and meaning creation (Heskett 2002). This may

be the situation where a person is in a shopping situation, looking at, touching, valuing alternative goods, solutions, objects, artefacts for possible acquisition.

Our theoretical view and way of dealing with choice models is cognitive and based on embodiment and embeddedness. The first issue (e.g. Clark 2003) is based on the assumption explained above that there is a fluent transformation between choices taking place fast of slow and that conscious elements is integral to much but only as an important ingredient (Damasio 2003). A choice may sometime happen very fast (Kahnemann 2014). Embeddedness concerns typically the context in which things happens. A strong embedded network may have strong influences on how we choose as sometimes seen in emotionally strong mass-events like Superball (Chwe 2001). Here some action is strongly synchronized where people are actually present or follow the rhythm via their TV set. Other situations may rather be described as weak links (Granovetter 1973, Chwe 2001) where the network may influence people in various degrees, but rarely totally like in an emotional mass-event (Christakis and Fowler (2010).

Variation between Babel and Common Knowledge

Babel is the Christian story of how people from many cultures spoke a mutually understandable language came to work together and wanted to build a tower to “heaven”. The god got angry and made it so every individual speak different languages. Confusion and lack of ability to complete the tower meant it all fell apart. The scale may encapsulate any position from which anyone acting in a regime of varying knowledge works from. The Babelian confusion is a rare situation where people are unable to communicate because nobody understands what others see or talk about. This is unrealistic for human beings since we know (Morris 1994) that body language may integrate even very remote cultures.

On the other hand recent research (Kristensen and Gabrielsen 2016) shows considerable variation in a group of people, randomly selected who were asked to consider the meaning of certain logos and their mission statements. Excluding the sampling error the idiosyncratic variation was typically concerned with 80 – 90 percent so that the shared message amounted to 10 – 20 percent, which means there was an overwhelming variation in the way logos were seen when respondents were shown the logos. However, when a new design was introduced in the form of an integrating language, subculture or common language, the idiosyncratic variation decreased considerably. By providing a common background for understanding, for instance a story, a particular epic, style or genre the variation was reduced considerably and more mission statements were understood.

One way of modelling this is the following scale:

Common knowledge is the contrary situation. A vital issue is not only that people know the same (..), but that they know that the others know the same and that they know that others also know. Common knowledge is a formal concept formed within modern game theory (Lewis 1969, Aumann 1974). The extreme version may look like grand media events like Olympic Games or Super bowl, US presidential election etc. where large parts of world population are seers (Chwe 2001). Also with the birth of radio and later television, there was usually only one channel and everybody was listening or viewing the same programs. With multiple programs and channels - not even to think about the internet - that has changed dramatically and big steps have been taken in the direction of the Babelian position.

While this means less common knowledge, it does not also necessarily mean problems- except when it is vital for someone in particular that everybody knows everything etc. The French general De Gaulle said: How can you govern a country which has two hundred and forty-six varieties of cheese? ("Comment voulez-vous gouverner un pays qui a deux cent quarante-six variétés de fromage"? Mignon 1972). It seems common knowledge, more than Babelian confusion that supports a political system or government. Anarchists may not be happy for common knowledge (Kropotkin 1902). But there is more to it.

Also a movement towards confusion may have costs in a society in the sense that knowledge of crafts, procedures, may be less common, such as information costs, even asymmetric information (Akerlof 1980).

Diversity of what?

A major issue concerns what we may call cultural diversity. What it directly concerned depend on the analysis at hand, but such issues as values, norms and rites are examples.

A value represents a slogan capable of providing for the rationalization of action by encapsulating a positive attitude toward a purportedly beneficial state of affairs Rescher 1969 p. 9. This is indeed an intellectual or articulated way. Values are to a large degree seen as symbols or experienced (Boztepe 2007). An experienced value does normally need no articulation or explanation. For instance by travelling, tasting food from other regions, meeting people with different backgrounds provides variation in experiences which are mostly absorbed through the emotions or feelings (Damasio 2003). When experiences seem

really odd, like culinary experiences that is taboos like in many western cultures eating horse, dogs, cats, insects or very strange do the signal come that there is something alien or potentially dangerous going on. Domestic experiences may be noted if they are particularly good or very strange.

What kind of elements creates this variation? As we suggested above, a source of variation comes from the perlocutionary utterance and another from the perlocutionary. Is one dominating the other and is there an interaction between them?

Hutchins (2004) emphasized the material anchoring of the processes, mainly referring to devises, but also behavioural design elements such as standing in a Line. In Hutchins´ (2004) optic, the examples are e.g. navigation devices used by many people to actually navigate movements on the earth. But to many people the navigation is social and may include certain objects, artefacts to show they possess good taste and belong to a certain in-group (Douglas 1979, Bourdieu 1982).

Introducing experiments

We experiment with such processes as a way of exploring how prospective users or customers value the outcome when given a paired choice. “Will you take this one or that one” is based on using a computer, iPad with a screen showing visually pairs of choices with a line – scale - between. We may test a number of options and add prices, brand names and stories and use conjoint-layouts. The respondent is asked to move the cursor towards the preferred choice and move it so close to the preferred choice that the closeness indicates the strength of the preference. By letting the same respondent make paired comparisons with varying options we may estimate the respondent’s rating of a number or items enabling us to rank order how strongly each object, artefact, model or prototypes is preferred by each single respondent in a sample of users. We consider such a rated rank order of objects or services a preference profile. The core is that by experimenting we can construct individual preference profiles, i.e. characterizing the single individual in contrast to characterizing a market. The data collection is web based and may be done anywhere, also when no internet is available because the connection can be made later. We need to develop a statistical program to deal automatically transforming the data to a comprehensible output with statistical tests, graphs etc. The research design needed to explain and measure how logos serve as communication elements and how effective they are, depends on a setup using the web. It is important (Louviere, Flynn and Carson 2010) that the experimental procedure reflects the real behaviour it is supposed to explore and explain. This means that a normal choice experiment, where tangible goods are to be investigated best take place in a real shopping environment and that the sequence of the experiment simulates a real behavioural process. Only if the experiment is intended to explain what happens online, should web designs be used. A common way of using picture of real objects on a pure web design is a poor research design when it is supposed to show what happens in a real shopping process. Similar should experiential studies of what the user or consumer experience and may feel satisfied with take place in their homes or else

where such experiences take place. In the current study we use a web-based design because it is quite common that the first time a respondent meets a new logo and considers its promises take place on the web.

In a given situation to estimate the model we perform an experiment. That is we construct a setting from which we can relate the outcome of the experiment to the parameters of the model. In general there are many ways to interpret the result of an experiment so we have to be very carefully using an appropriate statistical design.

In marketing the answer to the usually posed question "How many?" relates to a population or a market; implicitly by this "counting-approach" we are measuring a market. By sampling we usually want to estimate *the fraction* of some properties, e.g. democrats, republicans. In this case we pretend that all democrats are "equal" and similarly that all republicans "equal". To achieve knowledge about the desired fraction from sampling no more information about the single respond is needed than whether the single respondent is a democrat or a republican. In this case the viewing ankle or the model implicitly becomes a so-called "Urn model", that is an urn with a fixed number of balls, each being either red (democrats) or green (republican). Drawing in random a number of balls we can from the sample estimate the fraction of red balls (democrats) in the population by the fraction of the observed red balls (democrats) in the sample.

The question is what is random from this viewing ankle – or this model? The balls have fixed colours (democrat or republican) and what is random is which ball is chosen.

A totally different viewing ankle is the following; we ask a person which president candidate he will vote for. In this case we can sider the question a random experiment with two possible outcomes namely democrat or republican and what is random is what the respondent answers. Again we can estimate the fraction of respondents voting for e.g. democrat by the fraction answering "democrat" on the basis of a random sample of voters. The two perspectives will in this setting lead to the "same result", as both will yield consistent estimates; however, the two perspectives are quite different from a more theoretical point of view as the consistency is based on quite different probability arguments.

The first perspective is focusing on the population, the second is focusing on the respondents in the sense that in the last case we observe respondents and from these individual observations we may – under certain conditions - aggregate to a population and giving answer to the question of fraction of democrats.

In that sense the two models are totally different – they are in the words of Kuhn incommensurable, although both view ankles can give "correct answer" to the question.

The last model is called an inferential model indicating that it is a model – whereas the Urn model is referred to as random sampling procedure (or model) – downplaying that it "of cause" is a model.

The sampling approach cannot intuitively be extended to treat more attributes of the respondent. Doing that by giving the balls more than one color leads to an "Elaboration"

procedure, being a top-down procedure initiated among others by the sociologist Lazersfeldt and others.

The inferential approach, however, can easily be extended by observing more attributes of the same respondent. In this case the result of the analysis may be aggregated to the level of the population, which is a bottom-up approach.

The basic idea is here that the sampling approach is a top-down approach whereas the model approach is a button-up

The sampling approach is usually focused on analyzing fraction – and "explaining" why some fraction are different. It is in this model difficult to talk about variation as the variation implicitly is a function of the fractions. In this model there is no real concept of variation.

We therefore introduce continuous measures and we include several objects which are mutually compared.

In experiments we apply paired comparisons, using Thurstone (1927) scales which enables both a continuous measurement and also works at a non-numeric registration by allowing respondents to move a cursor on a screen to indicate the proportion of which s/he prefers one out of two options.

By variation we mean two different things. We consider the common preference profile, defined as that part of the individual preference profiles which is shared by all individuals. Further we consider how much the individual preference profile differs from the common preference profile. This difference is due to individual peculiarities and is the idiosyncratic deviance. The sum of the idiosyncratic deviances is the *idiosyncratic variation*, which is the variation each person attributes to a statement vs. the common variation of subjects in a market. A variation seen by the individual means that the message is received with its complexity and meaningfulness, while a big market variations means people understand different things and a Babylonian confusion is the outcome. Also differences between cultures are investigated, but found to be of limited size compared to the between subject-variation. If the between people variation dominates, it means that there are many competing interpretations in the market and that the market is fragmented. This means the agents are limited in their ability to compare and talk about the market message.

Conclusions

The presentation will show some examples of statistical reasoning where individual needs and perception of designs differs very much from the average preference. Statistical reasoning is shown to be useful for finding these differences and to indicate how it is the qualities of the needs and their satisfaction rather than the number of people within a segment that is the essential.

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About the Authors:

Gorm Gabrielsen is a mathematician and statistician with experience from forensic studies, criminology, sensorics and design research.

Tore Kristensen is a marketing and design researcher with experience from conceptual and empirical research on design in business from marketing, behavioural and economic perspectives

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Design as Driver for Understanding Sustainability and Creating Value in the Fur Industry

Irene Alma Lønne[a], Else Skjold[b]*

[a]The Royal Academy of Fine Arts
[b]Design School Kolding
*esk@dskd.dk
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Abstract: This paper examines the value of design in business seen through the example of the Danish company Kopenhagen Fur. Design School Kolding (DK) has during 2014 and 2015 conducted a design research project and study with focus on sustainability as a key parameter in the company's future use of design on different levels. In order to propose a new frame for understanding the company's value creation we draw upon Heskett's models (2003) and his explanation of the relationship between economic theories and design (2008). To explain the relationship between design and sustainability we further elaborate towards theories connected to the transformation economy (Gardien 2014) and explain how Kopenhagen Fur's potential for including design and sustainability throughout their entire value chain aligns with the present understanding in the fashion and textile industry.

Keywords: Transformation economy, Sustainability, Value Creation, Heskett

Introduction

This paper will show the preliminary results of a larger design research project about sustainability and fur conducted as part of a larger strategic partnership agreement between Design School Kolding and Kopenhagen Fur in 2014 and 2015. Kopenhagen Fur is run as a cooperative and owned by app. 1600 Danish mink farmers. It is a world leading supplier of mink skin and holder of the world's largest auction house for fur skin, which is positioned in the Danish city of Glostrup. In the research project, a group of four design researchers worked from their individual perspective which covered the value chain of fur from raw skin to end use, thus supporting already existing research on traceability and animal welfare. The focus area of each sub-project was, respectively; 1) how shared memory of fur design might

support more sustainable strategies around communication and designstrategic positioning, 2) how Kopenhagen Fur might better communicate and promote existing best practices around i.e. dying and dressing of raw skin, 3) how Kopenhagen Fur might learn from traditional virtues and practices amongst furriers to push for more sustainable approaches to fur design and 4), how a deeper insight in the use experience of fur might inspire new designstrategic pathways and services that align with sustainability (Skjold, et al 2016). As part of the study multiple semi-structured interviews with farmers and employees from all central departments were conducted, as well as with selected Danish fashion journalists and furriers. The researchers were physically located at the premises of Kopenhagen Fur part of their work time, which meant they had access to close interaction with the company.

