

PV259

# Programování generativního designu

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organizace

Úvod do problematiky programování vizuálních výstupů pro grafický design a umění

Výuka orientovaná prakticky - práce na zadáních

Prezentace studentských prací – každý 1x za semestr

# organizace

**Barva** - barevné palety skrze interpolaci, zpracování barevné palety z obrazu, organizace ploch podle programovaných hodnot.

**Tvar** - organizace rytmicky řazených tvarů, komplexních modulů v rastru, generování růstové struktury, programování štětců, štětce pro kreslení písmem a komplexními moduly.

**Písmo** - parametry vektorového písma, programování hodnot ovlivňující velikost písma, orientaci písma, vizualizace písma v textu, práce s křivkami, programovaná mutace písma.

**Náhodnost a šum**, oscilační křivky.

**Atraktory**, stromové diagramy, dynamické datové struktury.

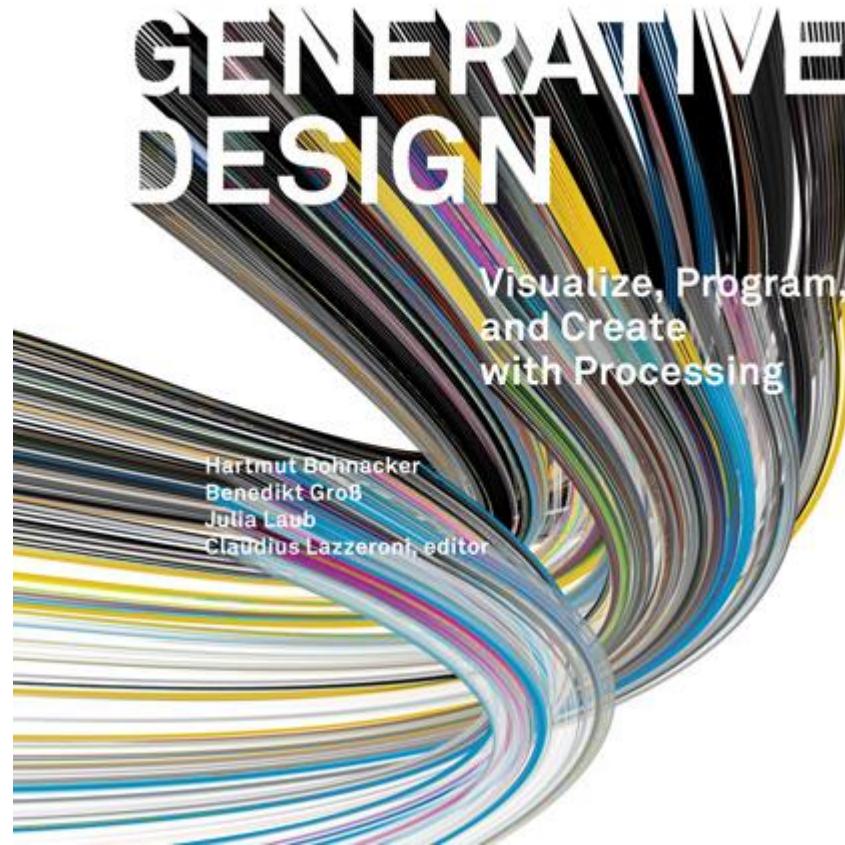
Rozvíjení interdisciplinárního uvažování