Building on this pool of knowledge that was not yet finalised at the time this paper was written, authors of this paper conducted a travel March 2015 to China, the presently largest market for Kopenhagen Fur, representing app. 80% of their revenue. During the travel, observations and semi-structured interviews were made with participants at the 2015 Hong Kong International Fashion and Fur Fair, and stakeholders and employees of Kopenhagen Fur in Shanghai, Yuyao and Harbin. The bias of these investigations was coloured by the authors' scholarly departure; Irene Alma Lønne, who was then head of research at Design School Kolding and responsible for the partnership agreement between Design School Kolding and Kopenhagen Fur, holds a PhD in design management (Lønne 2009). Else Skjold conducted the post.doc. project with Kopenhagen Fur on the basis of her PhD in user studies and management (Skjold 2014).

Driving the analysis forward, it has been an underlying theme how a design-perspective on sustainability might propose a new frame of understanding value creation within companies. In this context the work of Heskett becomes central. Sustainability is a wide-ranging concept, and it is often overwhelming for the individual company to decide how to work with it; not only at a more strategic and communicative level, but also in daily, hands-on practices. We see these obstacles as closely related to Heskett's notion on 'Neo-Classical theory' and it's influence on the view of design in value creation (Heskett 2009:72). As an exemplary case of this, Kopenhagen Fur mainly operates within what Heskett defines as 'static assumptions' about the market mechanisms (ibid:74) and do not currently make use of supporting parameters about value creation. One of the barriers for this seems to be how Kopenhagen Fur perceives themselves as raw material suppliers that cause them to focus mainly on particular phases of the value chain. Not only when it comes to implementing sustainability, but in fact, in their entire strategic approach. This approach corresponds with what Heskett refers to as product traditionally not subject to change "standardized products" and shows the transition that the company currently is going through from regarding themselves as raw material supplier to a branded company.

To support this view, we pinpoint how the company was founded back in 1930 (kopenhagenfur.com) in an era that Gardien et al defines as belonging to the 'industrial paradigm' (2014). What we find interesting is how 'particular phase' strategies, as defined by Kozlowski et al (2012) - that is, strategies that focus on one level of the value chain only - are

not seen as viable in the light of Heskett as well as in the light of recent theory on fashion and sustainability. To examplify this, we will show how 'design' or 'fashion' is perceived by Kopenhagen Fur as something relevant to physical products only (in this case, garments or accessories), while 'sustainability' is linked mainly to matters of farming. Even if the industry also highlights longevity of the material and natural composting as a potential zero impact parameter (IFTF 2012), we believe they have not really begun to drive on this in their business practices. Actually, we believe that this rather limited perception of both design and sustainability together represents a bottleneck.

According to this, the paper is structured in the following manner: First we will present our findings on the way Kopenhagen Fur approaches the idea of design in their activities in Denmark and China. Secondly, we will reflect on these findings through the work of John Heskett, and thirdly we will align this within the manyfold approaches to the areas of sustainability and design. Finally we conclude how the fur industry in general, on the basis of these perspectives, might enter the transformation economy through engaging more strategically with design management and thus reframe their idea of value creation. In order to pinpoint this, we show how the fragmented/limited approach to design and design management represents a bottleneck for Kopenhagen Fur's approach to sustainability - if not actually a bottleneck for them to survive in the future.

Kopenhagen Fur activities in Denmark and China

The core of Kopenhagen Fur's activities is the farming of mink and the unique intersorting system that takes place at the Glostrup auction house and enables the company to sell bundled lots of skin of a particularly high quality. This is done through the aid of hand skill and sophisticated technology developed by the company itself. Also, a laboratory has been established that secures managing and development of issues such as animal diseases, improvement of feeding, and general farming conditions. These activities together form the current slogan of the company, namely: *Kopenhagen Fur - Simply the World's Finest Fur,* which illustrates their self-perception as being raw material suppliers who makes a good product.

On top of this, the company has engaged with a line of promoting activities to push the use of fur in the garment sector. These activities are physically located in two buildings in central Copenhagen that houses *Studio*, a furrier workshop that works with collaborate partners such as brands, up-and coming designers and fashion design students, *Oh!*, a sub-brand for accessories, *Nexus*, a unit that pushes the use of fur through brand collaborations with fashion brands, and *Fur Fab,* a "fur library" that lends out the styles produced in *Studio*. On top of this, Kopenhagen Fur arranges each year a talent competition for fur design called *Imagine Talent Show*, in collaboration with selected design schools all over the world. But these are only the activities in Denmark. In China, that currently represents the majority of the company's revenue, Kopenhagen Fur has its own Chinese unit in Beijing that manages mainly collaborations with Chinese manufacturers and retailers, on top of promoting

activities on the Chinese fashion week or in the Chinese media. Most activities are centred around the so-called Fur Market in the city of Yuyao outside of Shanghai that houses most fur manufacturers in China, and in the city of Harbin that lies just beneath the Russian border in North-Eastern China, also referred to as *the capital of fur*, simply because this is where most of the fur is sold in China.

Throughout the program, it became increasingly apparent how Kopenhagen Fur has engaged with such promoting activities in order to revitalise the public image of fur. Back in the 1980s and 1990s, the sales of fur were decreasing. This was due to not only the attacks of the anti-fur movement, but moreso how the consumer group was ageing and new younger consumers were increasingly disinterested in fur. In Copenhagen alone, the Danish mink farmers could follow how one furrier workshop after the other closed down, and how the image of fur became more and more aligned with elderly rich women. It was mainly due to this that Kopenhagen Fur started engaging with the fashion world, and fashion designers, in order to boost a new and fresh image for fur[1]. This is confirmed when speaking to the then head of marketing, Ditte Hejberg Sorknæs, who said:

> "...a lot of people think that what keeps me awake at night is the anti-fur movement. But honestly I worry very little about it. Having been in this business for many years I can tell that anti-fur is to a large extent all about "preaching to the choire". Some people really believe in it, then there is app. 80% who is more like "I don't know", and then there are people who will wear fur almost by principle. What really keeps me awake at night is how when the temperature hits 4 degrees celcious and people start wearing fur, then all these horrid brown swinger coats comes out. Fur consumers are getting older and older. And this is what I told the furriers when I started out. That their target customer is the same person as 40 years ago, and that within 10 years time she will be dead"[2].

Also in in China, the same mindset and strategy dominates Kopenhagen Fur's activities. When discussing this, General Manager for the Kopenhagen Fur Beijing Office, Chris Cui answers the following:

> "We have the overall strategy to make fur more into fashion, that's one thing, to turn fur more fashionable, another thing is to move into the fashion industry...to get our customers our insides and expertise to actually produce more fashionable products, to attract younger consumers, and also to confine with the fashion industry more closely"[3].

Here, 'customers' are to be understood as b2b; primarily the fur manufacturers working in the 'Fur Market' in the city of Yuyao, but also the retailers in Yuyao and Harbin. Both furriers and shop owners and personel are trained by Kopenhagen Fur employees into engaging more with new techniques and combinations of skin, or new colour attitudes or styles, to move fur forward towards the fashion market. This is done through i.e. visits from

[1] This has been mentioned i.e. in a conversation between co-author Else Skjold and board member of Kopenhagen Fur Lars Eilersen in Bruxelles 30.9.2015.
[2] Interview 11th of December 2014 with Ditte Hejberg Sorknæs, now former Head of Marketing at Kopenhagen Fur.
[3] Interview 28th of February 2015 with General Manager of the Beijing Office Chris Cui at Hong Kong International Fur and Fashion Fair in Hong Kong, China.

Kopenhagen Fur unit *Studio* in Denmark who bring the latest collaborate projects or own developed styles and techniques, but also through visits from the Chinese unit *Furward* consisting of designers and fashion/design-consultants.

In this sense, one might say that Kopenhagen Fur's core activities in Denmark and China together rests on two main strategies; one is to keep improving their product, the raw skin, and to stay on top as world leader, closely followed by a few other auction houses. Another is to consistently push fur as material into fashion collections, in order to attract younger consumers.

Understanding Kopenhagen Fur through the work of Heskett

John Heskett's work has broadly influenced the understanding of designs role in business as it is closely linked and explained in accordance to economic theories.
Heskett's (2003) provides an overview of four types of companies i.e. Original Equipment Manufacturer – (OEM) Original Design Manufacturer (ODM), and Own Brand Manufacturer (OBM), and Original Strategic Manufacturer (OSM) - and shows in what way design is understood for each company type and how design can be used to move the company onwards to a new category (Heskett, 2003). Kopenhagen Fur's position in these four categories is at present unclear. On the one hand the company is a raw material supplier which aligns with OEM – and to a high degree understand itself as such and as belonging to the farmer business but also moving towards ODM in it's way of using design to differentiate products. On the other hand the company is undergoing a fast transition towards the OBM category where design is used as an asset to reinforce the brand, while it misses out moving towards OSM (see figure 1).

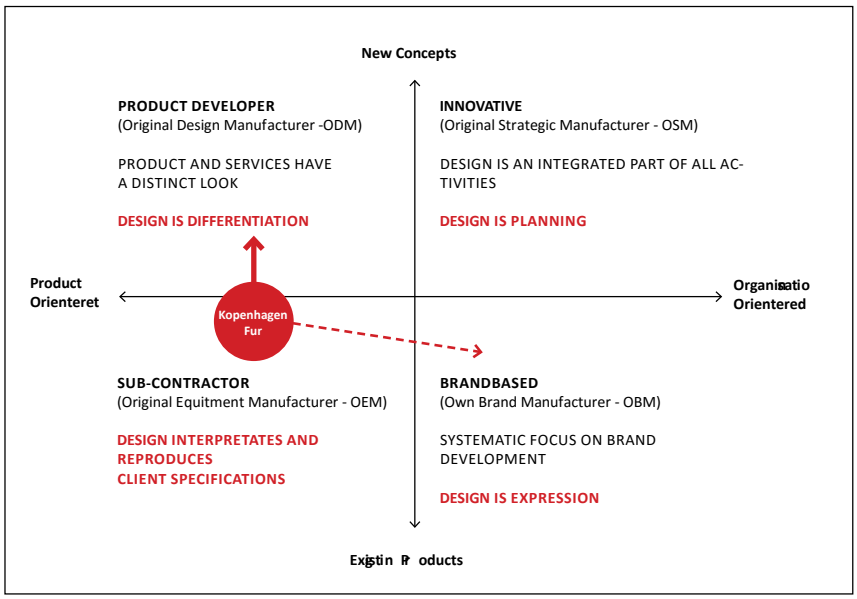

Figure 1 - The figure shows Heskett's four company categories and how design relates to their value creation (Heskett 2004). Kopenhagen Fur's position in this system is marked with the red dot

and the current development and understanding of design is indicated in the two red arrows.

The company understands design as important but mostly in terms of differentiating and image. Design is thus not understood as a factor for creating value that can move the company further and create impact throughout the whole value chain. Heskett provided in 2003 this overview aimed at the Chinese market. However it applies broadly and has thus been widely used – i.e. inspired the "Design ladder" developed by the Danish Design Center 2001 and further elaborated according to Heskett's ideas in 2004 (Dickson & Kristensen, 2004.) As helpful Hesketts four categories (as shown in Figure 1) and the design ladder are as a mapping tools they do not explain the deeper reason behind what limits the use and understanding of design. Heskett has thus further provided an overview and examination of how economic theories relates to design in terms of value creation (Heskett 2009). Heskett points out that though Neo-Classicistic Theory has been criticised it remains dominating in the Anglo-American world. He concludes:

> "Neo-Classicism explains what exist and is not fundamentally concerned with what might be. Widespread criticism of it focuses on assumptions about the static nature of products and markets. If they are as constant as depicted in Neo-Classical theory this at best reduces design to a trivial activity concerned with minor superficial differentiation of unchanging commodities – a role indeed – that it does frequently perform. At worst, it contradicts the whole validity of design."
>
> " As soon as the possibility of change, development and innovation are admitted into economic models however the perspective shifts and it becomes much easier to relate design to economic theories." (Heskett 2009:82)

What Heskett points at here is central in the case of Kopenhagen Fur's economic understanding and view on design; It not only limits the role of design in the company it prevails it's inclusion throughout the value chain and thereby using design as a way to create change and bridging towards new demands from stakeholders and the end-users i.e. demands for integration of new parameters as for example sustainability. According to that we will place Kopenhagen Fur as belonging to the industrial paradigm and with a market approach close to Neo-classicistic economic theory. The company focuses on market mechanism that doesn't include the user phase and the consumers' preferences in the value creation of the company's products, services and systems.

In relation to this, we find it fruitful to point at the economic paradigms defines by Gardien et al (2014), as they well reflect the above ideas of Heskett and places our design approach to Kopenhagen Fur in a further perspective. In their text, they suggest four main economic paradigms that have developed from the 19th Century and untill now: 1. The *industrial paradigm* that focus on creation of commodities in relation to local communities, in which the role of design evolves around rational problem-solving processes. 2. The *experience economy* that focus on subcultures and branded experiences, and in which the role of design evolves around meaning-oriented appraoches to design. 3. The *knowledge economy* that focus on open social communities and value through open innovation processes that

leverage user knowledge, in which the role of design must be seen as orchestrated between expert knowledge and user knowledge. Finally 4., the *transformation economy* that focus on "the public discomfort with downsides of the first three paradigms; pollution, global warming, wealth disparity, poor labour conditions", in which the concept of sustainability becomes the valid "business sense" (ibid:131). Here, in the currently prevailing paradigm, the role of design is seen as operating on a more overall systemic level, with the aims of creating zero waste products, services and systems based on the principles of 'cradle-to-cradle' as defined by Braungart and McDonough (2002). Even if some of Kopenhagen Fur's add-on activities evolving around design is related to the experience economy (as they try to push fur into the fashion world), and even if they are moving towards the knowledge economy through the use of expert knowledge that leverage user experience they remain stuck in the industrial paradigm. As we will show in the following, this basic self-understanding gets to represent a bottleneck for Kopenhagen Fur simply because they see themselves as suppliers - what Heskett defines as OEM - and not as a company who works strategically with design as benchmark for sustainability throughout the whole value chain, which could take them further into being a OSM positioned in the transformation economy (see figure 2).

Kopenhagen fur activities aligned with heskett's typology and gardien et al.'s economic paradigms

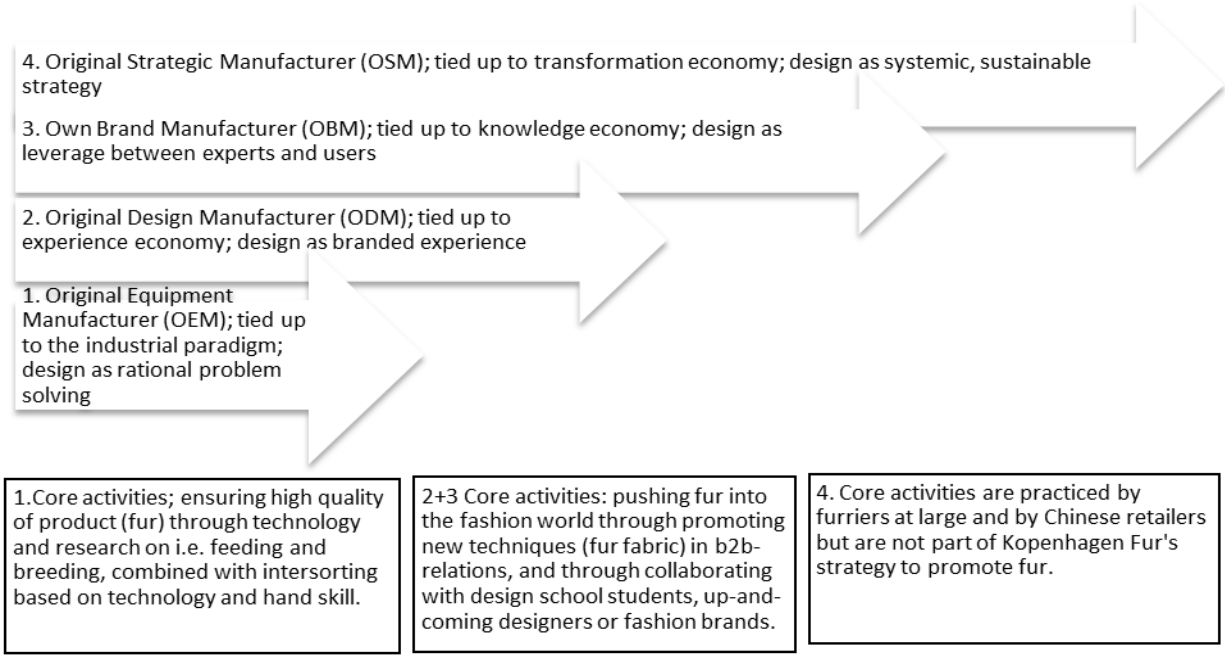

Figure 2 When related to the perspectives of Heskett's typology of company approaches to design and Gardien et al's perspectives on economic paradigms, Kopenhagen Fur must be seen as 'stuck' in their self-perception as an OEM type of company that engage mainly with level 1 activities. Also, even if they do engage with ODM or OBM activities, they do not acknowledge how the branded experience of fur is not fulfilling its potential, as they have not sufficiently engaged with leveraging the (semiotic, semantic and user related) meaning of fur between experts and users. In the case of OSM activities, Kopenhagen Fur has not committed to these at all even if they are practiced by their own stakeholders.

Aligning Kopenhagen Fur to Fashion and Sustainability

When looking at Kopenhagen Fur in the light of recent theory on fashion and sustainability, a similar pattern emerges. For example, Clark defines how fashion designers are increasingly aligning their practices away from mass production and standardisation and towards "slow fashion" practices in line with consumer needs and practices (Clark 2008), and Vinken claims how we are now facing "the end of a century of fashion" (2005).

Within the garment sector sustainability is becoming one of the crucial parameters of differentiation, and there are increasing numbers of SME or larger companies that engage with concepts such as circular economy, recycling and waste managing, or various types of services around the product - completely in line with the inherent values and practices in the transformation economy as listed above. In this context, it becomes a challenge for Kopenhagen Fur that they are not taking on design as a systemic approach, as they might potentially benefit from the transitions taking place in the garment sector. In our view, this happens first of all as they have undervalued the paradigms of the experience economy and the knowledge economy; thus, they fail to see how fur as a material is closely related to the concept of 'conspicuous consumption' as framed by sociologist Thorstein Veblen in the early 20th Century, who negated fashion because he saw it as deeply connected with (vulgar) status manifestations of the women of the upper classes. In recent debates about sustainability, these ideas are yet again approached by i.e. Entwistle who suggest that the hedonist overproduction and overconsumption taking place in the garment sector of today may be seen through the lens of Veblen (Entwistle 2014). Hence, it is not suffient for the fur industry to build trust from consumers and stakeholders through animal welfare assessment systems, improving of environmental impact of material processing, or managing of co2 emission from farming; what they need to do is to change completely the public perception of fur, as it has been so tightly linked with celebrity glamour and ideas of femininity and capitalism (Emberly 1998 and Bolton 2005) - associations that must be seen as representing exactly the 'downsides' of the hitherto existing economic paradigms as pointed out by Gardien et al. Secondly, as already suggested, there are currently practices around fur that must be seen as essentially sustainable; if looking at particularly the Chinese market, it became obvious how services around fur such as maintenance or re-design is already well established. Practices, which evolve around resource management and valuing of raw materials, that are also present in the craftmanship of the furriers, and could potentially form a whole new public idea about the value of fur.

Sustainable Strategies as seen through Design

On behalf of these considerations, we suggest to look at the case of Kopenhagen Fur through our three-step view on the development of sustainable agendas, which illustrates how strategic use of design can create value through connecting with the sustainable agenda for Kopenhagen Fur.

In relation to this, Kozlowski et al highlights how also in the garment sectore there are huge problems with implementing sustainability throughout the entire value chain, as most companies make use of "particular stage strategies" (Kozlowski, et al 2012:31). Thus, they argue how often, sustainability becomes an add-on bound up on technological innovation or i.e. organic materials, as the individual company cannot handle how designers are currently re-thinking their role, nor can they handle systemic approaches that breaks with traditional practices. Similarly, Busch in his 2009 article "Where are the Fashion Service Systems?" highlights the fact that for most fashion brands, the focus of attention ends at the point of purchase and do not continue into what he calls *the after market*; that is, what happens to garments as they are being used, maintained, possibly re-sold to other consumers at the 2Hand- or vintage market, or discarded (Busch 2009:1). Busch argues how this lack of involvement seems to stem from the fact that the sector must considered to be a late developer in relation to familiar areas such as architecture or product design. In his view, this is why this sector has not really started engaging with more systematic approaches in line with the related design disciplines, and why it has generally not been aligned with the development of the design field at large. Similarly, Skjold has pointed out in her own research how the sector has hardly engaged with user-oriented approaches at all, why systemic approaches to sustainability that engages with the use phase of garments has not come into consideration at large (Skjold 2014). Still, the garment sector has been subdued to changes according to the demands for i.e. traceability and CSR, and accordingly has experienced a transition process, which we see lined out in three various phases, as suggested below:

The first strategic approach to sustainability started emerging in the late 1980s, and is directed mainly towards matters of production often referred to as issues of *CSR* and *traceability*; this wave directs particularly (negative) environmental impacts of raw material production (Fletcher 2008) and (poor) working conditions (Klein 2000). These issues are mainly addressed through a long line of labelling initiatives that try to ensure a clean and ethically sound production. In relation to Kopenhagen Fur, this evolves around ensuring animal welfare, a minimizing of environmental damage in relation to ammonium emission from animal defecation, and ensuring that the whole animal is being used (through i.e. using carcases for biodiesel). According to the lobby-organisation *Fur Europe*, their sustainability strategy is to target what they call 'the entire value chain', consisting in their definition of *"farmers, trappers, auction houses, brokers and buyers, design centres, dressers and dyers, manufacturers and retailers"*[1]. However, it mirrors the argument of Busch in the sense that it misses out the *after market*, and thus taking the entire value chain into consideration.

In relation to this, the second strategic wave around sustainability emerged during the 2000s, and is here referred to as *post-retail*; roughly speaking, it addresses ways of continuing 'business as usual' within the garment sector (cheap, mass produced garments introduced through rapid production cycles) through resource management at post-

[1] As found 6th of November 2015 on: http://www.fureurope.eu/people-in-the-fur-sector/value-chain/

consumer level. This wave has emerged as a result of an increasing awareness of the massive waste problems in the sector, where tons of textiles end up on landfills after a relatively short life-cycle (Cooper 2005). Also, the sector is increasingly aware how the prices on raw materials might represent a serious future challenge for their current business model, as there will simply not be enough land or natural resources on our planet to produce the volumes needed (WRAP, 2012). Even as Kopenhagen Fur does not currently address this strategy in its overall operations, and is reluctant to do so, the findings of our research program show how redesign of inherited or 2Hand fur is a quite common practice amongst furriers. Thus, phase two activities are relatively easy to pick up on, as the practices sustaining it are already present within the market. Kopenhagen Fur does not need to re-invent practices for post-retail strategies as is the case in the garment sector. Subsequently, we argue that the reluctance to engage with post-retail is bound in the positioning of the company as a OEM company moving towards and ODM or OBM strategy, whereas they might engage more strategically with this type of activities if they moved on to OSM strategies.