Zkušenost s uplatněním kreativního kódování ve vizuálním díle

Rozšíření možností především v tvorbě grafických návrhů

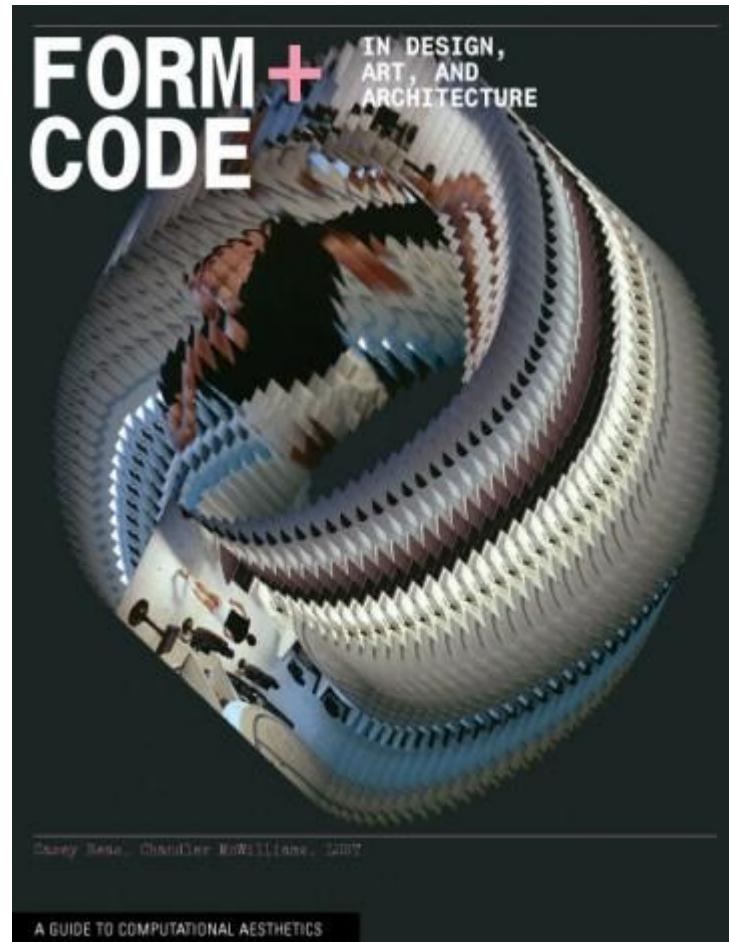
Radost

# Studijní materiály



<http://www.generative-gestaltung.de/code>

# Studijní materiály

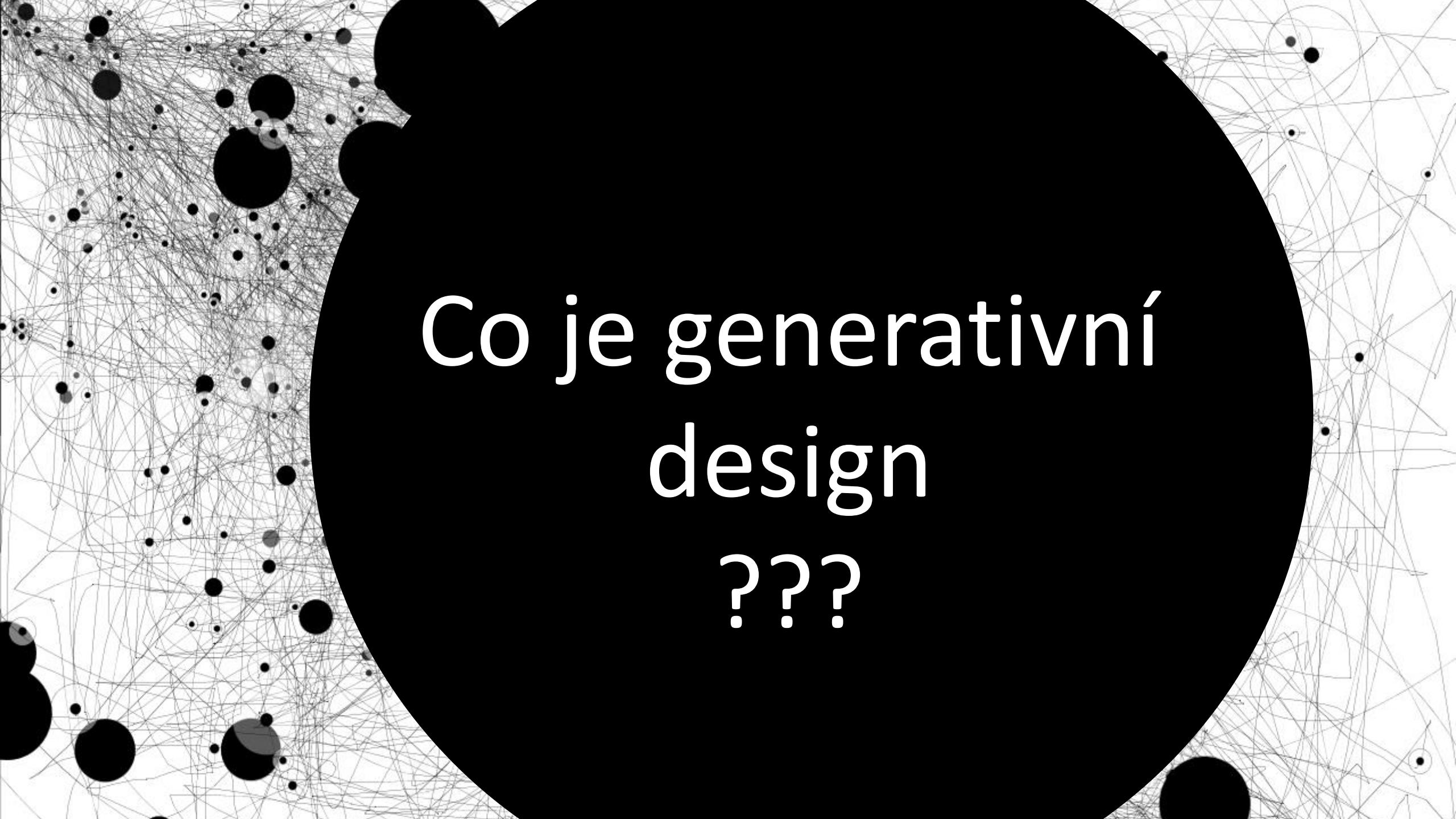


<http://formandcode.com/>

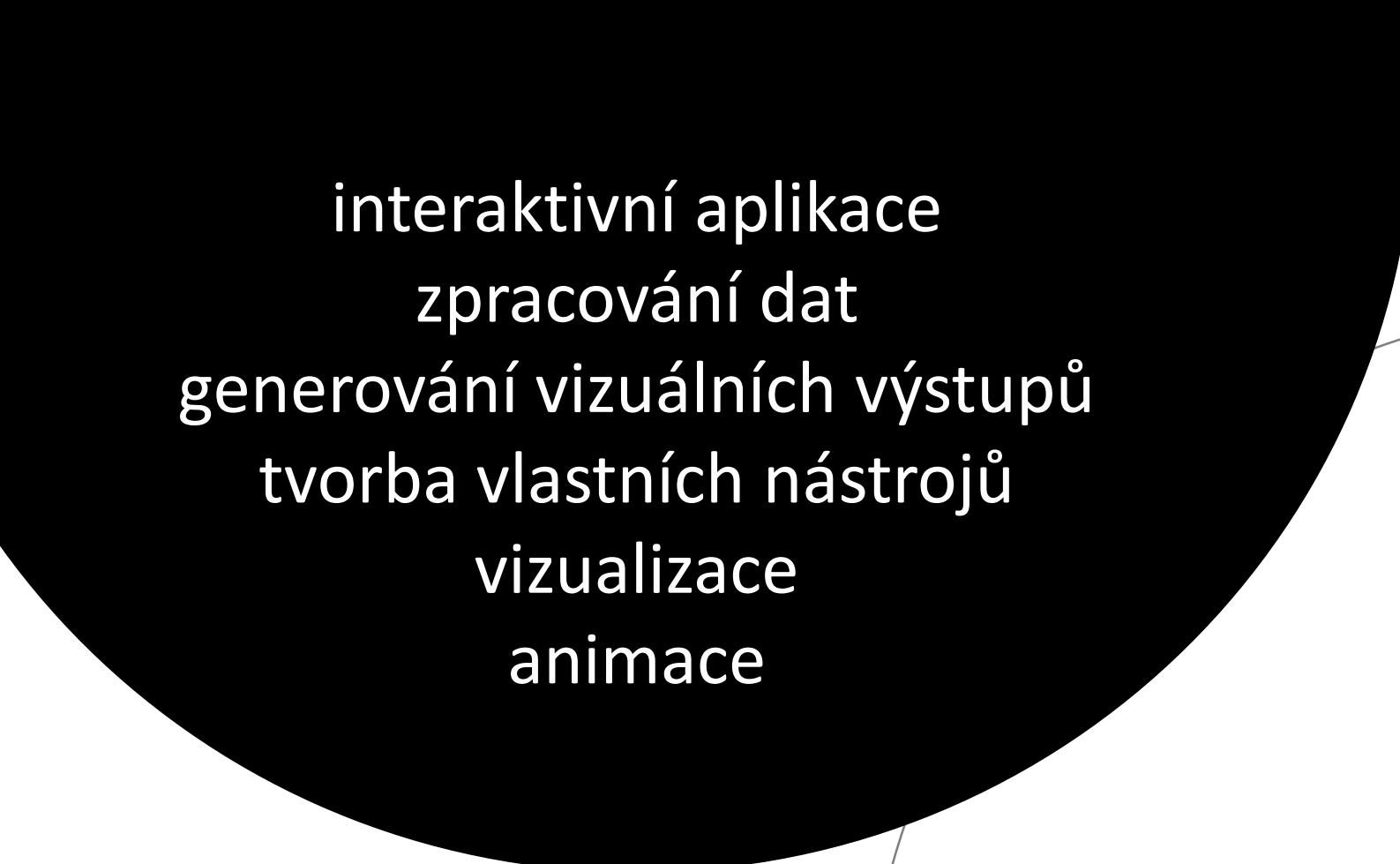
# Inspirace



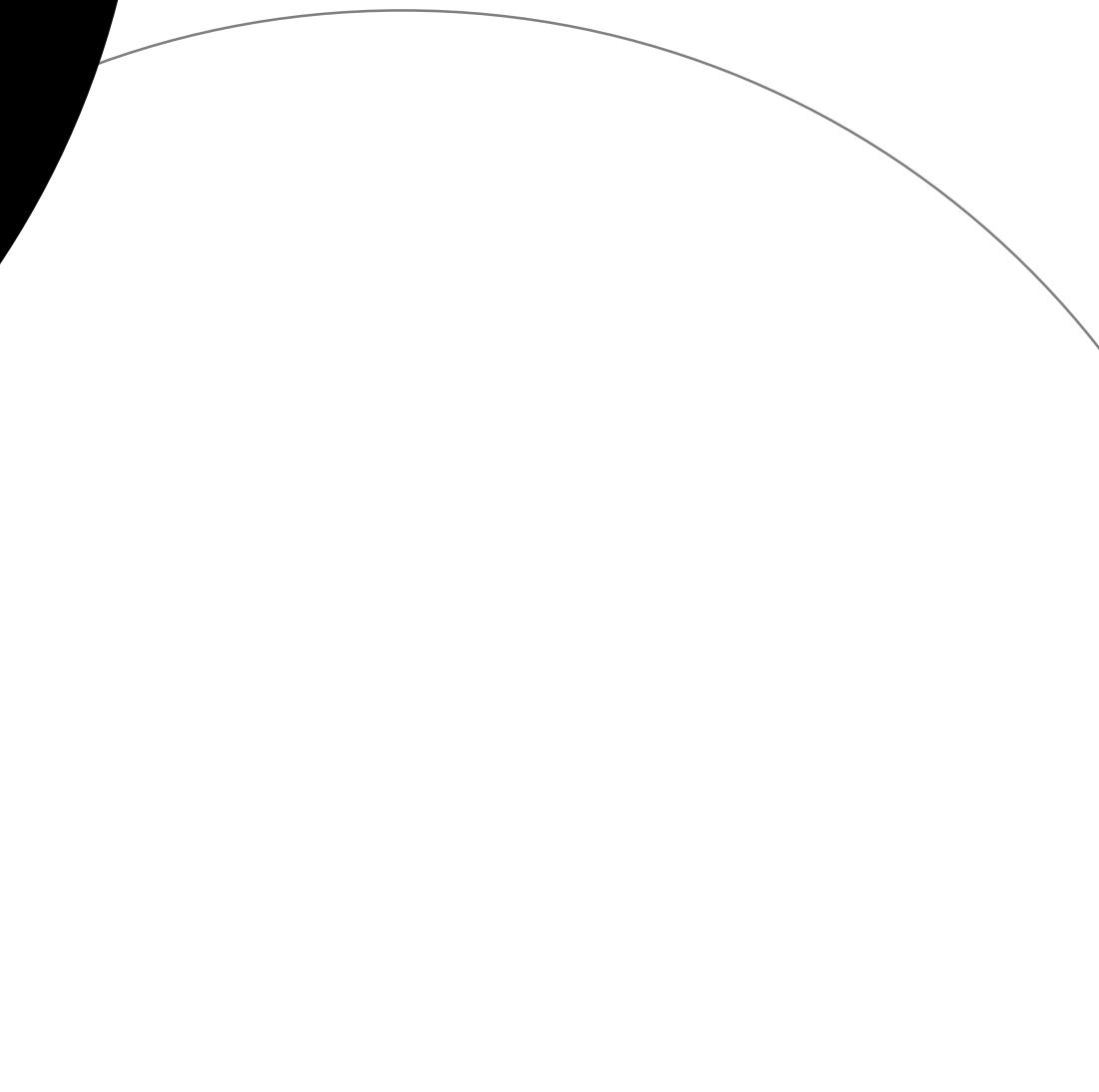
<https://vimeo.com/60735314>



Co je generativní  
design  
???



interaktivní aplikace  
zpracování dat  
generování vizuálních výstupů  
tvorba vlastních nástrojů  
vizualizace  
animace



V širším smyslu je to dílo, které bylo vytvořeno pomocí autonomního systému, který v procesu určuje výslednou podobu díla.

Koncepce je dílem autora,  
je to tedy jeho dílo?

X

Systém je tvůrcem?



# Příklady

*Actelion is a biopharmaceutical company.  
Its visual identity is based on the idea “From medical  
industry to medical magic”.*



ONFORMATIVE STUDIO  
Actelion Imaginety Wizard  
*corporate imagery tool*  
2011



## UNIVERSAL EVERYTHING

Forever in VA

*20 000 generovaných pohlednic*

2008

[/www.universaleverything.com/projects/forever-at-the-va-2/](http://www.universaleverything.com/projects/forever-at-the-va-2/)