In connection with this, a third strategic wave is emerging these years that address not only 'particular stage' strategies but more overall systemic strategies. Here we propose the concept of design to be installed as a strategic tool for entering the transformation economy, and for positioning Kopenhagen Fur as a OSM player. This includes engaging with so-called *green business models* that emphasises sustainable practices throughout the entire value-chain. That is, business models which are based on the lifecycle of products, from raw material to end use. As examples can be mentioned Danish childrenswear brand VIGGA that builds on circular economy (vigga.us), or Swedish *Nudie Jeans* that build on service design principles through 'repair workshops' for their product (nudiejeans.com). Also, there are currently experiments taking place within the sector around the concepts of DFR (Design for Reassembly) or DFD (Design for Disassembly)(see i.e. Schultz 2011) which have not yet fulfilled their potential.

What we found on our travel to China in particular was how some of these practices sustaining OSM strategies are already existing as an add-on to retail; hence, the Chinese market for fur represent an active engagement with maintenance services as well as re-design. Not taking action on these practices represent in our minds a bottleneck for implementing sustainability as a coherent strategy in the company. One of the barriers is how they do not fully engage with the way furriers and consumers actually interact with fur as material and design, particularly in China. As can be seen in figure 3, Kopenhagen Fur is currently focusing on phase 1 activities only. While these initiatives support traceability of the fur, they do not promote issues of longevity at all - even if this might be the actual competitive advantage of fur when it comes to sustainability, because very few materials last as long in use as fur. This is due not only to the durability of the fur itself, but also to the way it is purchased, used, maintained and stored by consumers.

Kopenhagen fur activities on sustainability throughout the value chain

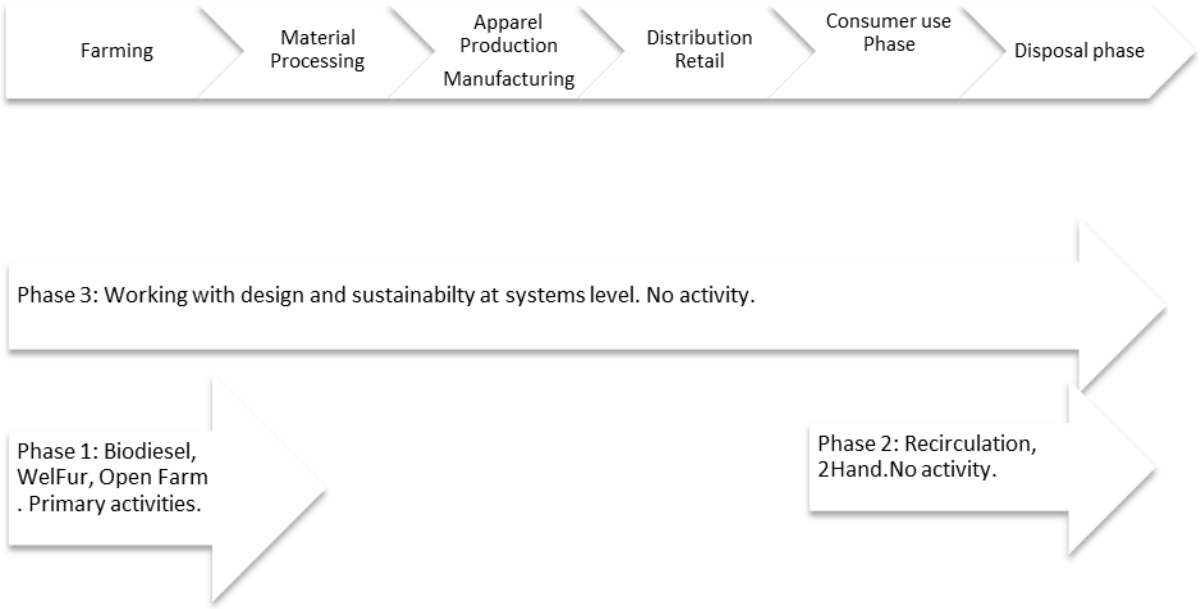

Figure 3 - As is illustrated, Kopenhagen Fur perceives sustainability as something primarily related to production level, which evolves around farming and raw skin. When comparing figure 1 and 2 it becomes apparent how both in terms of sustainability and overall business approach, Kopenhagen Fur experiences a limitation of value creation due to the fact that they don't work with sustainability - or design - throughout the entire value chain.

Conclusion and Perspectives

Aligning Heskett's model of company typologies and analysis of economic theories understanding of design with Kopenhagen Fur's selfperception and current activities makes sense when related to recent discussions about strategic design and sustainability. In our analysis, we find how there is currently a conflict in the branded strategy of Kopenhagen Fur, as the company is caught up within the industrial paradigm in which it was established. When comparing Kopenhagen Fur's activities with the remaining garment sector, it comes out how there are presently practices around fur in the market that reflect sustainable ideals about longevity of garments or resource management that are not utilised strategically. Engaging more with activities at system level bears the pontential of not only supporting Kopenhagen Fur's ambition of engaging with sustainability, but also their market position as a original strategic company (OSM). Thus, carrying through with phase 3 activities such as re-vitalising service design systems for maintenance, recycling and redesign might propose a new frame for how to operationalize fur in the light of the transformation economy which is mainly formed by ethical concerns and revisions of former industry logics and practices.

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About the Authors:

Irene Alma Lønne, PhD and head of institute for architecture and design at the Royal Academy of Fine Arts/Architecture (DK). As former head of research at Design School Kolding she was responsible for the overall partnership program with Kopenhagen Fur

Else Skjold PhD and Assistant Professor at Design School Kolding and SDU Campus (DK) within design management, user studies and sustainability. She has been the project coordinator for the project *Fur and Sustainability* which formed the basis of this paper

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Design Awareness: Developing Design Capacity in Chinese Manufacturing Industry

Sylvia Liu

The Hong Kong Polytechnic University
sylvia.liu@polyu.edu.hk
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Abstract: This study is an extension of John's research of managing design in Chinese manufacturing industry and focuses on their design awareness. Two sets of factors about design awareness and support for design are utilized for questionnaire survey. The result introduces the levels of design awareness in the firms and its influence in design implementation and management.

Keywords: Design awareness; design capability, design policy; manufacturing industry

Introduction

Raising design awareness is the first step of introducing design to a firm (Brazier, 2004). For many years, different ways of nurturing design awareness have been developed at national level and firm's level. At national level, an design agency of government maybe established to promote design in industries (Malvido, 2008; Stashenko, 2009). The earliest one could be Design Council in UK. At firm's level, there are two ways, workshops and assessment of design capability. A company first experience design through a successful project or a workshop (Lee, 2008; Manzini and Rizzo, 2011). With an effective result, they maybe plan to invest in design and develop long-term projects (Jevnaker, 2000; Brazier, 2004). A project or a workshop just creates the context for communicating design through showing, telling, arguing and revision. Nurturing design awareness is a part of constructive action (Jevnaker, 2000).

Design awareness can be raised through assessing design capability (Moultrie, 2007) and will influence business implementation and growth (Bruce, et al., 1999). Good design awareness can contribute to design knowledge and good design performance with support from CEOs. Their awareness of and knowledge about design is main factor of innovation skill (Dickson, 1995; Song, et al., 2010).

In recent years, with the hype of design thinking, the design awareness is raised significantly (Rylander, 2009). However, it is reported that SMEs are still unaware of design as a strategic resources (Acklin, 2013). The situation is even worse in Chinese manufacturing industry.

Despite the rapid progress of manufacturing in terms of quantity, Chinese manufacturers have been unable to break the bottleneck of quality, because of the lack of key basic materials, reliance on exported core components, limited key technologies, lack of research on advanced basic processes, limitations in application, and an underdeveloped service system.[1] In view of the weak basis for manufacturing, China's manufacturers are limited in competing on both cost and speed of production, and they cannot extend their business through improving the quality of products, building brands or enhancing capability for independent innovation. The urgent demands for solving the problem were stated by National Chairman Jinping Xi as Three Transitions, "from China's speed to China's quality, China's products to China's brands, and Made in China to Created by China." [2] Bruce Nussbaumin (2005) his article,"How to Build Innovative Companies," indicated that design strategy begins to replace the Six Sigma as a key organizing principle and has played the most important role in product differentiation, the decision-making process, and in understanding the consumer experience.

The juxtaposition of challenges and opportunities requires new thinking on the subject of design to lead product development. The application, role and awareness of design in China is closely connected to, and influenced by, its economic development (Cai, 2008). Since the open door policy, China has maintained its pursuit of developing technology via absorptive and re-innovation means (Wang, 2006). This has resulted in China becoming the world's second largest economy. However, having entered the new economy, and facing new market needs, it has become apparent that the traditional path of innovation is no longer sustainable. Although China was active in both industrial transformation and upgrading in 1992, with the emphasis on higher added value, lower energy consumption and pollution, and upgrading from extensive to intensive development, absorptive and re-innovation is still the dominant approach. This should be replaced by a new innovation strategy which emphasizes independent innovation through design. Raising design awareness is a critical step to fulfill the target.

In this instance, John Heskett initiated a study of design development in manufacturing industry in 2007. The initial idea is to explore unique characteristics of developing design in Chinese manufacturing industry based on existing frame, which is built from Western experience. As a result of his research, characteristics of managing design are reported and six models of developing design capacity is explored. This is published in DMI conference (2012). Later, the criteria of the models is combined with Design Ladder by Storvang (2014)

[1] The problems were first mentioned in the work meeting and were defined as three basics (basic part, basic manufacturing process and basic material). The meeting was organized by the China Machinery Industry Federation, CMIF) on 19 Jun, 2011. They were redefined in 2015 into four basics, including key basic material, core basic parts (components), advanced basic process and basis for industrial technologies (abbreviation: Four Bases).

[2] This was stated by National Chairman Jinping Xi in May, 2014, when he was in Henan Province.

and developed into a new set of factors. Besides academic field, the results is also introduced to industries through speech and training programme in China. Good feedback had been received for its function of efficient diagnose and guideline of design development. There are some successful cases, which followed the models to improve their design capability. Furthermore, the model caught the attentions from government, when they planed to study new design policy of China around 2012. Later. It contributed to the definition of innovation design, which is the domained concept of innovation in *Made in China 2025*, which is released in May 2015 as national strategy of upgrading manufacturing (Liu, 2016).

This research reports certain findings from an extended research of John's. In John's research, he had never closed the door of models to fix it into six categories. His criteria and models were explored through case studies, which were selected purpose samples through questionnaires. In our research, questionnaire is utilized to describe the understanding of design in Chinese manufacturing industry. Our research question is: what is the design awareness in Chinese manufacturing industry? The purpose of this paper is twofold. First, understanding the design awareness and support for design. Second, explore models and factors to describe it.

Literature Reviews

Criteria of managing design in Chinese manufacturing industry

As an extension of John's research, the questionnaire keep main questions designed by John in his research of managing design in Chinese manufacturing industry (Heskett, *et al.*, 2012). Through reviewing literatures related to design management, main topics of managing design is proposed as a frame of design management content, which is divided into three levels (Borja de Mozota, 2003). Questions are developed from the interface between strategic and functional levels. The topics include strategy of business (business type and brand), company competitiveness, investment in design, design resources (outsourcing design, internal design and mixed), as well as new product development. This frame is utilized in our research to support designing questions.

Design awareness

Design awareness has been defined as a critical factor for design capability of a business organization (Dickson, 1995; Jevnaker, 2000; Best, *et al.*,2010; Heskett and Liu, 2012; Storvang, *et al.* ,2014). To better understanding product design skills in small, high-growth firms, Peter Dickson (1995) conducted a survey of CEOs of Inc. 100 and Inc. 500. In the final reported 16 factors, design awareness is listed in the category of innovation skills. Jevnaker (2000) indicated that with good design awareness, design championing will foster corporate design capability. Heskett and Liu (2010) stated six factors to assess design capability through a mix of quantitative and qualitative research. In it, design awareness is defined as

one critical factors. Two years later, Storvang (2014) developed the factors further, combining it with Design Ladder (DDC, 2003).