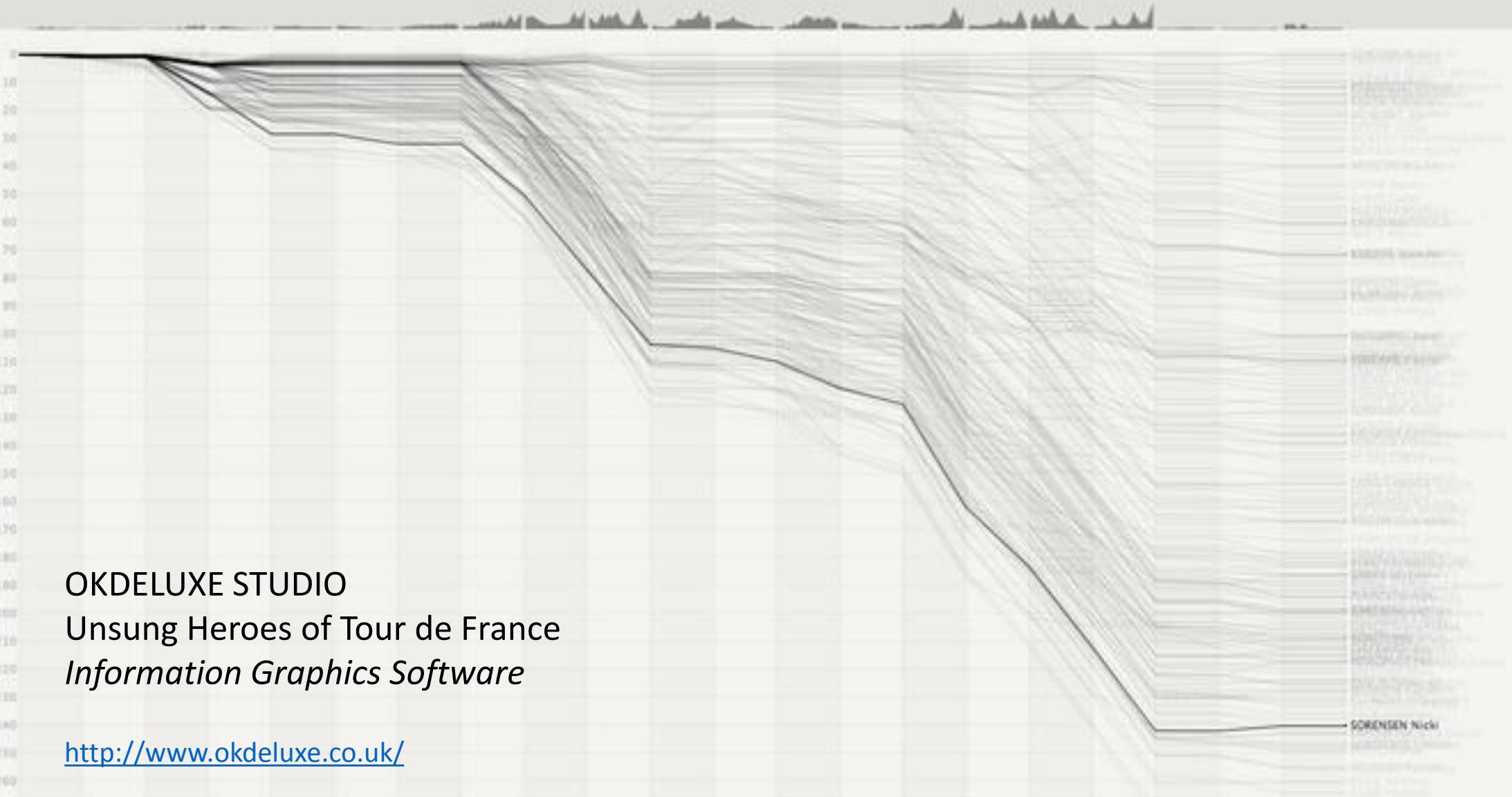


## Unsung Heroes / Tour de France 2010

ZOOM

BROWSE TEAMS

+ SØRENSEN NICKI





**N-e-r-v-o-u-s s-y-s-t-e-m**  
Kinematics  
*online aplikace pro úpravu  
3D objektů pro tisk*  
2014

<https://vimeo.com/80893331>

# Projděte si práce těchto studií

Okdeluxe Studio, UK

Onformative Studio, D

Universal Everything, UK

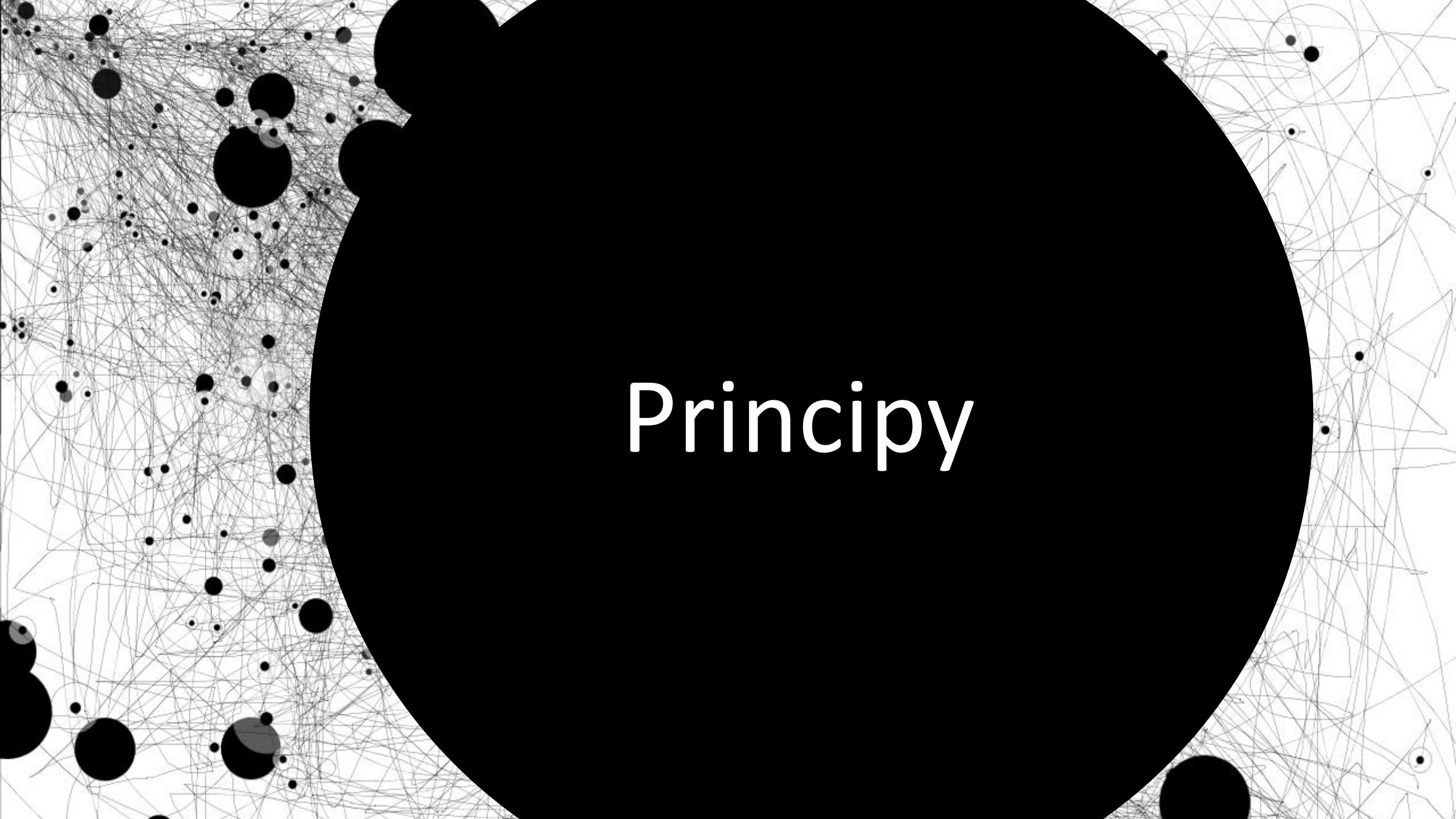
Nervous System, USA

<http://www.okdeluxe.co.uk/>

<http://www.onformative.com/>

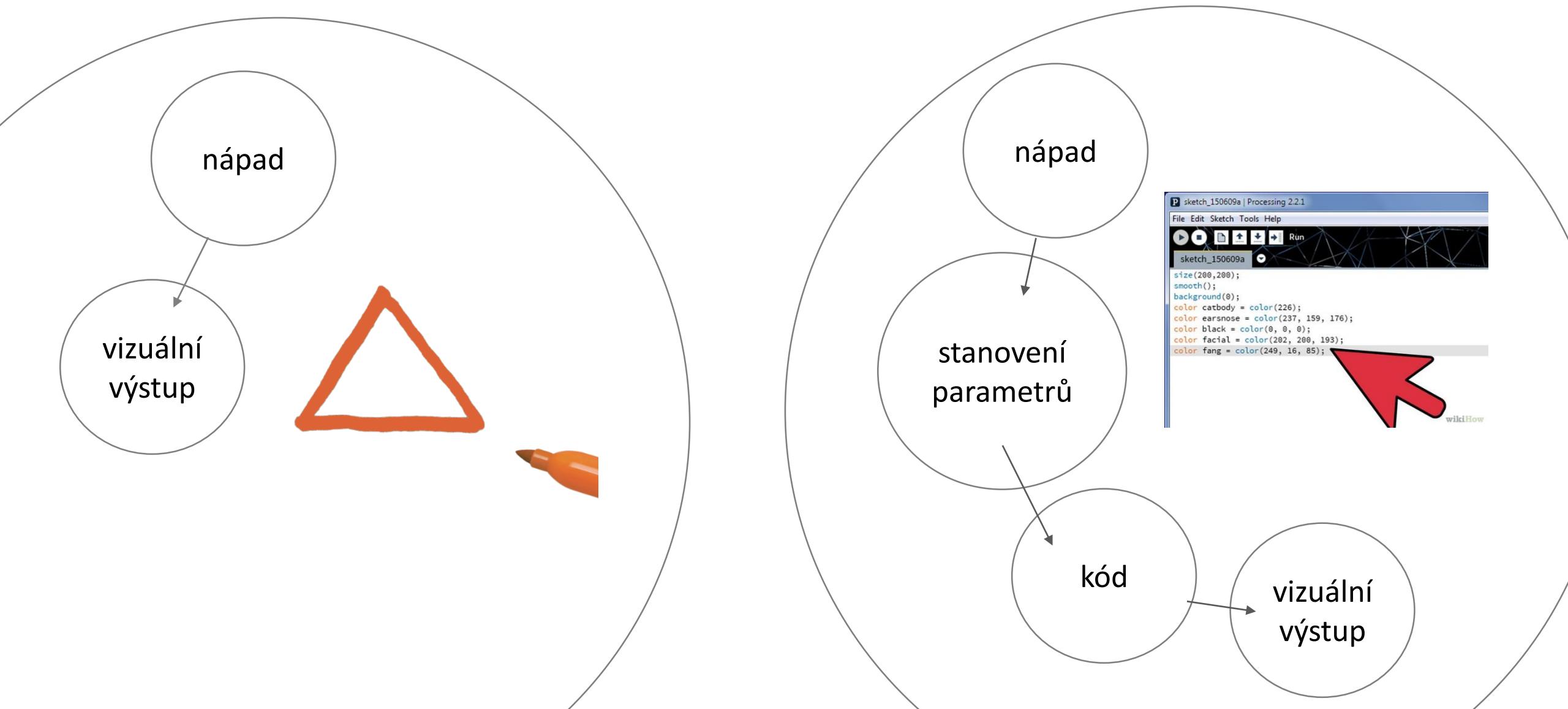
<http://www.universaleverything.com/>

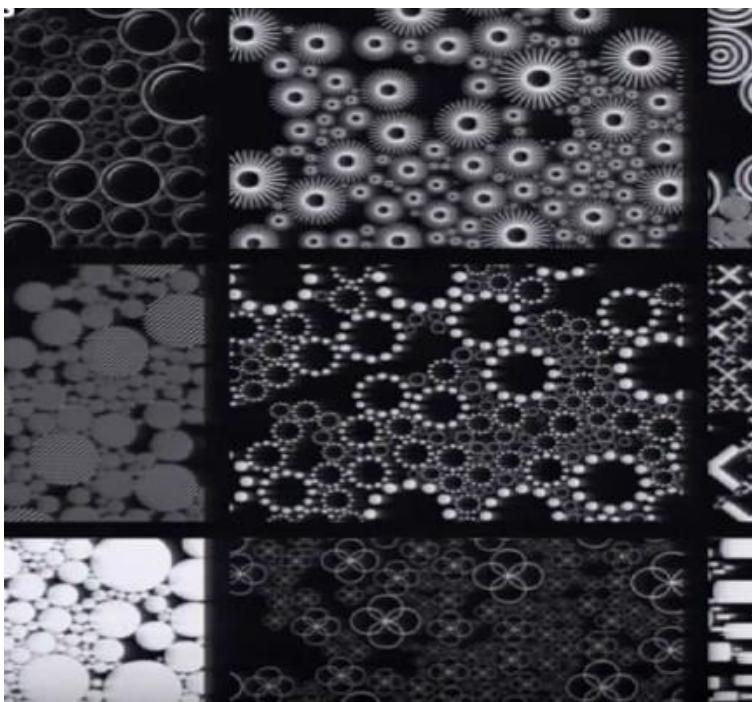
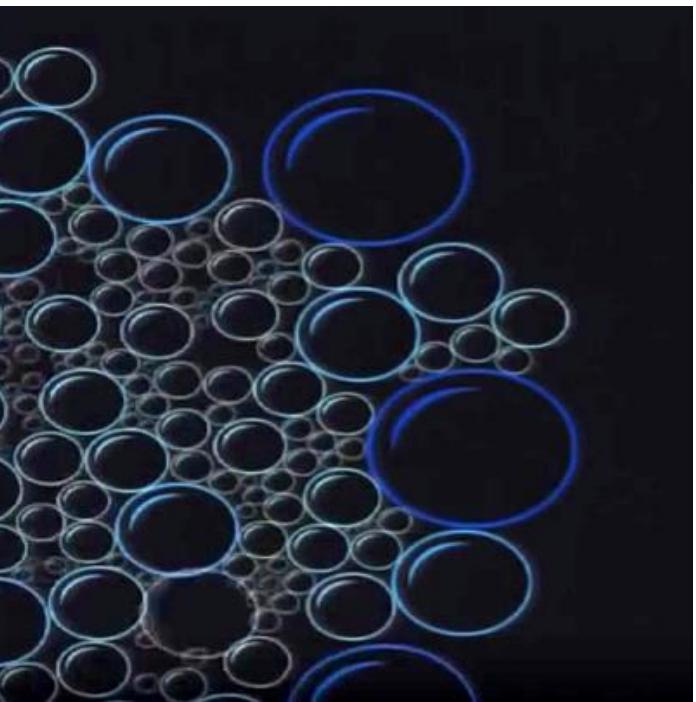
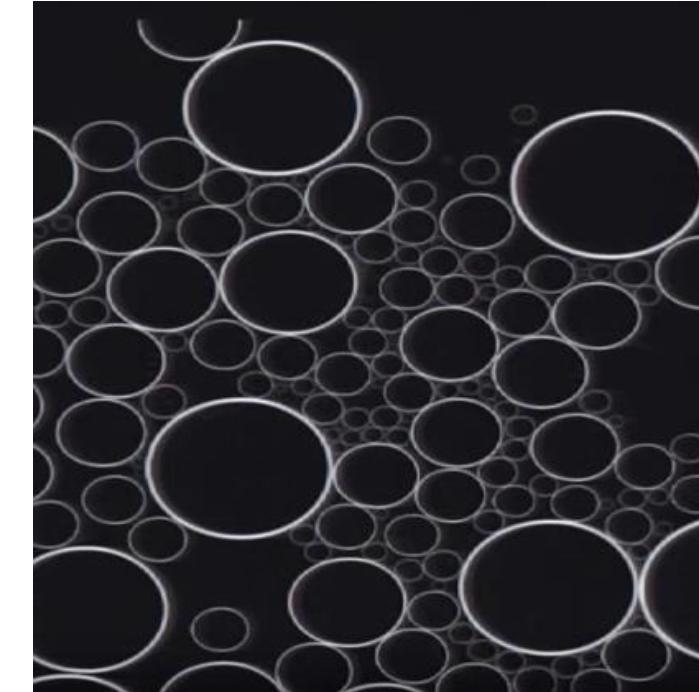
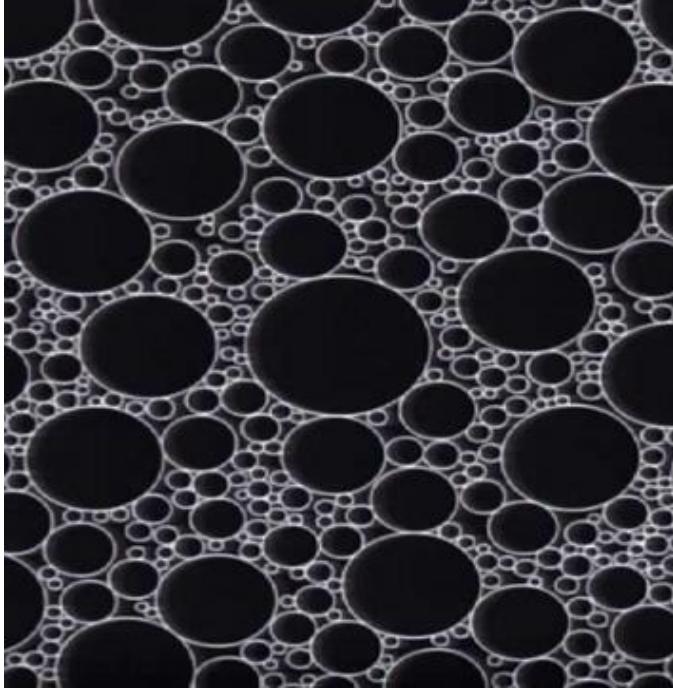
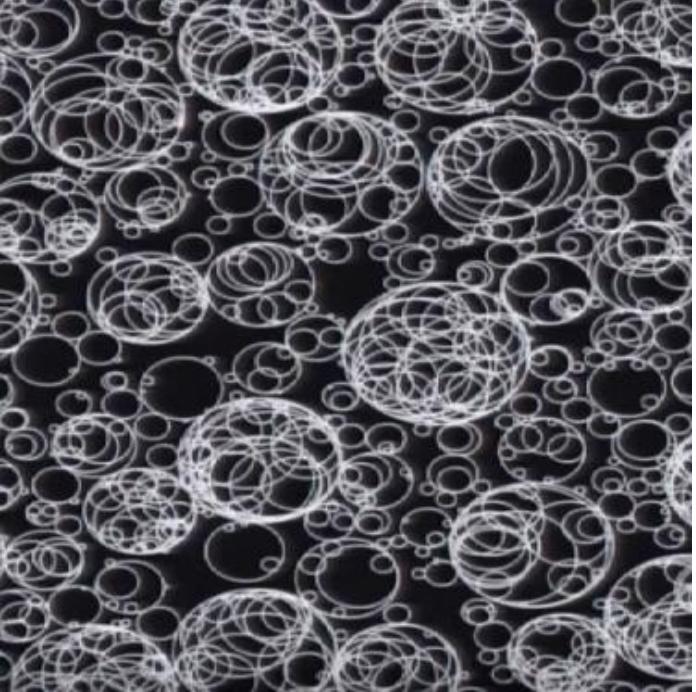
<http://n-e-r-v-o-u-s.com/>



Principy

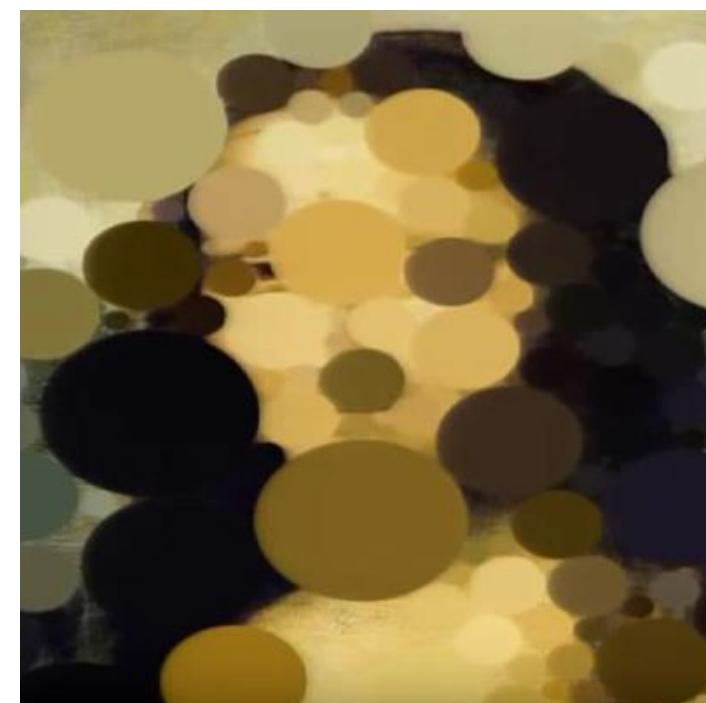
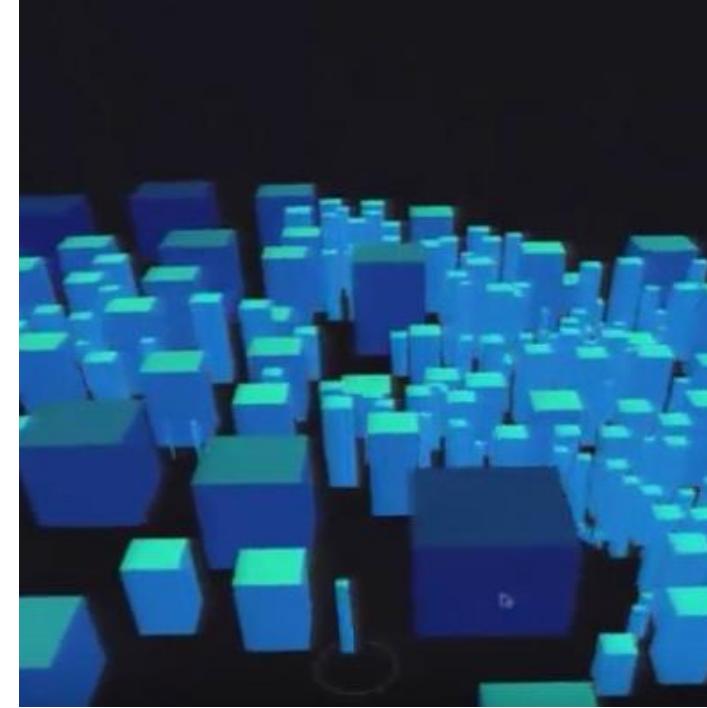
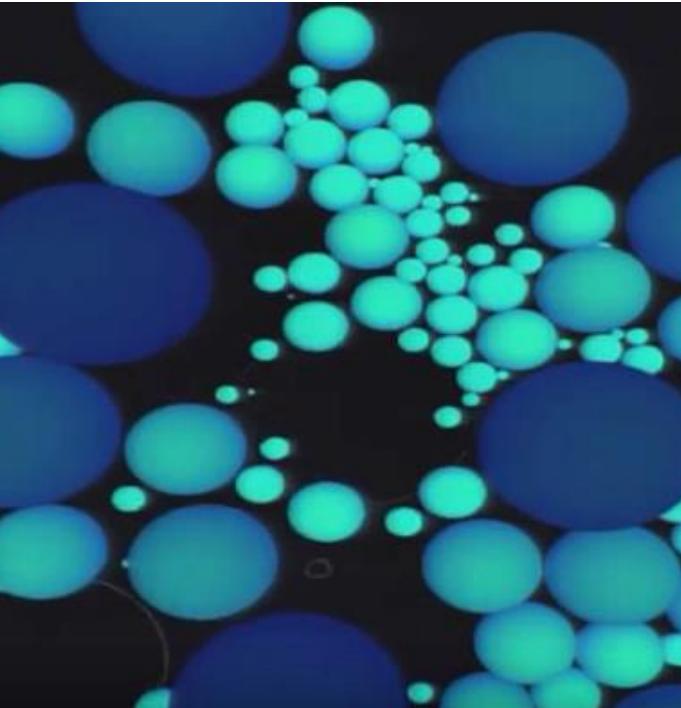
# Generativní design není nový styl, je to nová pracovní metoda.





CÉDRIC KIEFER  
z předášky CPEU2 - Generative design  
2012

[https://www.youtube.com/watch?v=7vlTr\\_QOc4](https://www.youtube.com/watch?v=7vlTr_QOc4)





# Stručná historie

take an object.

Do Something to it.

DO **Something else** to it.

-Jasper Johns

Rules-based Art

Generative Art

# WOLFGANG AMADEUS MOZART

Hudební hra s kostkou

1787

<https://www.youtube.com/watch?v=9Zdg6Ec4mVw>

A portrait painting of Wolfgang Amadeus Mozart, showing him from the chest up. He has powdered grey hair and is wearing a red jacket over a white cravat and a patterned waistcoat. The background is dark and textured.

*In 1787, Mozart wrote the measures and instructions for a musical composition dice game. The idea is to cut and paste pre-written measures of music together to create a Minuet.*



**BRIAN ENO a PETER CHILVERS**  
Scape  
Aplikace pro Ipad  
2015

<https://www.youtube.com/watch?v=8zNLIKRRuvk>

# How to make a Dadaist Poem (method of Tristan Tzara)

To make a Dadaist poem:

- Take a newspaper.
- Take a pair of scissors.
- Choose an article as long as you are planning to make your poem.
- Cut out the article.
- Then cut out each of the words that make up this article and put them in a bag.
- Shake it gently.
- Then take out the scraps one after the other in the order in which they left the bag.
- Copy conscientiously.
- The poem will be like you.
- And here you are a writer, infinitely original and endowed with a sensibility that is charming though beyond the understanding of the vulgar.

-Tristan Tzara



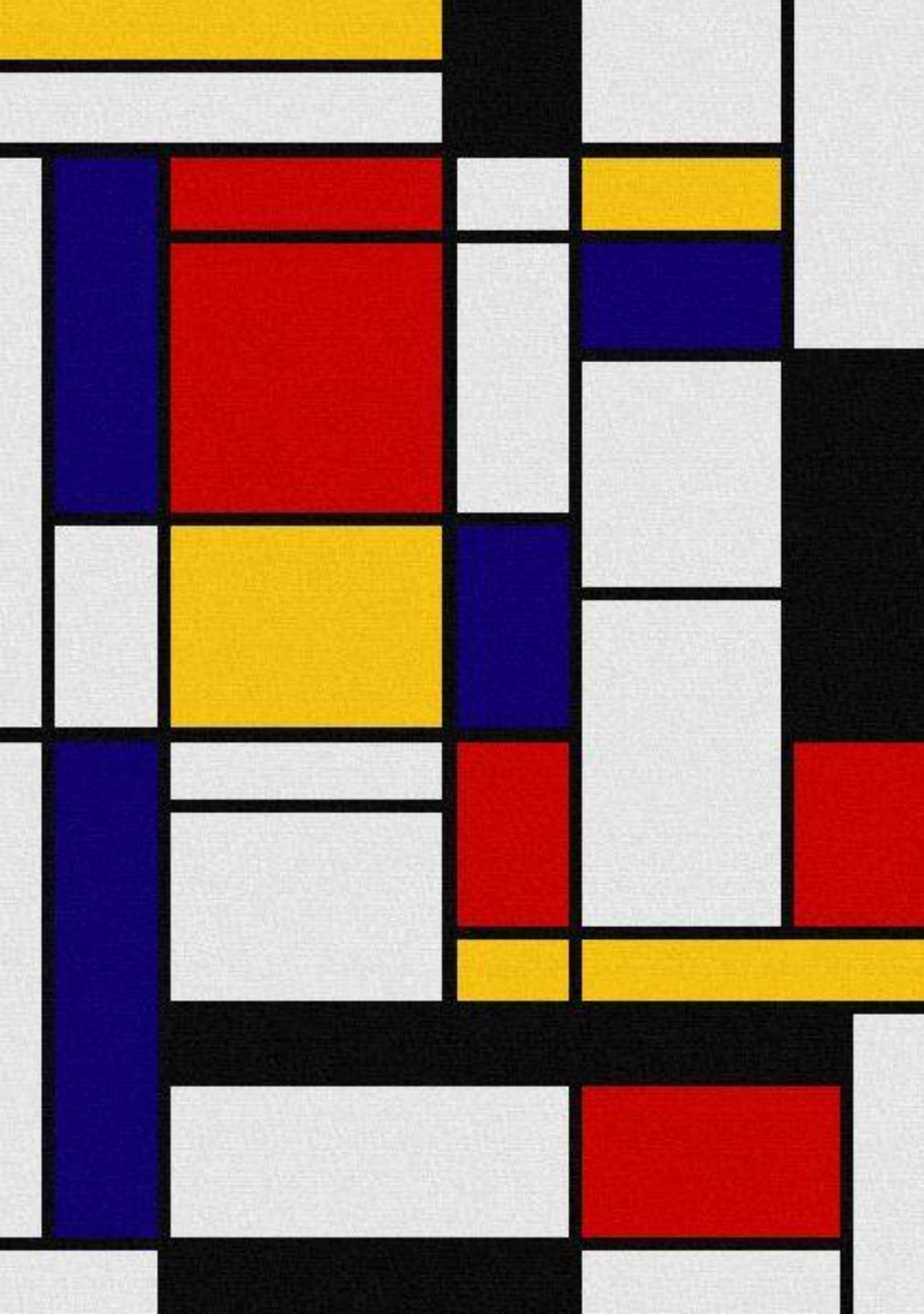


*This surrealist method established itself as the creative vehicle for some of the most brilliant creative figures of the 20<sup>th</sup> century.*

William Burroughs  
David Bowie  
Bob Dylan  
Iggy Pop  
Joy Division  
Kurt Cobain  
Radio Head

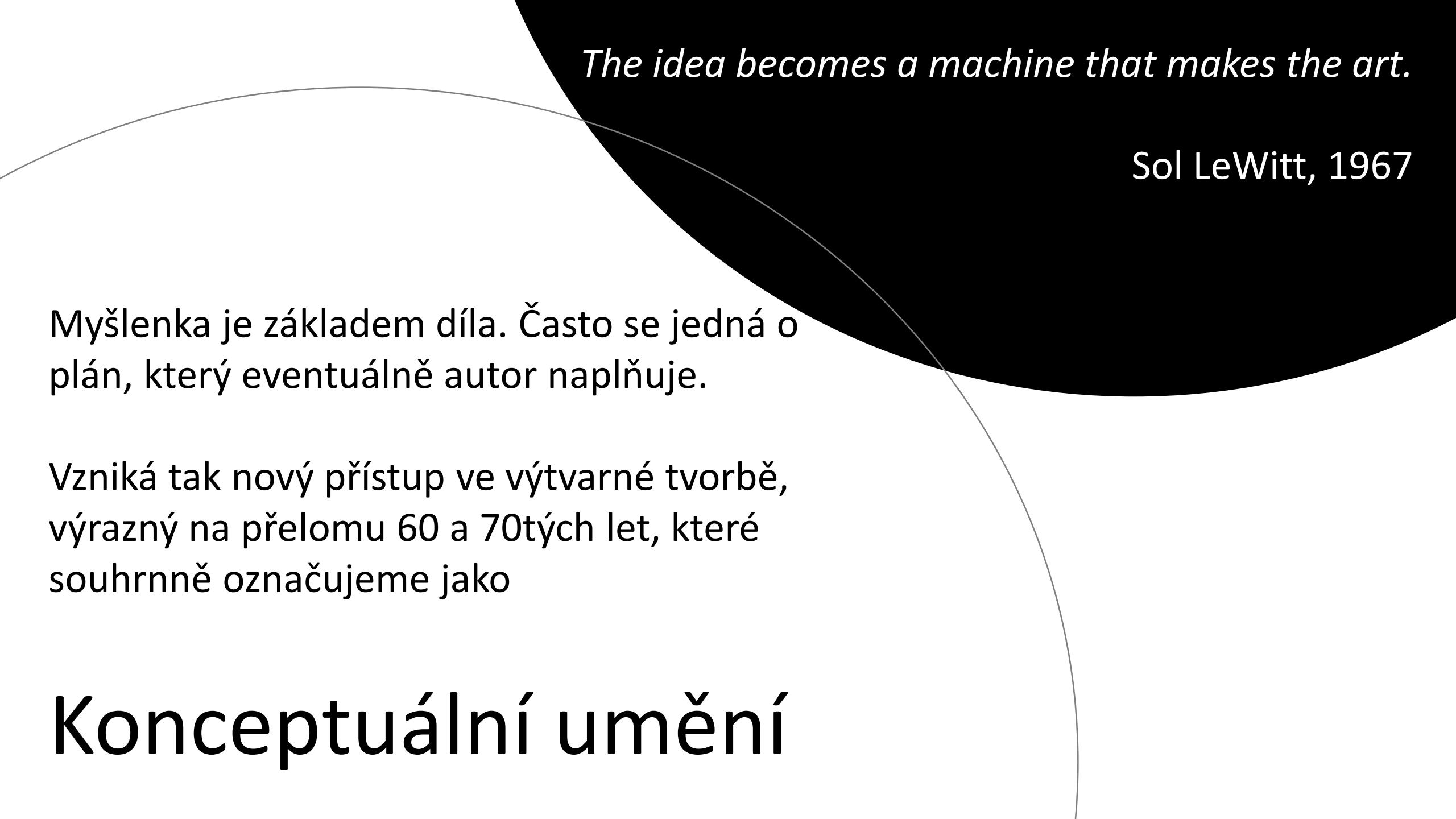
Cut up technique- David Bowie  
<https://www.youtube.com/watch?v=m1InCrzGIPU>

Cut-Ups William S. Burroughs  
<https://www.youtube.com/watch?v=Rc2yU7OUMcl>



Holandská skupina DeStijl  
*neoplasticismus*  
1917

*vertikální a horizontální linie  
primární barvy černá a bílá*



*The idea becomes a machine that makes the art.*

Sol LeWitt, 1967

Myšlenka je základem díla. Často se jedná o plán, který eventuálně autor naplňuje.

Vzniká tak nový přístup ve výtvarné tvorbě, výrazný na přelomu 60 a 70tých let, které souhrnně označujeme jako

# Konceptuální umění

NAUM JUN PAIK  
Random Access  
1978



*The visitor can use the sound head, which has been detached from the tape recorder, to interactively run through the tapes glued to the wall, and constantly vary the sound sequence according to location and speed. This random access to the musical raw material enabled visitors to produce compositions of their own.*

DJing



VJing





JOHN CAGE

4'33"

1952

<https://www.youtube.com/watch?v=JTEFKFiXSx4>

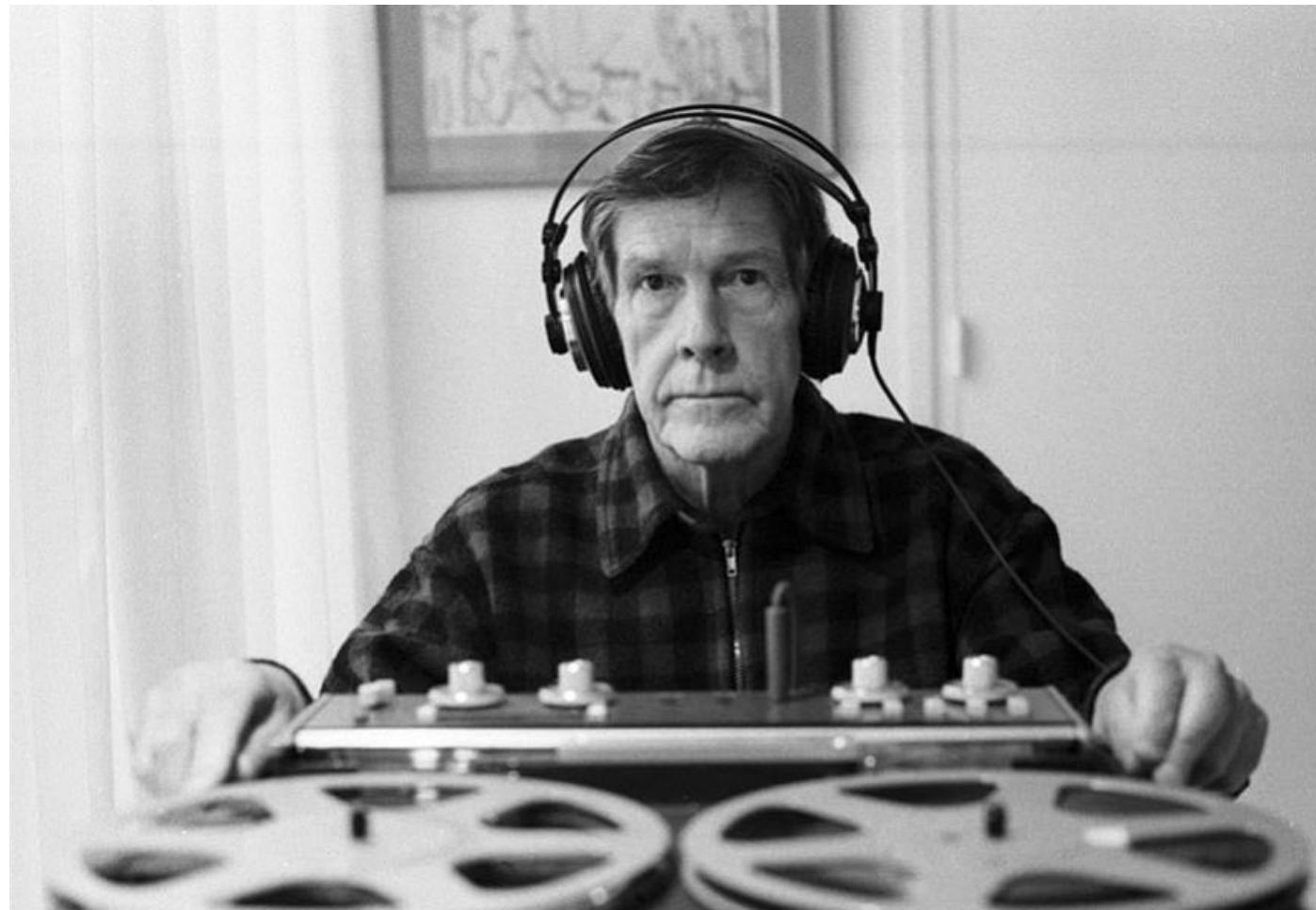
Water Walk

1960

<https://www.youtube.com/watch?v=Yybn6iKmYdQ>

*"Until I die there will be sounds," concluded Cage. ,,*

*Odmítal jakýkoli hierarchický pořádek a prosazoval rovnoprávnost úmyslně, ale také neúmyslně vyluzovaných a vydávaných zvuků a hluků.*