At one hand, design awareness is a critical factors for design capability of a firm, on the other hand, it can be raised through assessing design capability. With developed design audit tools and validity through cases, Moultrie (2007) shown design awareness can be raised through assessing design capability. Once design awareness is raised in a firm, it will influence implementation and growth (Bruce, *et al.*, 1999). And the design awareness could be consistently grown via successful projects (Jevnaker, 2000; Manzini, *et al.*, 2011) and design knowledge will be built also based on it (Jevnaker, 2000).

Among all the research, it is Design Management Europe (DME) survey (Best, 2009) introduced five factors for evaluating design awareness into four levels. In our study, the five factors is employed as a frame to understand design awareness (DA). They are: 1) awareness of benefit; 2) planning for design; 3) resources for design; 4) Design management expertise; 5) design management process.

Support for design

In previous research related to design awareness, the most important role studied is the CEOs (Dickson, 1995; Song, *et al*., 2008; 2010) and their role in design activities, especially in design project and decision making (Beverland, 2005; Zhang and William, 2008; Buganza and Vergant, 2009; Acklin, 2013; Chang, 2015). Their design awareness will directly decide their strategy of design and implementation (Mozota, 2008; Song, *et al.*, 2008; 2010). Song (2010) proposed four influential factors: design awareness, good sense of design, support for design, and involvement in design. Our study utilizes the five categories of support for design (SD): 1) choosing design talents; 2) financial support for design ; (3) allocation design resources; (4) building a design-supportive climate and structure; (5) improving designer conditions.

Table 1. Frame of design awareness and support for design

Design Awareness *(DME, 2009)*		
DA1	Awareness of benefit	To what extent are people in the company aware of the benefits of managing design effectively
DA2	Planning for design	Is design part of business or marketing plans and objectives?
DA3	Resources for design	What level of resources (staff, budgets and means of production or implementation) are allocated to design activity and how?
DA4	Design management expertise	How do evaluation and selection of the best design solution-to satisfy business, market and consumer needs-take place?
DA5	Design management process	What place does design have in the process when something new is developed; when are designers typically involved?
Support for Design *(Song et al., 2010)*		
SD1	Hiring design talents	choosing design advisors, external consultants, and design directors

SD2	Financial support	approving financial systems and cost controls related to design;
SD3	Allocating design resources	allocating appropriate resources (e.g., working spaces and design equipment) to design;
SD4	Building design environment	building a design-supportive climate and structure
SD5	Improving designer conditions	Improving designer conditions.

Research Methodology

Samples

Manufacturers in the Yangtze River Delta and Pearl River Delta are drawn from the membership list of local industrial design associations. These manufacturing enterprises cover a broad range of size and product categories, mainly from four industries, home appliance, consumer product,digital product, instruments and transportation (Table 2). This is because these industries are the domain ones in the two deltas and with long history, which is titled as 'traditional industry.'

250 questionnaires were distributed to manufacturing businesses in the two deltas regions. 173 questionnaires were collected and judged as valid. All the samples matched the following four requirements simultaneously: 1)manufacturing-oriented; 2) employ design for product development; 3) Hire internal designers, or someone in the role as designer, or responsible for managing external design resource; 4) locate in the PRD or in the YRD.

Samples are selected to represent diverse firms, in term of size, history and business type (Table 2). Half of the samples are small-size business, while middle and big size is with similar number. Ceoncing business type, OEM and ODM firms is same, occupying 15 percent, while around 70 percent firms claim as original brand management (OBM). Among them, 8 percent firms mixed their business types. They may operate with OBM, meanwhile has ODM or OEM business. This is because they start up with OEM and develop to OBM later. Since their manufacturing capacity can maintain a steady cash flow for the business, they prefer to keep it to decrease the risk of launching own brand and offer sufficient financial support.

The history of the firms shows typical economic booms in China economy. More than 70 percent of firms are established after 1994, which is the starting point of second stage Open Policy, marked by Deng Xiaoping's Southern Tour Speech. Other 20 percent firms are set up in the first stage of Open Policy, in 1980s.

Table 2. Descriptive information of sampled firms

	No. of firms	% of sample
History of the firm		
Before 1979	17	10.2%
1980-1994	34	19.6%
1995-2004	101	58.2%
2005-Present	21	12.1%
Industrial sector		
consumer product	57	32.9%
home appliance	17	9.8%
digital product	14	8.1%
instruments	68	39.3%
transportation	17	9.8%
Firm size (No. of staff)		
Small (<300)	87	50.3%
Medium (300~1000)	41	23.7%
Large (>1000)	55	26%
Business type		
OEM	25	14.5%
ODM	25	14.5%
OBM	109	63%
OBM+others	14	8.1%

questionnaire

In this study, the questions are based on John's research (2010) with an emphasize on attitude toward design, which includes design awareness and support for design. The questionnaire consists of four parts, background of the firms, business performance, design awareness and support for design. Concerning the background, size, business type, history and industrial sector is designed for a brief description of the samples. In the performance part, factors about markets, ownership of brand, annual production and annual sales revenue are listed in questionnaire. Factors about design awareness are adopted from Design Management Europe's study of Design Management Staircase (DME,2009). Factors about support for design are borrowed from Song's study about CEO's influence on corporate design management activities (Song, *et al.*, 2010).

However, in DME's research, the five factors are assessed according to interviewees subjective answers. We prefer to transform it into objective questions and test the ideas with pilot study. Meanwhile, Song (2010) introduced five factors of support for design, but had not developed explicit questions about it. To solve the problem, we reviewed literatures of related topics and developed questions for pilot study. In the pilot study, interviewees

showed their interested in objective questions, instead of subjective ones. They think these are easier to answer and contribute to reliable result, which they are interested in. The final questions are redesigned combining all these consideration (Table 3).

Table 3. Redesigned questions in questionnaire

Area	Questions in questionnaire	No. Of item	Origins
Background (4)	Date of establishment.	-	
	Number of employees.	3	
	Division & plant	3	
	Product category	5	
Business performance (6)	Business type	4	
	Core competence	5	
	Net annual production (quantity) of products.	5	
	Net annual sales revenue.	5	
	Ownership of brand	2	
	Market	3	
Design awareness (5)	Design awareness	2	DA1. Awareness of benefit
	Design plan	2	DA2 Planning for design
	Developed annually product by design.	5	DA3 Resources for design
	Design expertise needed	3	DA4. Design management expertise
	When design in a process	3	DA5. Design management process
Support for design (6)	External design	2	SD1 hiring design talents
	Annual expenditure in design	5	SD2 financial support
	Design dept	2	SD3 allocating design resources
	D Investment in a process.	6	
	Decision maker	-	SD4 building design environment
	goals for the internal design facilities?	2	SD5 improving design conditions

Settings

According to the report of the World Bank, the leading role of the PRD in Chinese economy and business can be demonstrated by the following fact: the PRD economic region accounts for 34% of China‟s exports and 24% of China‟s foreign direct investment (FDI), mostly contributed by SMEs (including those invested from Hong Kong). The region is a vital part of global production networks across the Pacific. The PRD also takes a leading role in

developing design. The first design firm in China is established there. The provincial of Guangdong government has realized the importance of design and manages to develop it in various ways. They have established Shunde Industrial Design Distinct and a China original product design award: Cottontree prize. Furthermore, Shenzhen has even been awarded the title of City of Design by the United National Educational, Scientific and Cultural Organization (UNESCO) in 2008.

Although the YRD only covers an area of 109,961 sq.km which is about 1% of China's total land area, its GDP reached RMB 7,179 billion in 2009, which was 21.4% of the whole China economy. The YRD is an important economic powerhouse of the Chinese mainland, with Shanghai as China's financial and logistics centre, and Zhejiang and Jiangsu as increasingly important manufacturing regions. The YRD's total population stood at 92.2 million at the end of 2006, accounting for 7% of China's total. At present, there are more than 100 design firms in the YRD. Since 2007, the World Industrial Design Fair (WIDF) was held in Ningbo every year. And the Wuxi (National) Industrial Design Park is established. As the leading city in the YRD, the Shanghai Creative Industry Centre (SCIC) had been set up in 2004 to promote the development of creative industry. It is responsible for organizing Shanghai International Creative Industry Week every year. With its endeavour, numbers of creative industry clustering parks have been formed.

Data collection

The process of collecting data is divided into two stages: survey and interview. Local design associations prepare a list of membership and potential samples. After discussion, the final list of 250 firms are selected. Questionnaire are distributed to the PRD and the YRD by them via email. Questionnaires were sent out via email. Telephone interview was utilized to clarify certain answers and further understanding of certain confused results.

Results

Business performance

The firms have developed solid manufacturing basis, producing a large number of products every year and achieving sales revenue around 100 RMB per unit (Table 4). Around half firms produce product more than 1 million units annually and annual sales revenue is over 100 million RMB.

Majority firms claim that they have established their own brands. However, there is a 5 percent gap between firms with own brand and firm with OBM business. These firms state established own brands, while they do not operate OBM business. We try to explore the reasons for this via telephone interview. They consider registered trademark or even logo of firm as brand. This is a misunderstanding of brand concepts.

Concerning markets performance, around 70 percent firms have developed oversea markets and more than 20 percent only focus on exported markets. This is the evidence of Made in

China known as manufacturing base of the world and producing about 80% of the world's air-conditioners, 70% of its mobile phones and 60% of its shoes (The Economist, 2015).

Table 4. Business performance of sampled firms

	No. of firms	% of sample
Annual production		
missed	9	5.2%
<100,000	37	21.4%
100,000-300,000	19	11.0%
300,000-600,000	12	6.9%
600,000-1,000,000	14	8.1%
>1,000,000	82	47.4%
Annual sales revenue (Million RMB)		
<10	24	13.9%
10-30	23	13.3%
30-60	23	13.3%
60-100	25	14.5%
>100	78	45.1%
Brand		
Established own brand	132	76.3%
No brand	41	23.7%
Markets		
Domestic: China	55	31.8%
Global: China &oversea	79	45.7%
Oversea	39	22.5%

Design awareness

Five questions of assessing design awareness in DMS is employed in our questionnaire. In it, there is an independent question about whether they have the awareness of benefit contributed by design (DA1). However, all the firms gave confirmed answer and stated they had clear awareness about design. Although their design performance varies, they seems eager to show their confidence about design and motivation for developing design from their answer. Another possible explanation is the interviewees of the firms are shame of showing no or little awareness of design, especially most of them are CEO. This is quite same in plan for expanding design capacity (DA2). Nearly 80% of firm gave positive answer (Table 5).

According to feedback from pilot study, the factor of annual products developed by design replaces the question about resource for design (DA3). This is because the new question is

easy to answer with explicit number and is a critical factor to demonstrate the resource allocation for design. Developing new products is the main function of design in a firm. There are two opposite directions of design used in all enterprises, extremely limited utilization and sufficient utilization. In the first direction, design is only employed in 10–20 percent of annul products, while it is used in more than 60 percent of products in the second direction. The two directions define design status and its role in a business. In the first direction, design plays a supplementary role in product development. It is seldom applied to products annually and usually with a limited investment in the whole product development process. In the second opposite direction, design is used frequently with high investment. In this regard, design usually has high status and takes a leading role.

Based on feedback from pilot study, design expertise needed in the coming three years is utilized to show the design management expertise (DA4). More than 60 percent of firms have planned to expand the scale of the current design team; 50 percent prefer to hire 1–5 designers in the near future. Compared with 70 percent of firms which have plans for internal design facilities, this shows that not all firms will improving design capability via expanding scale.

When design is involved in a typical new product development process is utilized to understand design management process (DA5). In around 40 percent firms, design is involved upstream of a product development process. This demonstrates a high status of design. In nearly 50 percent firms, design is involved midstream. This implies its contribution for product development as styling offering, instead of planning strategy.

Reviewing the results of five questions for design awareness, a distinguished answer between subjective and objective questions is shown. For subjective questions, such as design awareness (DA1) and design plan (DA2), no evidence needed to support the answer, the interviewees managed to demonstrate high design awareness through the answers. For the objective questions, such as annual product developed by design (DA3), designer needed (DA4) and when design in a process (DA5), concrete evidence is required. And the results show backward design awareness.