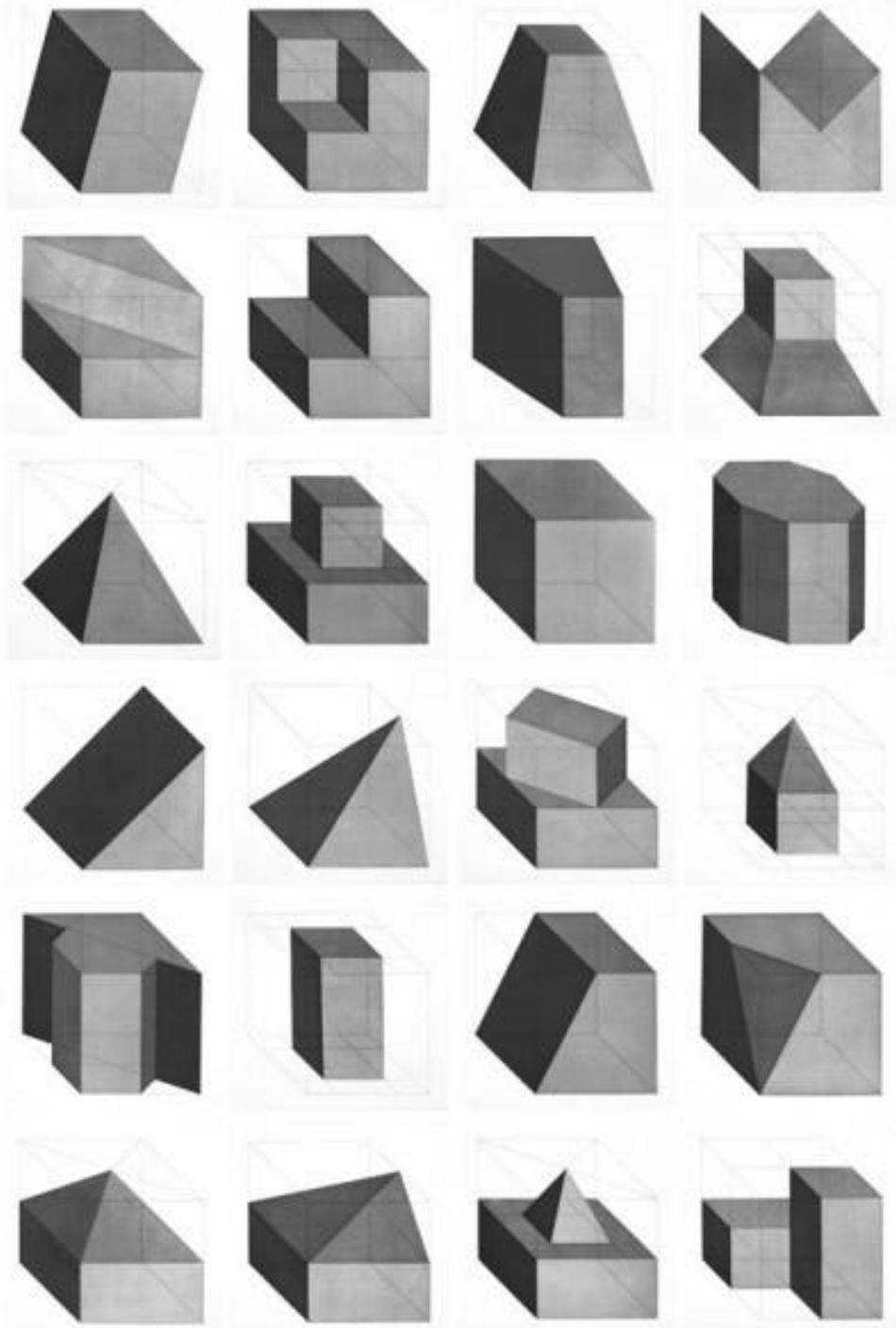


MR. PRESIDENT AGENCY  
BACARDÍ Bat Beats  
Movement reactive sound  
2014



*We set ourselves the mission to make music out of the movement of bats (the BACARDÍ brand icon). It was a difficult undertaking: we needed to build a new piece of technology in record time, and had to rely on the bats making an appearance at dusk on the night...*

<http://mr-president.co.uk/project/bat-beats-2/>



SOL LEWITT  
Forms Derived form the Cube  
1982



ZDENEK SÝKORA  
Topological Structures  
1969

A photograph of a person standing in a digital architectural space. The architecture is characterized by organic, flowing, and undulating forms, creating a sense of depth and complexity. The person is seen from behind, wearing a dark t-shirt and pants, with their right arm raised towards the ceiling. The overall aesthetic is futuristic and organic.

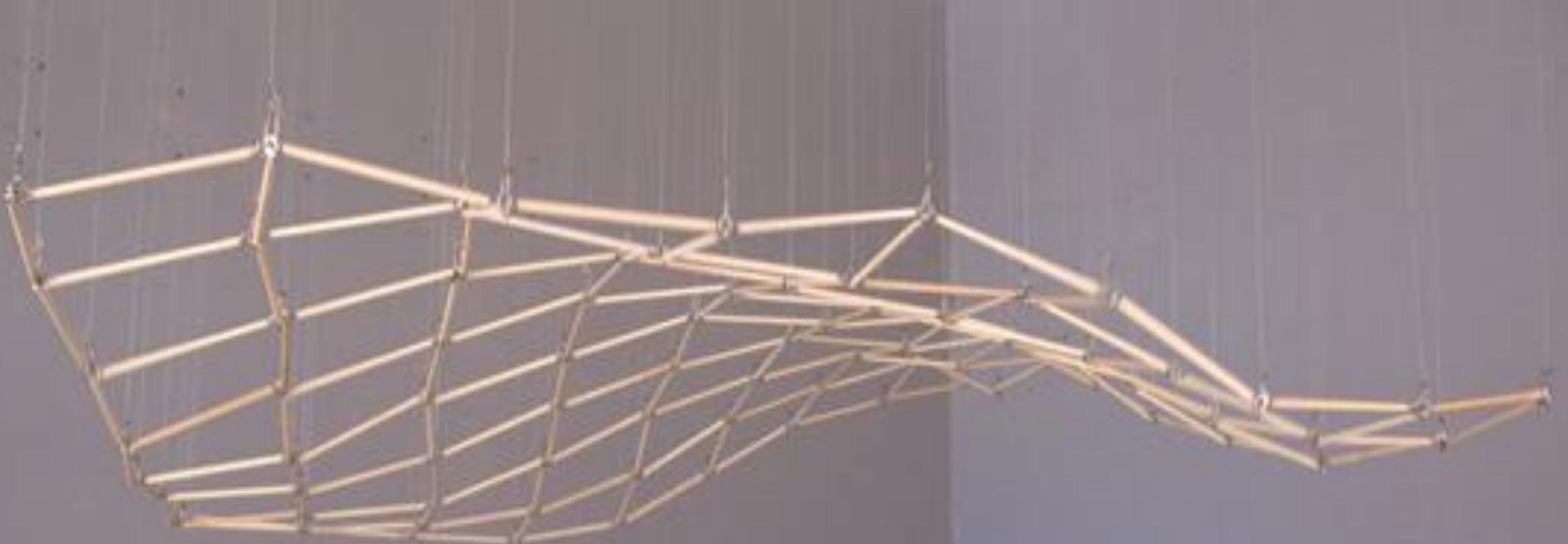
*We explore unseen levels of resolution and topological complexity in architecture by developing compositional strategies based on purely geometric processes.*

MICHAEL HANSMEYER  
Digital Grotesque  
2014

<http://www.digital-grotesque.com>



HANS HAACKE  
Condensation Cube  
begun 1965



*Surface controlled by wires and servo-motors that replicates sea wave patterns measured in real time in a remote location.*

DAVID BOWEN  
Telepresent Water  
*Telekinematic instalation*  
2011

<https://www.youtube.com/watch?v=0p3je4WGcM0>



RANDOM INTERNATIONAL  
Rain Room  
2012

<https://www.youtube.com/watch?v=EkvazlZx-F0>

NICHOLAS NEGROPONTE  
Seek  
*with the Architecture Machine Group , MIT*  
1969-1970

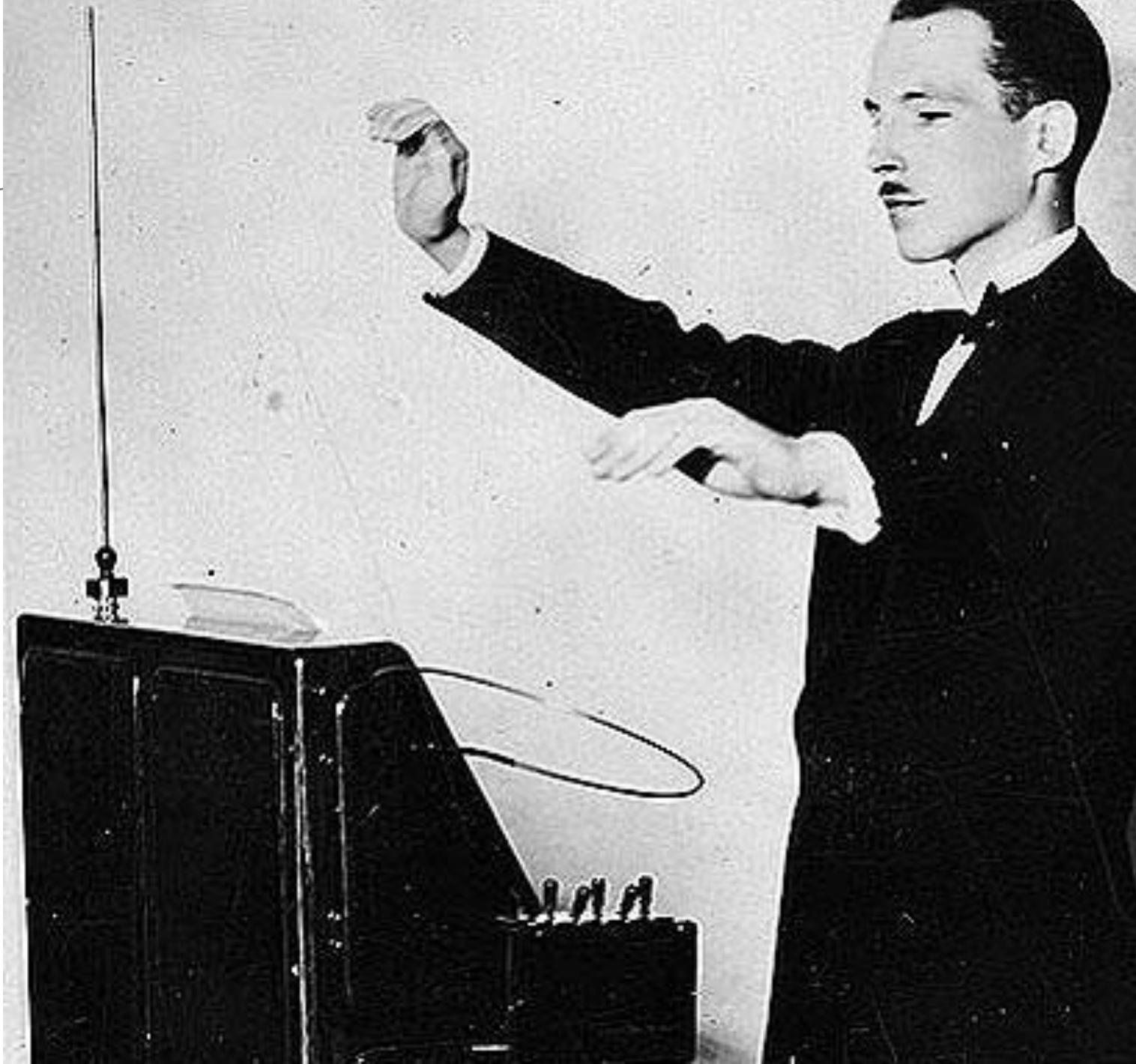




FEDERICO DIAZ  
Outside Itself  
Venice Bienalle  
2011

<https://www.youtube.com/watch?v=eBcjIK8GvsI>

LEON THEREMIN  
Theremin instrument  
1920



<https://www.youtube.com/watch?v=w5qf9O6c20o>



ONYX ASHANTI  
Beatjazz sound system  
ongoing

<https://www.youtube.com/watch?v=cqgX8H72LPs>



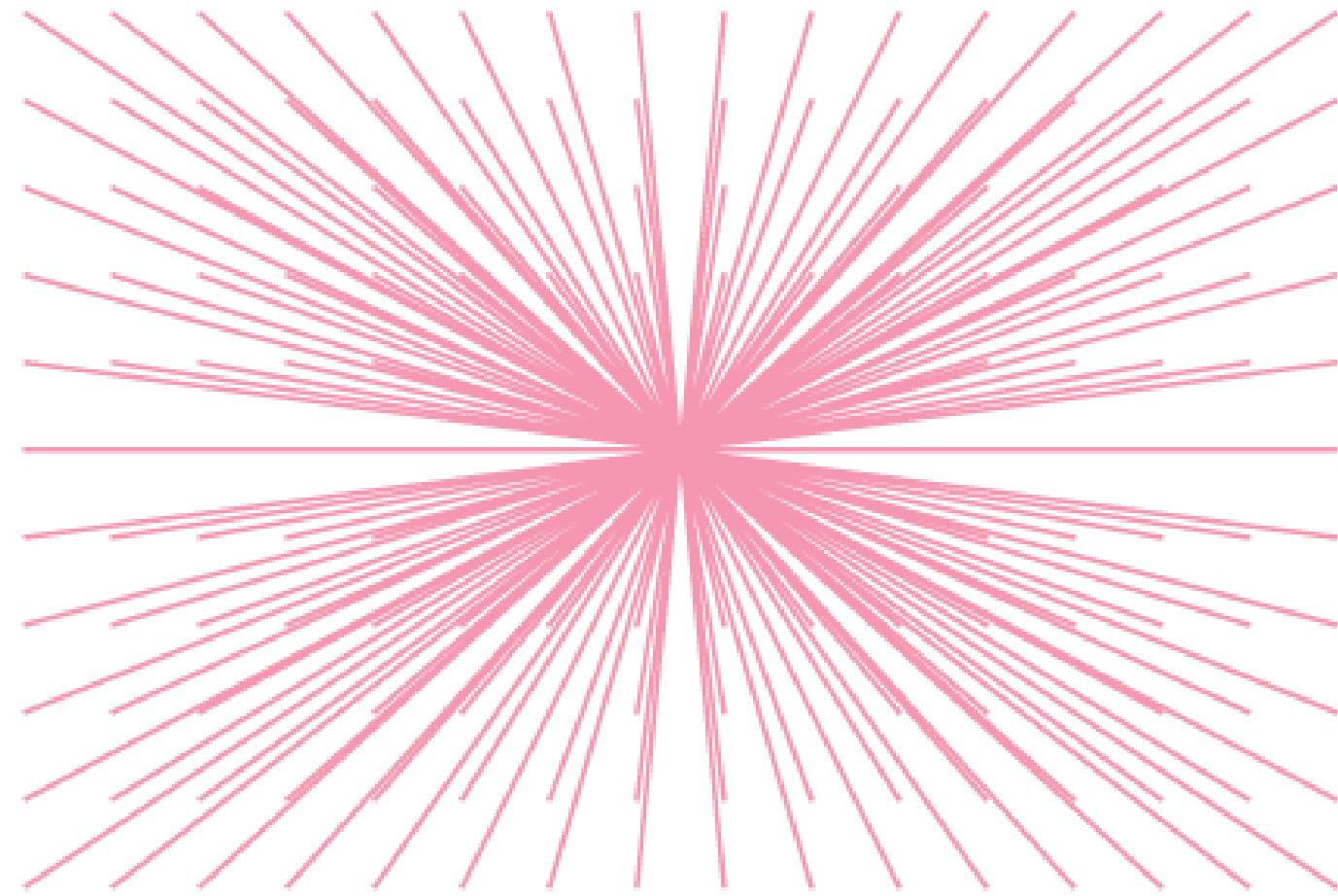
ALLAN KAPROW  
Women licking jam off a car  
from the happening series Household  
1964

UNIVERSAL EVERYTHING  
Together  
2015

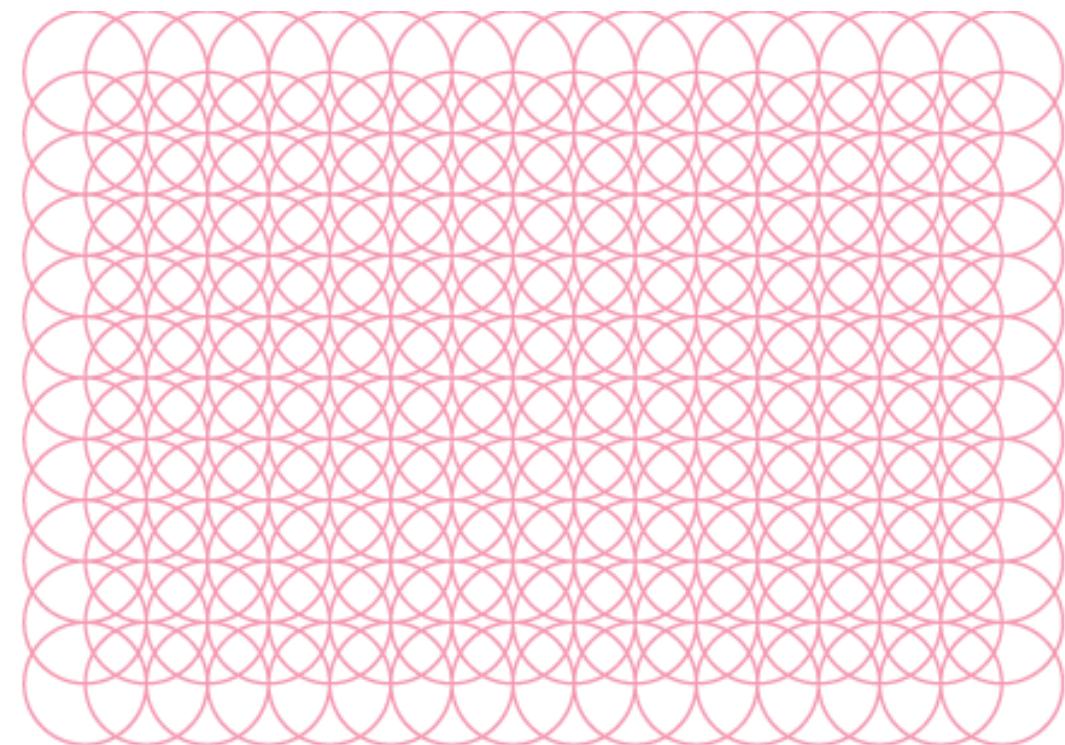
<https://vimeo.com/106589895>

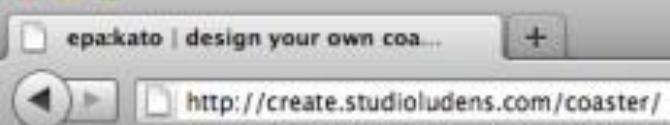


# Opakování



*All programming languages can repeat an action, such as drawing the same shape over and over. When one repetition sequence is embedded within another, the effect multiplies. This simple technique can be used to explore many kinds of patterns.*





# Opakování

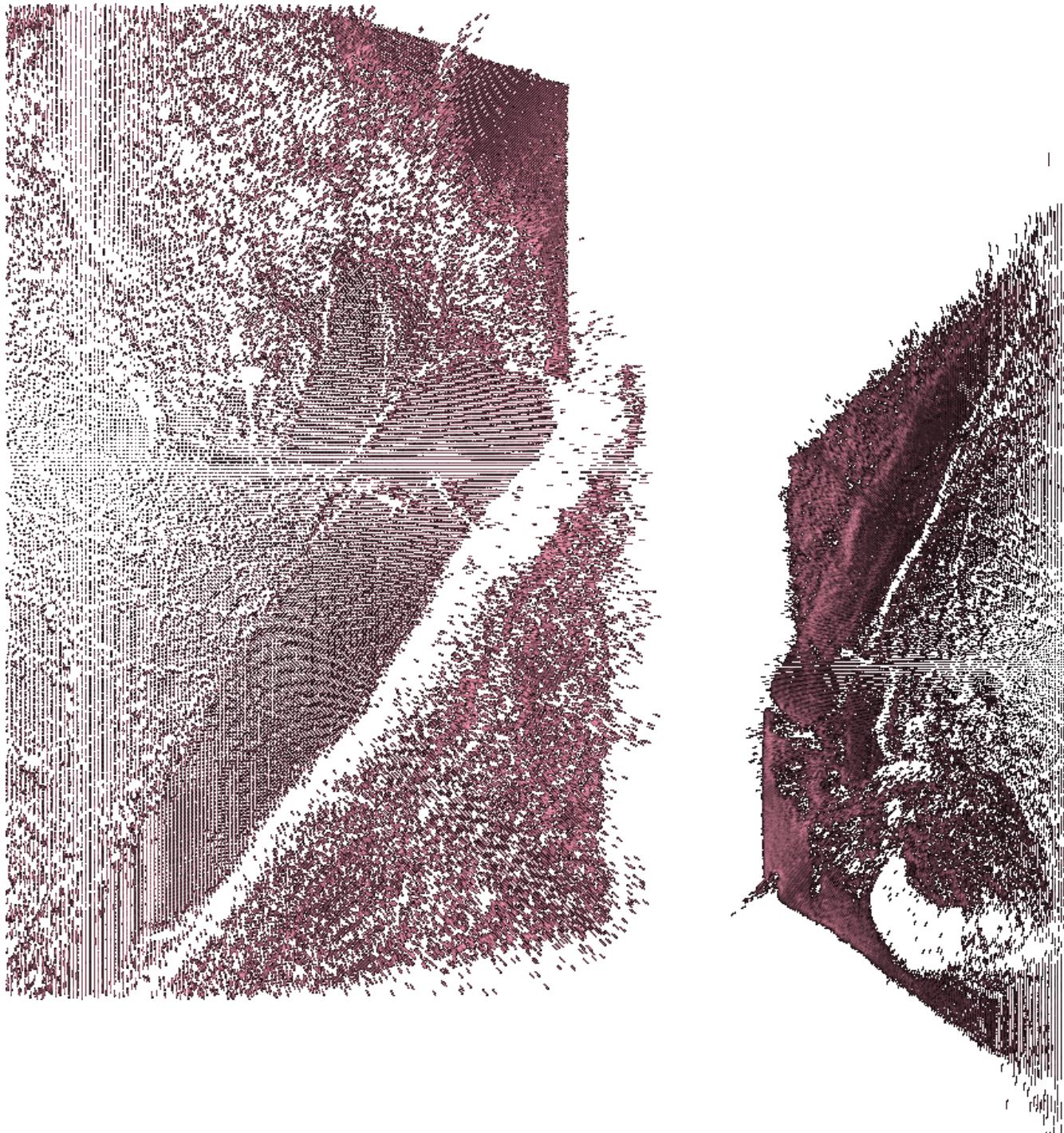
**STUDIO LUDENS**

Epaka:to online desing tool

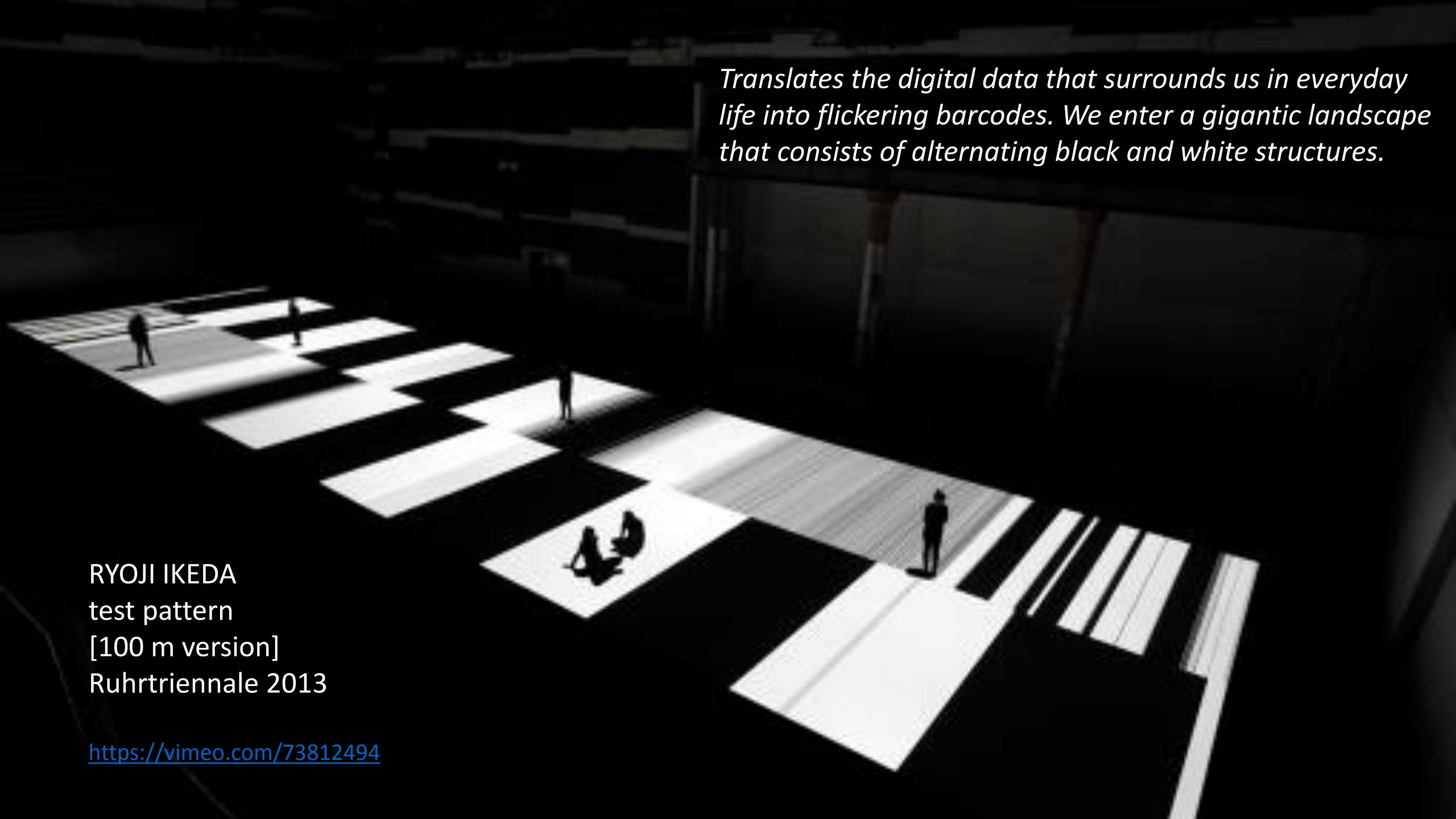
<http://www.studioludens.com/epakato/>

**epa:kato**  
by studio:ludens

# Transkódování



*A rich source of data, and transcoding can be used to interpret this data from a different perspective.*