Table 5. Design awareness

	No. of firms	% of sample
DA2. Plan for design		
With plan	134	77.5%
No plan	39	22.5%
DA3. Annual products developed by design		
No answer	6	3.5%
5~10%: ;	54	31.2%
10~20%	32	18.5%
20~40%	39	22.5%
40~60%	17	9.8%

>60%	25	14.5%
DA4. Design expertise needed		
No need	65	37.6%
1~5	85	49.1%
5~10	14	8.1%
>10	9	5.2%
DA5. When design involved in process		
No answer	4	2.3%
up-stream	69	39.9%
mid-stream	85	49.1%
down-stream	10	8.7%.

Support for design

Questions for understanding the top managers' attitude and actions of supporting design are developed based on Song's research (2010). It have been adjusted according to comments from pilot study too.

External design service (SD1) is popularly utilized in 70 percent firms. Most of them hire external designers not only for fresh ideas, but also to accumulate good design knowledge and experience of design management. These small businesses usually lack investment and experience. They prefer to rely completely on external design resource to fulfill all the design work. Annual expenditure on design is limited (SD2) . More than 40 percent firms spend less than 500,000RMB annually, while nearly 80 percent allocate less than 2,000,000 RMB per year (Table 6).

Nearly 90 percent firms have established their internal design department (SD3). However, its location in a organization structure varies from independent functional department to a sub-function in R&D, Marketing or Engineering department.

CEO is reported as the final decision maker of design in 65 percent firms, while only 10 percent firms leave design to make decision (SD4). This implies the status and influence of design in the firms is still weak.

Nearly 70 percent firms state they will keep developing internal design facilities (SD5). However, comparing with 80 percent firms planing to expand their design capacity, a 10 percent gap is shown. It is highlighted later in the interviews. In practice, the means of expanding design capacity can vary from internal design facilities to equipment investment. Some enterprises emphasize investment in physical products or facilities, while others prefer intangible knowledge and experience, which leads to difficult definition of an explicit goal.

Overall, a positive attitude toward design is shown from the results of questionnaire. Majority of the firms have established their internal design team, had ever hiring external design for learning-by-collaborating and set up goals for the internal design facilities.

However, their investment in design shows conservative attitude. Annual investment in design is lower than 2 million RMB in around 80 percent firms, while design expense is lower than 20 percent of a project cost in 70 percent firms. This implies that the function of design is understood by the firms and they would like to develop related resources. However, the profit contributed by design is unknown. As a result, the firms are cautious of cost input of design.

Table 6. Support for design

	No. of firms	% of sample
SD1. Hiring external design		
Yes	121	69.9%
No	52	30.1%
SD2. Annual expenditure in design (Million RMB)		
No answer	3	1.7%
<0.5	74	42.8%
0.5~2	62	35.8%
2~5	22	12.7%
5~10	6	3.5%
>10	6	3.5%
SD3a. Establishment of design department		
Yes	149	86.1%
No	24	13.9%
SD3b. Investment of design in a NPD process		
No answer	5	2.9%
<5%	34	19.7%
5~10%	52	30.1%
10~20%	37	21.4%
20~40%	28	16.2%
40~60%	12	6.9%
>60%	5	2.9%
SD4. Decision maker		
CEO	113	65.3%
Design director or design team	16	9.2%
Other managers	44	25.5%
SD5. Goals for the internal design facilities?		
Yes	119	68.8%
No	54	31.2%

Discussion

Design awareness

In John's research, design awareness is reported as an independent factor, which consists of two dimensions, top manager and whole firm (2012). This is summarized from the interviews of CEOs. Top manager means only top managers understand the importance of design, while middle-level managers and staffs may do not understand. This is explained further in our research. All the top managers are eager to show their good design awareness, while their implementation is backward. This implies that their design awareness maybe not good as their statement and the real awareness may be shown by their implementation.

Support for design

This is only one factor in John's research related to support for design, which is the establishment of internal design department (2012). This has been involved in our study. With additional questions, support for design in the firms is explored further. The firms emphasize it on resource allocation and development, such as expertise, facilities and organizations. This show an positive attitude toward design development. However, coming to the financial support, the firms are conservative. This may be because of their understanding of design. From the interview, we know the firms think design is important, because it had begun a common sense in the industries. They learned it from fierce market competition. However, in most of the firms, design is still viewed as part of cost input, instead of value added or creation. This can explain two models in John's research, design follower and styling-focused. Both view design as a component of product.

Research possibilities

Transform the research language into new context is the difficulty we meet in this study. Chinese manufacturers lack knowledge of design and can not understand the questions very well. This is our finding in pilot study. They prefer questions with scale or order, with which they can answer easily. So HOW TO adopt existing frame into new context could be a research opportunity. It could be related to linguistics, history, cross culture and education.

In the previous studies, a positive loop among design awareness, design capability and support for design is proposed. This study just focuses on the design awareness and support for design and emphasizes on describing the performance, instead of explore cause-linkage. A study of WHAT IS their linkage and relationship among them could contribute to built a model of it and will be an efficient guideline for developing design capability.

Conclusion

Based on John's research of managing design in Chinese manufacturing industry, we studied design awareness and support for design for further understanding design in the context and

explain John's models. Basic understanding of design and its importance has been established in the manufacturers. However, they still lack understanding value of design and design is viewed as a cost, instead of increased profit in most cases. Overall, they have the basic understanding of design, while lack good design awareness. Their support for design also illustrates similar results. Firms endeavor to develop or allocate design resources for efficient work, but limited in investment in design. This can be explained by their cost-view of design. In the future, study the relationship between design awareness, support for design and design capability is urgent and important. With it, CEOs could transform their awareness of design as value creation from brief understanding as styling.

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About the Author:

Xihui Liu is research assistant professor in School of design, the Hong Kong Polytechnic University, where she obtained PhD degree in 2011. Her research areas are design collaboration, design capability and design policy.

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Design Expanding into Strategy: Evidence from Design Consulting Firms

Suzan Boztepe

IT University of Copenhagen
suzb@itu.dk
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Abstract: The purpose of this paper is to examine how design works at the level of strategy. Through analyses of the practices of five design consulting firms in Denmark, it explores how designers become part of strategy formation in the first place, the types of strategic work they undertake, and what design skills and knowledge they utilize in the making of strategy. The findings suggest that designers engage in strategy-level work in multiple domains ranging from redefinition of existing strategies to building unique organizational competencies to setting corporate vision by developing future scenarios.

Keywords: strategic design; design consulting firms; design management

Introduction

Design is no longer concerned with giving form to products only. It has been expanding into corporate strategy formation and becoming a conceptual field. Buchanan (2001), for example, named four orders of design, the last two being what he called strategic planning and systemic integration. The expansion of design is also increasingly recognized by the corporate world: There is a growing enthusiasm over design's contribution to strategy formation. Organizations increasingly turn to design in order to gain competitive advantage (e.g., Brown 2009; Liedtka, King, & Bennett 2013; Ravasi & Lojacono 2005; Martin 2009). Many leading business schools around the world are now offering design-related courses in their degree programs. One can even talk about a confluence between firms in strategic management consulting and those in design consulting. This enthusiasm, however, does not seem to have a solid research base about design's supposed strategic impact. In spite of the growing acknowledgment of design's relevance to strategy, the mechanisms of design's strategy-level work are yet to be explored. This paper examines design's ways of engagement with strategy by analyzing the practices of five design consulting firms in

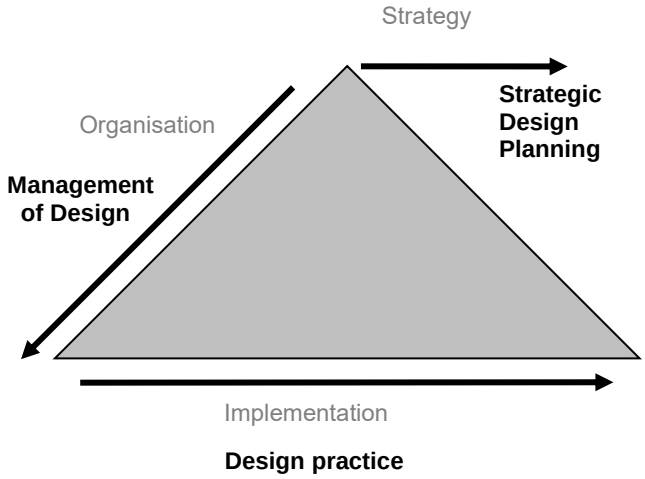
Denmark. Specifically, it explores how designers become part of strategy formation in the first place, the types of strategic work they undertake, and what design skills and knowledge they utilize in the making of strategy.

Strategic design

The idea of design as a strategic tool in organizations dates back to the 1950s, when prominent designers such Donald Deskey and Raymond Lowey argued that design is a high-level planning activity, essential for business competitiveness (see Heskett forthcoming). Even though their ideas generated some attention, they went largely unheeded in less than a decade. The role of designer as a strategic planner was not welcomed by corporate America either, ruled then by the elites of financial management—as it is today. While the relationship between design and strategy became a subject of scholarly interest in the 1980s, the work in this area has remained underdeveloped to this day. Design borrowed contemporary strategy theories to argue that design could be one source of strategic advantage (see Borja de Mozota 2011). For example, many were inspired by Porter's (1980) positioning approach, which views strategy as achieving and sustaining competitive advantage through establishing a favorable position in industry vis-à-vis competitors by differentiation or low-cost (e.g., Blaich & Blaich 1993; Kotler & Rath 1984; Lorenz 1986; Walsh, Roy, & Bruce 1988). They argued that by creating visually distinct products design achieves low cost and differentiation, and thus, competitive advantage. With the rise of the resource-based view (RBV) (e.g., Barney 1991; Wernerfelt 1984) and dynamic capabilities approach (DC) (e.g., Eisenhardt & Martin 2000; Teece, Pisano, & Shuen 1997), in which strategy is seen as building and reconfiguring firm-specific resources and capabilities, the ideas about design's strategic contribution changed as well. According to RBV and DC, design as a single, visually differentiated product is easy to imitate, and thus, can bring only a short-lived competitive advantage. Therefore, it can easily be dismissed as a source of strategy. The focus then shifted from design as creator of differentiated products to design as an organizational activity with its own systematic processes, routines and even its own attitude, which can be ingrained into organizations and can be reused. For example, many claimed that designers push for a fresh thinking about innovation throughout the organization by the priorities they hold and the tools they use (e.g., Borja de Mozota & Kim 2009; Jevnaker 1998; Svengren Holm 2011). It this sense, it was argued, design becomes an organizational competence that can lead to sustained innovation, as opposed to delivering one-time creative outputs. Indeed, RBV and DC offer a frame of exploration for design's strategic contribution that is broad enough to account for a wide range of design activities in an organization.

However, according to Heskett (forthcoming), this will give only a partial picture of design's relationship to strategy-- the reason being that design is largely neglected in existing management and economic theories. Particularly, the questions of how products and services are actually developed as well as how they are used beyond the point of sale, both of which are areas of concern for design, have either been ignored or addressed

inadequately. Further, the obsession of economics and management with the quantitative makes it difficult to deal with the tacit nature of some of the design knowledge, not to mention that it makes it blind to design's issues such as values, human and social benefit. Therefore, Heskett vehemently argued that design needed to establish its own theory of value creation which would take into consideration both the contribution of design to business success and its impact to society and individual lives at the same time. He acknowledged that such contribution will be at varying degrees and levels, depending on many factors including, but not limited to, industry, firm size, market structures, culture, etc. He even laid the foundation by offering a three-layered framework for design's functions within organizations (Figure



1)

Figure 1 Varied levels of design function in organizations (Heskett 2005).

Each layer denotes to one of the three basic levels at which any organization operates: (1) strategy sets out the direction of organization, its products and markets, (2) organization refers to the managerial structure responsible for the implementation of a strategy, and (3) implementation is responsible for the execution of strategy in terms of development and delivery of particular products or services**.** The most common design practice occurs at implementation level. Here design is part of product development teams, and it is mainly concerned with the application of technical skills. The management of design is concerned with the integration of design competencies in a firm. Finally, at the level of strategy, design is engaged with framing a vision of the future, giving a sense of coherence and direction to organization, and creating new value.