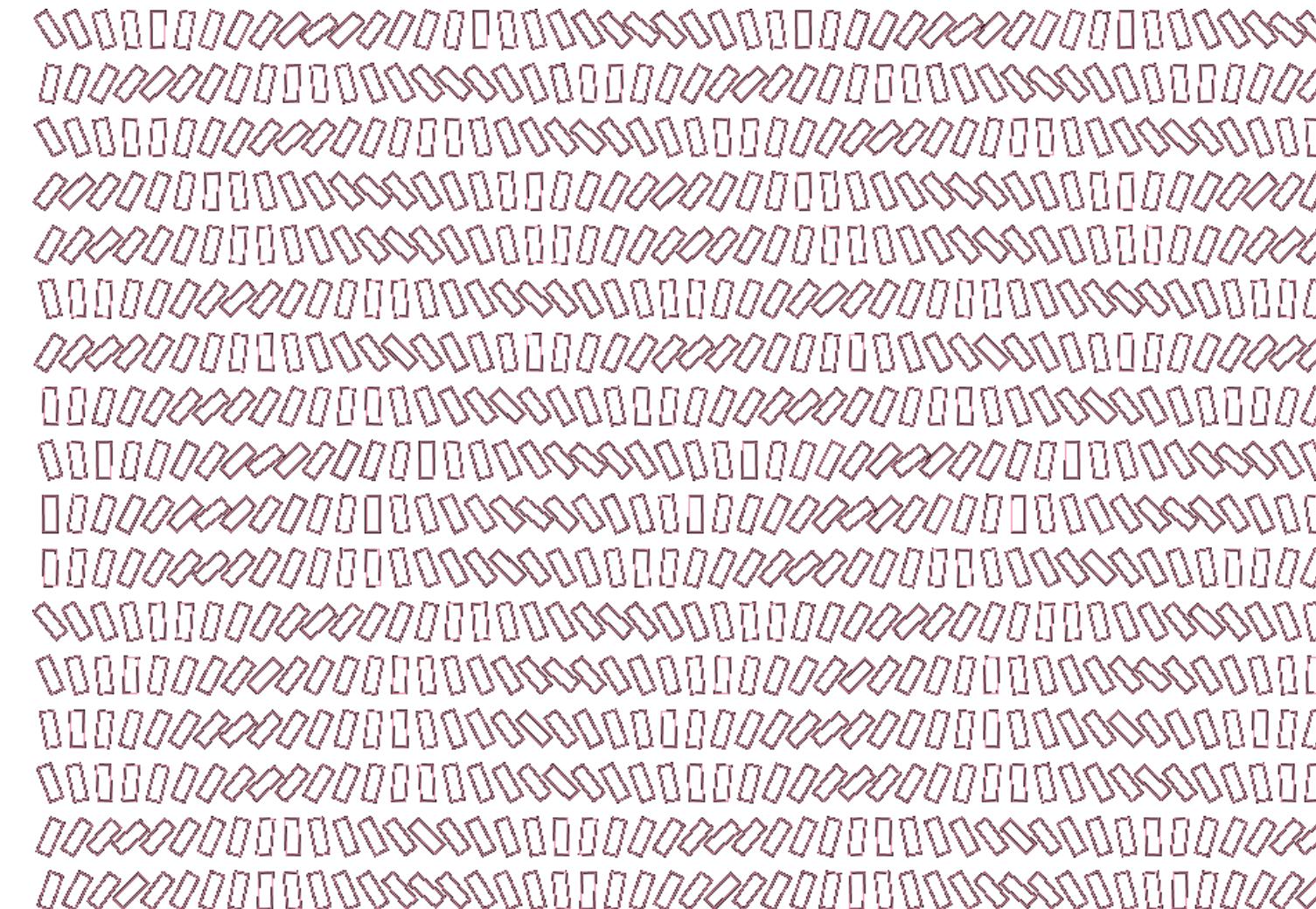


*Translates the digital data that surrounds us in everyday life into flickering barcodes. We enter a gigantic landscape that consists of alternating black and white structures.*

RYOJI IKEDA  
test pattern  
[100 m version]  
Ruhrtriennale 2013

<https://vimeo.com/73812494>

# Parametrizace



*Parameters are powerful tools for controlling a series of objects. The behavior or form of each object can be connected to the value of one or more variables. The designer can think about more than just the individual objects.*

# Kinematics

designed by nervous system + you

template  
necklace  
oval

NERVOUS SYSTEM  
Kinematics  
2014

# Parametrizace

<https://vimeo.com/80287226>



SELECT A STYLE



polygon



crystal



smooth



sharp

DENSITY TOOLS



density



sparsify



delete



randomize

SIZE (edit)

15.0in  
circumference

DIMENSIONS

6.83in x 7.69in

COLOR



MATERIAL

black 3d-printed nylon

PRICE

\$88 ships in 2 weeks

TITLE

give your design a name

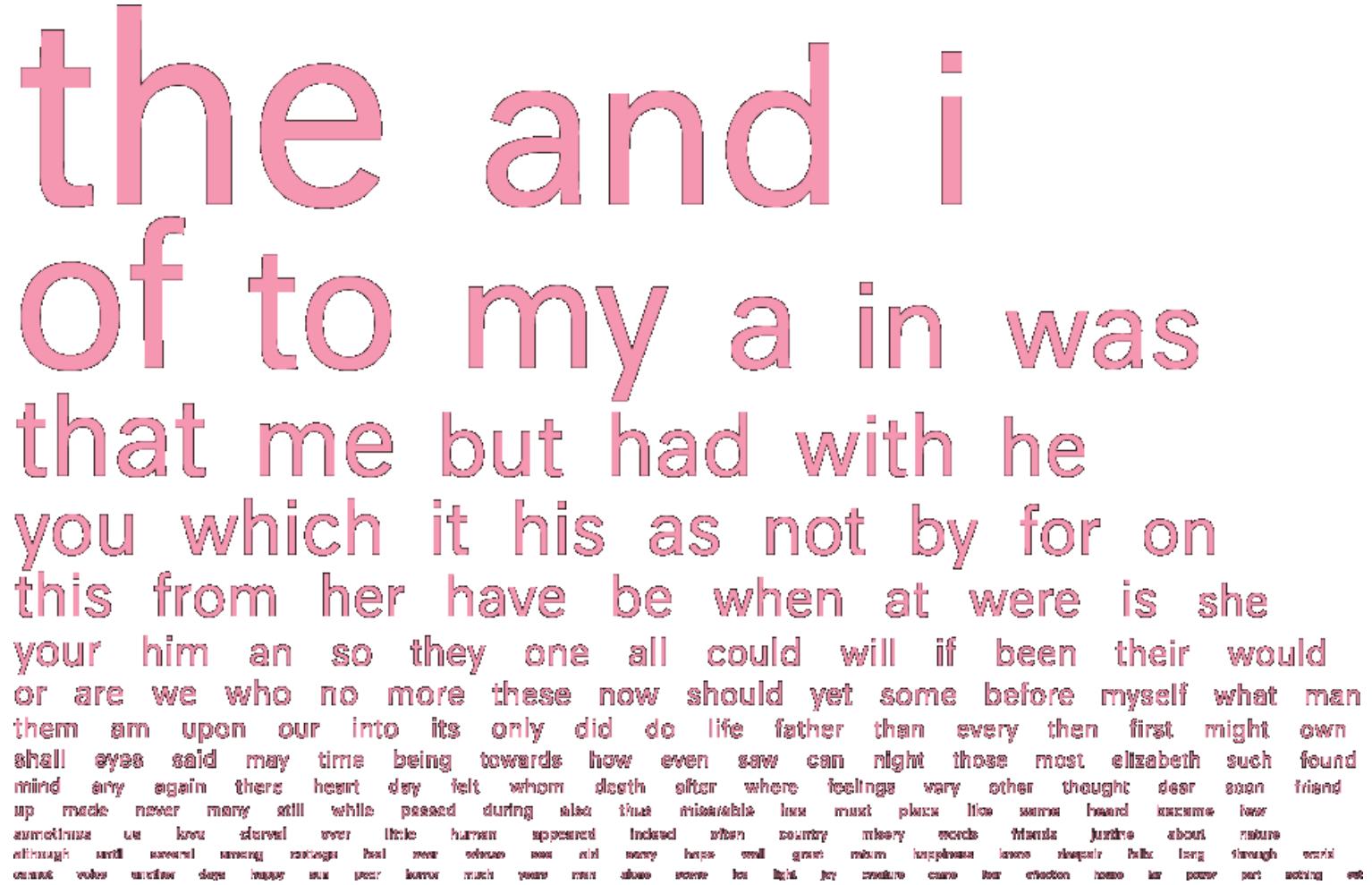
BUY

SAVE



a generator by  
nervous system

# Vizualizace



*This example loads, parses, and visualizes text files from Project Gutenberg, a massive online collection of electronic books. The images on this page show the program's analysis of two books side by side: Mary Shelley's Frankenstein and Bram Stoker's Dracula .The size of each word correlates to the number of times it is used in the book.*

# Obama's First Day Not "Business As Usual"

**NY Divers to  
Resume Search  
for US Airways  
Engine**

**Obama's Draft  
Order Calls for  
Closing Gitmo in  
One Year ...**

A night of  
euphoric  
celebration  
in Washington

Ceremonial  
Duties  
Completed,  
the Bushes  
Depart

Michelle  
Obama's  
style:  
Change  
you can  
wear

**US STOCKS-**  
Wall St up on  
financial  
rebound;  
Geithner  
grilled

White House  
Staff Moves  
In; Obama  
Plans  
Econ, Iraq  
Mtgs

Sen.  
Kennedy  
released from  
hospital after  
seizure

Online  
inaugu  
ration  
videos  
set  
records

Republicans  
seek Obama  
meeting on  
stimulus

Biden Takes  
Shot at  
Roberts for  
Flubbing  
Presidential  
Oath

America  
Loves Its  
Labrador  
Retrievers  
  
Will First  
Daughters Sasha  
and Malia Give J.  
Crew a Lift?

Franken meets  
with Reid,  
Coleman also in  
town

Los Angeles  
275 for  
Impeach  
Don  
Vidovich

Los Angeles  
275 for  
Impeach  
Don  
Vidovich

# Don't count on Egypt to stop weapons smuggling

**European  
countries  
vow to  
prevent  
repeat of  
gas crisis**

**11 Taliban, two  
Afghan soldiers  
killed**

+ SELECT ALL CATEGORIES

LESS THAN 10 MINUTES AGO

WORLD

NATION

BUSINESS

TECHNOLOGY

SPORTS

MORE THAN 10 MINUTES AGO

MORE THAN 1 HOUR AGO

**Chrysler cash  
still an issue  
after Fiat  
deal: CSM**

**US STOCKS-Wall  
St up on financial  
rebound; Geithner  
grilled**

**Toyota  
Speeds  
Past GM**

**Oil futures  
surge to end  
above \$43 a  
barrel**

**Are the Steelers  
the greatest  
franchise?**

**Gaza Crisis  
Sows Discord  
at Arab  
Conference**

Israel enables  
transfer of  
humanitarian  
aid into Gaza  
Strip

Anti-Chavez  
students return  
with protests

Argentina's  
president meets  
Fidel Castro in  
Cuba

Kenya: Kogelo  
Tribesmen  
Celebrate With  
Pomp

'Safe  
zone' in  
Sri Lanka  
conflict

Chinese  
media  
censor  
Obama's  
inaugural  
speech

UNHCR Calls For  
Access To  
Rohingya Boat  
People

Will  
Rwandan  
troops  
help in  
Congo?

India plays  
down  
Miland  
dispute

Polanski wins  
a stay on  
hearing in  
child-sex  
case

Marc  
Anthony  
sings with  
wife at  
inaugural  
ball

What will be  
tomorrow's  
biggest  
surprise?

America  
Loves Its  
Labrador  
Retrievers

John Edwards  
Defends His  
Support For  
Healthcare  
Reform

Ringing in the  
Year of the Ox  
with a feast of  
lucky foods

"Guru"  
finds  
love at  
Razzies

Conficker/D  
ormadup Worm  
Dubbed 'Epidemic'

Warming in  
Antarctica  
Looks Certain

Ringling Bros.  
and Barnum &  
Baily

HBO Reboots:  
Lie to Me

Cellphone  
operator band  
starts break  
during  
negotiations

Google And  
T-Mobile US  
Call Off 3G  
Bidding War

China's  
National  
Development  
and Reform  
Commission  
Approved  
Plans For  
High-Speed  
Railways

Apple CEO  
Steve Jobs  
Leaves  
Hospital

Microsoft  
CEO Steve  
Ballmer  
Leaves  
Hospital

IBM Switches  
Up Vice  
Presidents'  
Jobs

IIS charges  
missing  
Florida fund  
manager with  
fraud

American  
Airlines Sees  
Drop in 1Q  
Ticket  
Bookings

Suspicious  
envelopes  
sent to Wall  
Street Journal

Online  
pornograp  
hy law  
appeal  
denied

US Buys  
40%  
of Credit  
Suisse

SEC  
reviewing  
Apple health  
disclosures  
on Steve  
Jobs: report

US Buys  
40%  
of Credit  
Suisse

SEC  
reviewing  
Apple health  
disclosures  
on Steve  
Jobs: report

US Buys  
40%  
of Credit  
Suisse

Wednesday January 21, 2009 17:51

ARCHIVED						
THU	FRI	SAT	SUN	MON	YEST	TODAY
00:00						
06:00						
12:00						
18:00						

<http://newsmap.jp/>

*This is an ongoing attempt at an algorithmically-generated, readability-adjusted scatter-plot of the musical genre-space, based on data tracked and analyzed for 1385 genres by The Echo Nest.*



ECHO NEST  
Every Noise at Once  
ongoing

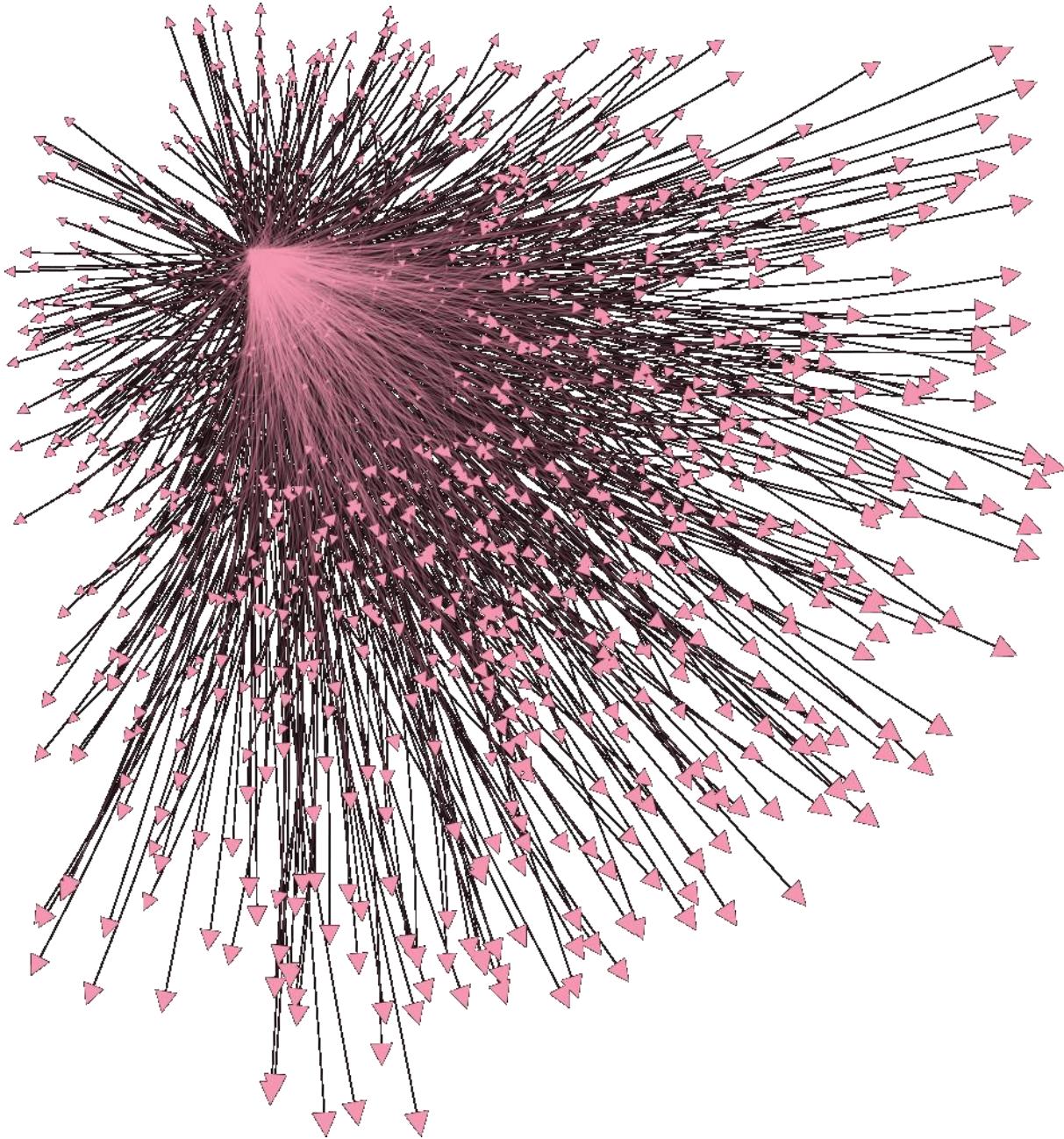
<http://everynoise.com/engenremap.html>

# Vizualizace

ONFORMATIVE STUDIO  
Facebook Tree  
*data visualization for Telekom flagship store*  
2014

<http://www.onformative.com/work/4010-facebook-tree/>

# Simulace



*Particle systems are an essential technique for simulating nature. These systems can replicate the look and behavior of water, fire, smoke, explosions, clouds, fog, hair, fur, stars, and more.*

# Simulace

UNIVERSAL EVERYTHING  
Znělka pro MTV

<http://www.universaleverything.com/projects/mtv/>

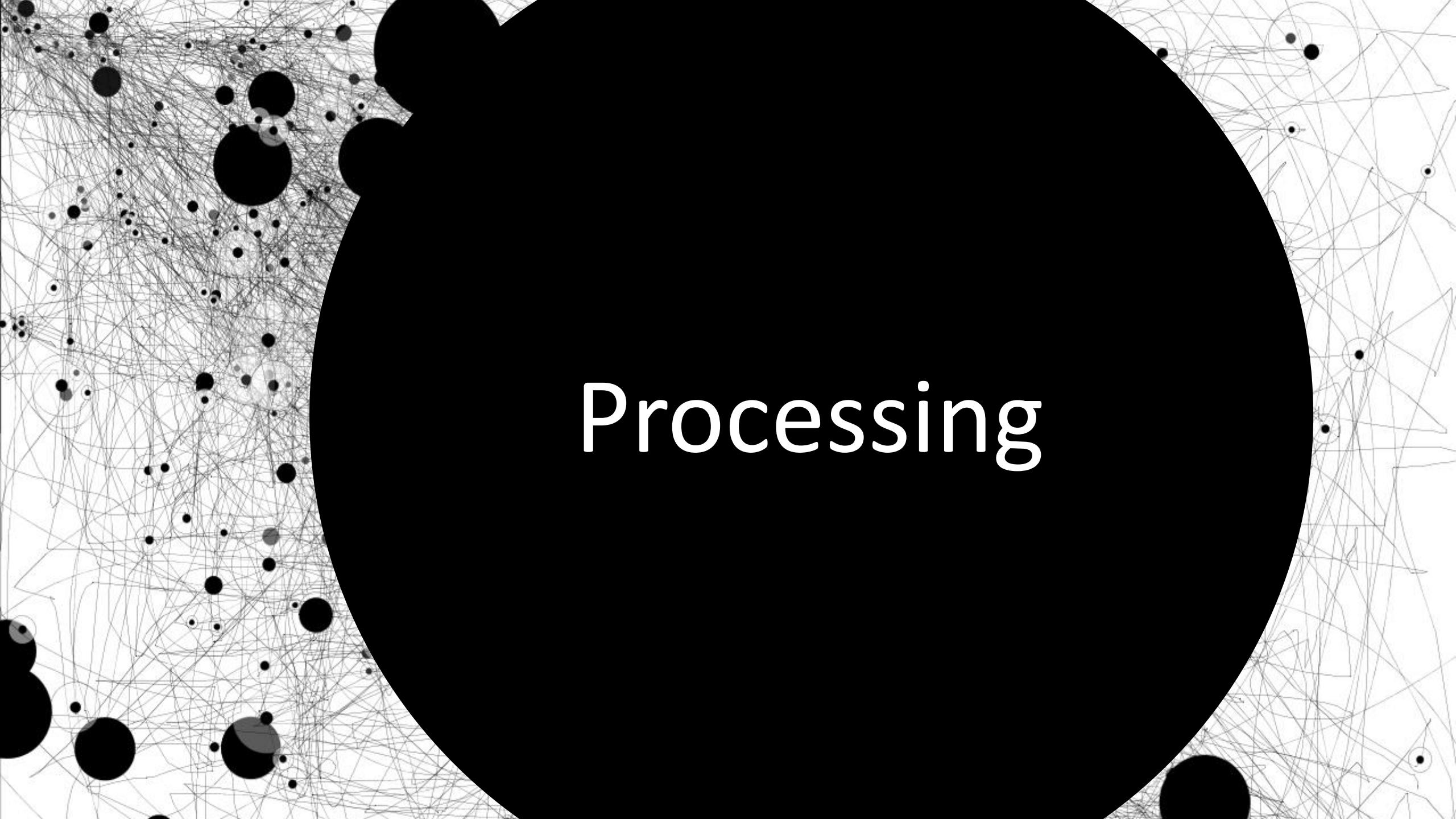
# Simulace

UNITED  
NATIONS  
CLIMATE  
CHANGE  
CONFERENCE  
2009



OKDELUXE STUDIO  
COP15 Generative Identity  
Generative identity Software -  
Evolutions Light

<https://vimeo.com/8193600>



Processing

Vytvořený pro elektronické umění a  
vizuální tvorbu

Podporuje výuku programování  
ve vizuálním kontextu

Elektronický „skicák“

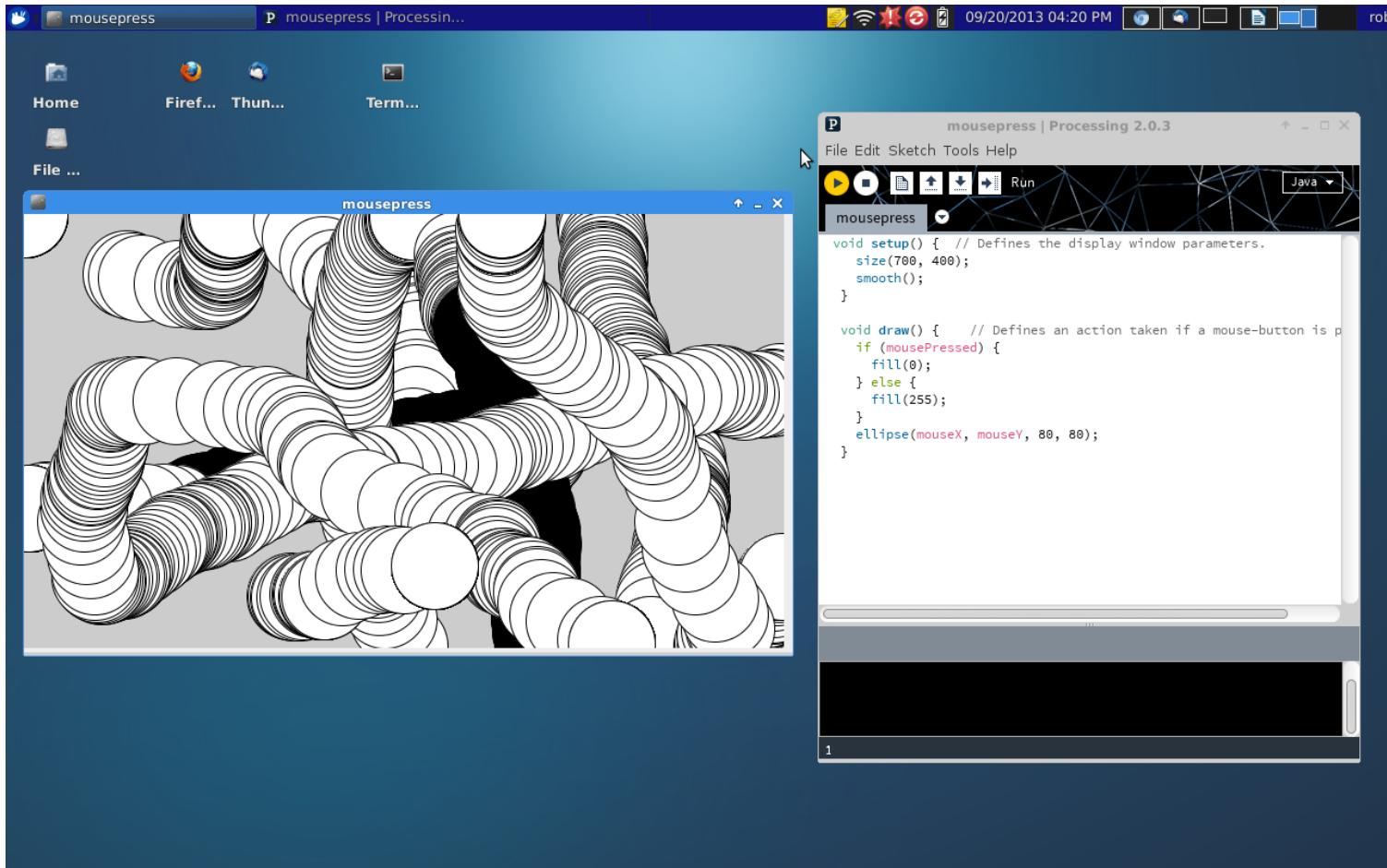
Open source program = velká komunita

Processing stojí na programovacím  
Jazyku Java.

*"We made it to be a flexible  
software sketchbook and  
a language for learning  
how to code within the  
context of the visual arts. "*

MIT 2001 – Casey Reas a Ben Fry,  
oba grafičtí designeři a programátoři

# IDE - integrated development environment



**Computer is stupid  
but f~~u~~king fast!**



Podkladový obraz - **Julien Gachadoat**

## Další odkazy:

O processingu

<http://motherboard.vice.com/read/meet-processing-the>

O generativním počítačovém umění

<http://jonmccormack.info/~jonmc/sa/wp-content/uploads/2012/10/TenQuestionsV3.pdf>

O konceptuálním umění

[http://www.theartstory.org/movement-conceptual-art-artworks.htm#pnt\\_5](http://www.theartstory.org/movement-conceptual-art-artworks.htm#pnt_5)

Tech Talk: Douglas Welton on Generative Art

<https://www.youtube.com/watch?v=0ghiCgTUixU>

CPEU2 - Generative design Cédric Kiefer

[https://www.youtube.com/watch?v=7vITr\\_QOc4](https://www.youtube.com/watch?v=7vITr_QOc4)

**What is Generative Art?**

**Complexity Theory as a Context for Art Theory**

[http://www.philipgalanter.com/downloads/ga2003\\_paper.pdf](http://www.philipgalanter.com/downloads/ga2003_paper.pdf)