This three-layered model of the functions of design also received empirical support (e.g., Perks, Cooper, and Jones, 2005). Note that the three-level distinction in the model does not suggest a progression from one level to another. All three levels may exist simultaneously, even within the same organization. Different organizations utilize design at different levels, which Heskett (2003) classified as below (Figure 2).

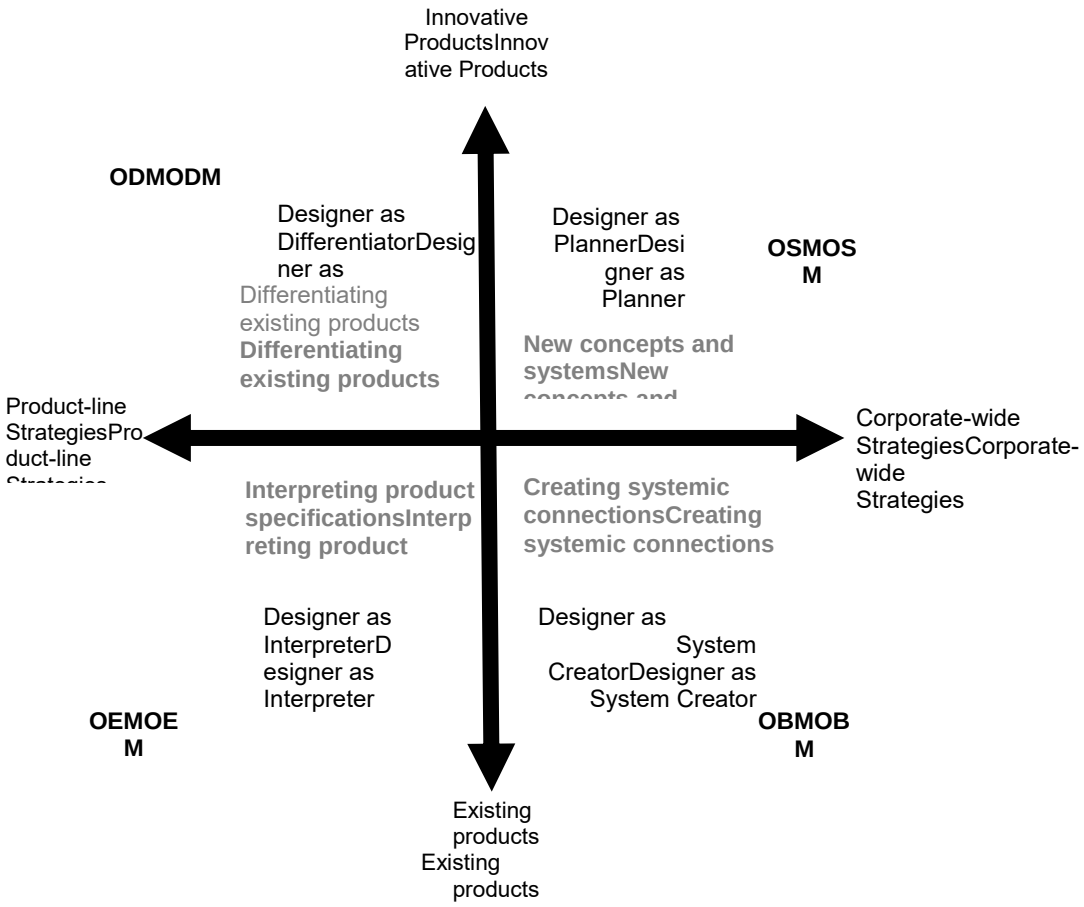


Figure 2 Design utilization in different organizational contexts (Heskett 2003, p. 11)

The horizontal axis identifies whether the organization's emphasis is on product-level or company-wide strategies. The vertical axis, on the other hand, is concerned with the degree of innovation, ranging from focus on existing products with incremental innovation to creation of new concepts. Accordingly, four types of organizational context are identified based on the role of designer: In the lower left quadrant, designers function as interpreters of existing products. They are typically engaged in superficial improvements of product line with little or no differentiation. Heskett called this executant role, as designers implement ideas generated by other functions in the company or clients—a situation commonly observed in Original Equipment Manufacturing (OEM) firms. In the upper left quadrant, designers' emphasis is on differentiation of products in a way that they create a distinct market position, which is typical of Original Design Manufacturing (ODM) firms. The lower right quadrant refers to the role of designers as system builders, which involves a managerial role. The focus is placed on systemically connecting the overall output of a company, which is part of Original Brand Management (OBM). Finally, the upper right quadrant corresponds to Original Strategy Management (OSM). Here designers get involved in the creation of innovative plans for the company as a whole. That is, they use design to set vision and direction for a company, as well as identify strategies for systemic innovations which are

harder for competitors to replicate and which can lead to long-term competitive advantage. As strategic planners, they offer tangible insights into future possibilities through a range of scenarios. Such scenarios can explore potential future experiences, new technologies, markets and products, and can provide the basis for assessing their desirability, feasibility and viability. Given the present state of high uncertainties for businesses, Heskett stressed that one of the key contributions of design at OSM is to act as a highly flexible tool for exploring possibilities and flexibly responding to new and unknown situations.

Even though the work of design at this level is not yet a pervasive phenomenon, it has already received some attention in the management research. There are even arguments that design has to be adopted by top management into their own practice (see Liedtka 2000; Martin 2009; Simon 1993). This idea was originally put forward by Simon (1993, 1996), who suggested that strategizing is designing—the reason being that any management activity aims to create a new state for organizations, markets and even industries, and design is precisely concerned with the creation of new future states. Consider the outcry in the management community for more originality, creativity and synthesis in strategy formation that started in the 1990s (e.g., Mintzberg 1994; Prahalad & Hamel 1990; Simon 1993). At the heart of those calls lied an observation that strategy formation processes fall short in generating original strategies and predicting the future in uncertain environments because of their heavy reliance on extensive quantitative analyses and elaborate choice making. It was precisely in this context that Simon proposed design as a model for strategy making. After all, alternative generation, creative thinking and synthesis are at the heart of design. That is, designers spend considerable effort on ideation and iteration in order to arrive at new solutions that are better than the existing ones. As with design, strategy making is abductive in nature. That is, it is concerned with envisioning a desired future state, and creating a blueprint for turning it into reality (Liedtka 2000). Also, the problems design and strategy deal with are of similar in nature: They are too sophisticated with multiple variables that cannot be resolved with statistical means alone. Design is known for its ability to deal with such problems (Buchanan 1992). It is a compelling factor that brings essential competencies to strategy table that could allow for a more creative and generative process, balancing out the efficiency-based approaches typically employed in strategy formation.

While these shared attributes between design and strategy making present a compelling argument for design's role in strategy creation, research is needed on what design has to offer to the making of strategy, and how it actually works at that level. The emergence of strategy-as-practice (SaP) approach (Jarzabkowski et al. 2007, Whittington et al. 2003) may provide a theoretical backdrop for such situated understanding of strategy work. In SaP, strategy is viewed as a locally constructed phenomenon through actions of organizational members. It is based on the premise that upper management is not the only place where strategy making occurs.

Method

The study involved case studies of five design consulting firms in Denmark. The participating companies ranged in size from 9 to 100+ employees. Three participants had offices outside Denmark. The services offered included graphic design, interaction design, advertising, manufacturing coordination, service design, user research, strategy design, and organizational processes design.

The primary data collection technique was a series of semi-structured interviews. Heskett's (2001) case study guidelines were adapted and used as a framework for the interviews. Initially, interviews focused on firm structure, clients, position, project management, services, etc. Then, they were directed to individual projects aiming to create a retrospective account of the whole project development process. The goal was to describe the participating consulting firm's structure, its position in the market and the industry, and the use of design/human-centered design at the levels of (1) strategy and planning, (2) management of design, and (3) implementation.

All interviews were conducted face-to-face on site. At least three interviews were conducted in each firm. The interviewees were partners, design managers, project managers, and/or designers, among others. Each interview lasted 2 to 3 hours, depending on the interviewee's availability. Additional data involved archival information such as company statistics, project documentations, media articles, and photos of products and of the workplace, etc. All interviews were tape-recorded and then transcribed. A total of 29 hours of interviews was recorded. The transcribed data was coded for categories, as identified in the guidelines. Specifically, I looked at how design functioned at execution, management and strategy levels. Next, patterns of practice across different cases were identified. The issues of how diverse user/market needs are addressed, how they are reconciled with other business requirements, how they are deployed in innovations, and how design is functioning at strategy level, including setting vision, distinctive market positioning, future plans, sustained company innovativeness were analyzed. Finally, based on the grounded descriptions of design practices and analyses, strategic practices and design functions of the participating consulting firms were identified.

Design's ways of engagement with strategy

Preliminary findings show that designers operate at multiple levels ranging from creating specific products to integrating innovations into systems and finally to strategy-level work. Any strategy-level work was characterized by the use of design knowledge, skills, processes and tools to help shape an organization's competitive positioning, devise future plans, or build capacity that will impact organizational innovativeness. I will specifically discuss here three ways in which design consulting firms were engaged in such work.

Strategy Redefinition

Design consulting firms were often viewed by their clients as mere implementers of existing strategies. However, they often challenged, reinterpreted, or even redefined those strategies. One way in which they did so was through their efforts to define the design problem they needed to solve. While clients typically approached design consulting firms with a problem already at hand—often manifested as a request for a product—the common assumption among designers was that the real nature of the problem is almost always veiled. Therefore, all participants were at some point engaged in problem redefinition and creation of the project brief. In so doing, they typically employed ethnographic or participative user research. For example, one partner reported that they included user research even if the client did not pay for it because "solving the right problem is more important than having a good solution to a wrong problem." While user research provided valuable input for the development of a brief for a specific product, they also often put into question higher-level organizational decisions. For example, a consultancy that was hired to develop a product for a medical company discovered from user research that in the eyes of the medical practitioners, the company had too many products, and that it was hard to distinguish which one was the best in a given situation. The project thus changed direction and resulted in several sub-projects, including streamlining the portfolio in light of the users' needs, creating educational packages for medical practitioners, and reorganizing some of the firm's structure and processes to deliver innovations taking into account users' experiences.

Another way in which strategy redefinition occurred was by giving it a tangible form. Strategies as devised by clients were often abstract statements. An important function of design was to translate those statements into tangible reality, giving them form and turning them to experiences that users would value. In so doing, designers relied heavily on visualizations. For example, they used storyboards, sketches and mockups to paint a picture of how those abstract statements could be turned into tangible futures. While they were not necessarily part of the end deliverables, clients often returned to those visuals as tangible representations of whats and whys of their strategies. In other words, visuals turned over time into a tangible organizational resource that different stakeholders could easily refer to. But it was not only the visuals created along the way that led to reinterpretation of strategy. The end products too served a similar function. For example, a grill manufacturer approached a design consulting firm with a desire to extend its sale season beyond the summer. Designers created a new range of products, which not only extended the brand's sale season but also took the brand inside the kitchen. The products projected a specific lifestyle image around grilling, which, in turn, guided later innovation initiatives within the company.

Capability Building

All consulting firms were involved in projects in which they contributed to building innovation capabilities in the client organization. Some of this capability building was carried

out explicitly as defined by the project brief. For example, under the threat of commoditization of its core product, an energy company turned to one of the participants to fuel innovation in different parts of the organization. Designers observed the work of the organization, conducted a series of interviews, and looked at the product development processes as prescribed by the management. They then developed custom processes as a roadmap to integrate design skills and methods into the organization's routines. Acting as process trainers, they engaged members from different divisions and ranks of the client organization in workshops in which participants experienced hands-on the design approach and tools. The idea was that the best way to understand design's approach to innovation is to be immersed in it. It was hoped that this approach would be a step toward changing the organizational attitude in favor of design. The designers then created tangible tools such as games, cards and templates that would supposedly encourage and support innovation within the client organization. These tools generated ways around which new organizational processes of idea generation and development could grow.

Most capability building occurred implicitly, in the form of a knowledge spill to the clients. Members from the client organization were typically included in the design team in whole or part of the project. This involvement inevitably created a familiarity with the design process. The client members were reported to pick the process and the tools, and apply it to other projects in their own organizations.

The participants believed that their knowledge brokering capability was one of the reasons they got hired by their clients. That is, by working with clients in multiple industries and different geographical areas, design consultancies transferred their knowledge about users, materials, technologies, trends, etc. to clients in new industries where such knowledge had no prior existence. This, in turn, allowed clients to get access to knowledge domains that they previously have regarded as not relevant.

Strategy Building

All design consulting firms were involved in projects related to competitive positioning, identifying new markets, future forecasting, or vision setting—i.e., the kind of work that they considered to be at the level of strategy. Of these, competitive positioning was seen as a prerequisite for any project as it was assumed that each new product should differentiate and favorably position their client. It is not the only way though. User behavior data too was used to identify opportunities for unique competitive positioning. For example, a user research on the notion of home in Scandinavia revealed that technology was not something people wanted to be central in their house. This kind of observations led to the idea of reframing technology as a cherished domestic object that enables comfort and coziness. As a result, the client, an electronics manufacturer, had to change not only its design language but also its strategy that had previously emphasized technological performance.

Design consulting firms were also directly involved with activities traditionally considered to be a cornerstone in strategy formation including new market identification, future forecasting and vision setting. Such work typically involved creation of vivid, tangible

scenarios of the future, constructed on the basis of a combination of user studies, trends and technology research and creative thinking. For example, one consulting firm was engaged in envisioning the future of health innovation within a 20-year period for a major pharmaceutical company with which it had a long-term engagement. The project involved both identifying new market creation opportunities and charting of a strategic direction. Trying to predict the future with such timespan may look like an effort in vain. In fact, the project attempted not just to predict what the future would be like, but also give it a specific direction by designing products, services and communications that would lead to that future—relying on observations, interviews and the best information available on trends in various other areas. Designers produced short- and long-term scenarios in the form of movies and posters for desired user experiences, new pharmaceutical business models, products and services. By doing this, they were able to visualize an abstract company direction and vision, and link it to the tangible reality of actual products. The products may never be realized, but they created a vivid image for the client of what the future might be like, and how the company could shape it. They also were intended to raise the company's awareness and preparedness in the face of a shift of focus from curing diseases to preventing them or helping patients manage and improve their lifestyles.

The path to strategy-level work

As it emerged from the data, design consulting firms get involved in strategy-level work in two distinct but related ways:

Repeated Client Engagements and Trust Building

As design consulting firms work with the same clients over and over again, they build client trust, as a result of which the complexity and strategic importance of their deliverables increase. This includes identifying innovation opportunities and even helping organizations develop their own innovation approach. Each new project is treated as part of a larger system of integrated products, processes, services, environments, etc. That is, they have "ongoing conversations" with their clients, in one partner's words. He noted, "the most important design works happen between projects." That is, the identification of future opportunities in fact takes place when the client is not actively seeking help from the consulting firm. Another participant called his firm's relationship to long-term clients strategic design partnership, emphasizing how integral their work is to clients' own strategic processes. Yet another one called this type of work a design program, explaining that what they do is basically about helping create an organizational design culture.

User-Centered Design

User research often serves as a stepping stone for design consulting firms to get involved with strategy-level work. It brings user needs, problems and opportunities into focus. These may have to be addressed at the level of product, but may also call for changes at organizational processes, structure or strategy. User research allows for an abstraction of

the problem presented by the client—the task changes from designing a product to solving a problem identified from users' standpoint. In other words, it allows for strategy-level discussion and solution seeking.

Expanded activity area

In parallel with an increase in the complexity of their work, design consulting firms have also expanded their activity areas over the years. Initially, they simply focused on one or two design areas, such as product design or graphic design. Over time, they offered a wider range of services, including communication design, service design, portfolio management, corporate design policy development, etc. This expansion was driven by clients' demand for complementing products as well as consultancies' own search for locking clients in through integrated offers. Some consultancies went through horizontal integration. That is, they included a diverse set of design services in the offering. Others expanded through vertical integration—they started to perform either upstream or downstream activities. For example, one consulting firm provided manufacturing and logistics in addition to design. Another one specifically focused on downstream activities of research marketing and planning.

Characteristics of design's strategy-level work

There were some patterns across design consulting firms in the way they perceived and organized their work at the level of strategy. Some of the characteristics of design's strategy-level work include the following:

Strategy as a Product. From designers' point of view, "strategy is just another product." Therefore, it should be a result of the same process used for designing physical products, interactive systems or services.

Transdisciplinary Work. The projects were executed by transdisciplinary teams, which, depending on the project, involved social scientists, engineers and designers, etc. But the consulting firms differed as to their approaches to how teams should be formed. They were experimenting and struggling with different ways of forming teams, and allocating and distributing their human resources.

Resetting Expectations. A great deal of attention was given to altering client expectations, identifying the problem, and setting up of the right brief. An assumption was that it is never possible to predict from the beginning of a project what exactly the problem is or what kind of offering will solve it.

User-Centered Design and Co-Creation. User-centered design was at the core of strategy-level work of the firms. This allowed for bringing into focus the questions of what to do. It also means a shift of emphasis from solving the perceived problem to identifying the problem. In addition to front-end user studies, co-creation was utilized in different stages of the projects.

Visualization. Visualization tools were used to describe and analyze complex situations, generate, improve and evaluate alternatives, and present solutions to clients. The clients, however, did not always welcome consulting firms' reliance on visual thinking. Several interviewees reported that clients often mistrusted anything that is not presented in numerical terms—particularly new clients.

Creative Thinking. All participants believed creative thinking was a significant asset that they owned. Many developed structured approaches to support it—each consultancy had its own processes and selected set of tools that fostered creative thinking. They were mostly related to idea generation and alternative development. However, the consulting firms differed in their preference over involving clients at ideation stage. While one participant explicitly included clients in idea generation and later handed them what they called an idea book containing all alternatives generated in the session, another one carefully kept clients away during this phase. The physical space in each firm was organized in a way to support creative work. Typically, the offices were set up as studios—characterized by toys, drawing materials and surfaces, various images, interesting objects and modeling materials.

Client Training. Innovation training, design workshops and similar activities were routinely carried out to build client capability. Transferring innovation knowledge to clients was not seen as a threat. This is partly because consultancies have built a somewhat complex set of competencies and interlinked services, which they believed would still be needed by their clients. The common belief was that the more clients knew the design approach the more they would involve design consultancies in strategy work.

Conclusion

This study provided some initial insights into design's ways of engagement with strategy formation. First, design's emphasis on users can help change the way companies strategize. It provides a way for addressing the key strategy question of what to do next. In tackling this issue, designers are driven by the insights generated about users and the idea that they could profoundly improve users' experiences. By keeping strategy development process grounded in user experiences, strategy can be formed in ways that would be meaningful from users' perspective. This, in turn, may alleviate some of the risks associated with uncertainty. Second, design's emphasis on creative thinking and alternative generation has the potential to create opportunities unknown to company, and, consequently, distinctive and more competitive strategies. Also, generating multiple alternatives supports a more effective strategic decision-making process in uncertain markets. Third, visuals and prototypes are a staple of fostering experimental and creative thinking—essential for building an organizational culture of innovation. Visualization and prototyping can help create a common language and an environment conducive to learning within the organization. Visualization makes strategy tangible and understandable. As for prototypes, they not only allow for quick testing but also provide feedback for the alternative being considered. By so doing, they push for making improvements and generating new ideas. Prototyping allows organizations to rapidly generate new knowledge about the current

situation, which, in certain cases, may compensate for the lack of up-front information about uncertain markets. Designers' strategic work seems to involve continuous innovation rather than single projects. The ability to weave them together as part of company direction, and to communicate and defend design ideas with clarity and conviction stand out. Also, design's engagement with strategy seems to be fostered by early involvement in client projects and long-term relationships with clients. However, more research is needed to fully uncover the dynamics of design's work at the level of strategy. Future research needs to investigate the effectiveness of the design factor, the internalization of design knowledge in organizations, the use of specific design tools and methods for strategic decision making, and the application of design in different organizational domains.

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About the Author:

Suzan Boztepe is Associate Professor of Design and Business at the IT University of Copenhagen, Denmark. Her research interests include generating economic value by design, design-oriented innovation, and the strategic impact of design. Specifically, she examines design's ways of contributing to development of organizational innovation capabilities, creation of strategy, and organizational change

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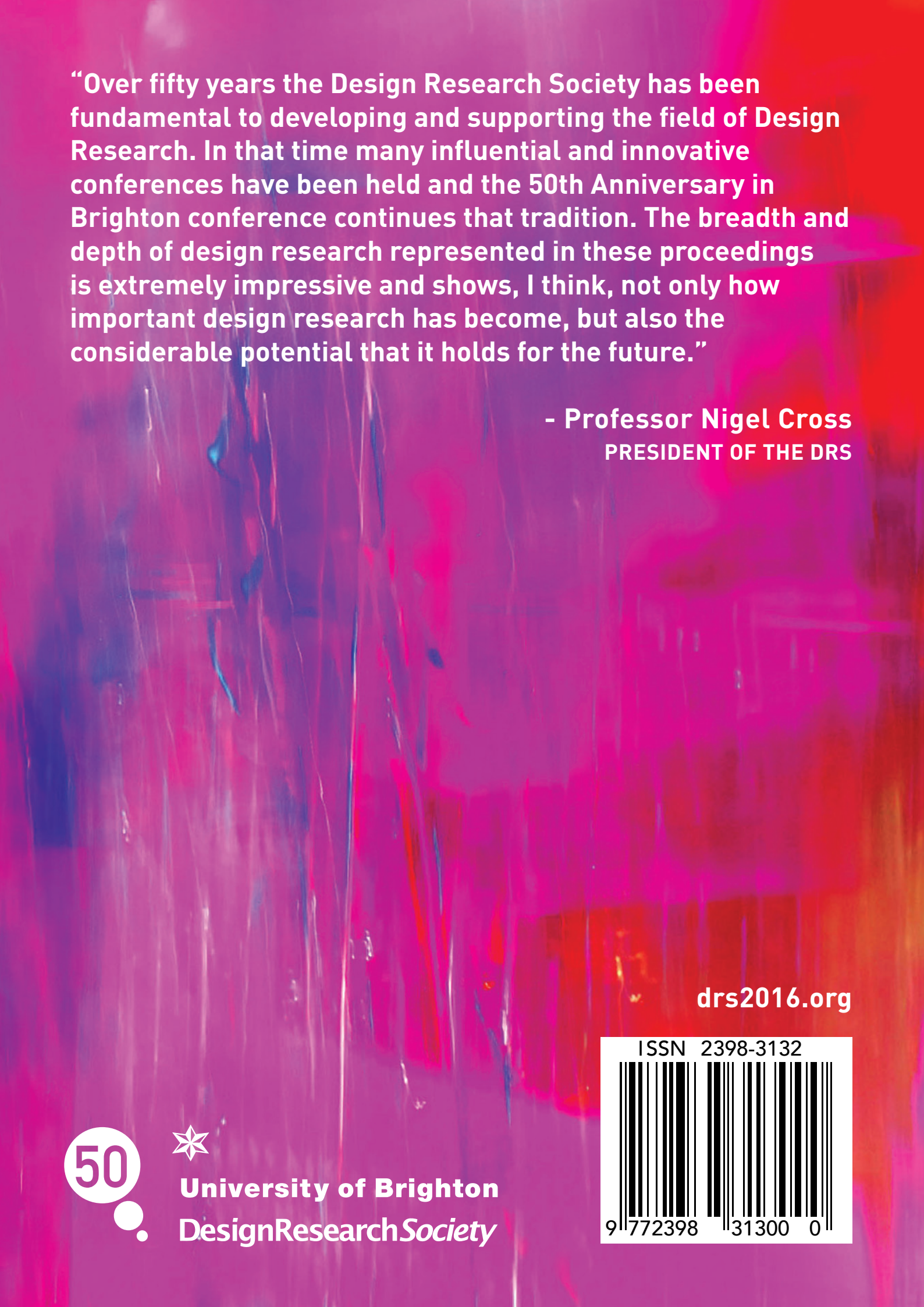

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