Article

Bounded Ownership: Lessons Learned From Online Platforms in Creating Inclusive Goods

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Abstract

The article explores a part of platform imaginary that is dedicated to property rights. Specifically, it explicates a notion of ownership—called here bounded ownership—that brings benefits to owners through loosening restrictions on property use. Bounded ownership creates online spaces that are more inclusive and at the same time enables owners to govern them. To fully grasp bounded ownership, the article argues for maintaining the distinction between production and consumption and uses Zelizer's theory of exchange circuits. With this conceptual toolbox, the article traces the principles of bounded ownership in free and open-source software (FOSS), where they have been present for several decades. It is argued that in FOSS production and consumption constitute separate circuits where ownership is enacted differently. The article then draws a parallel between FOSS and more recent commercial online platforms. It argues that FOSS projects can be considered a layer in the platform ecosystem and at the same time highlights the differences in how bounded ownership is enacted in FOSS and other platforms. While online platforms have been successful in implementing bounded ownership in various sectors, they created deep dependencies on the part of users and content producers. The article concludes by discussing platform practices that retain the inclusiveness of bounded ownership while decreasing the dependency on platforms.

Keywords

intellectual property, prosumer, platform imaginary, platformization, open source software

Introduction

The institution of intellectual property traditionally works from the assumption that free accessibility of works depletes their potential for monetization and thus harms the interests of owners. This assumption has been challenged by new business models utilizing the effectiveness of digital technologies in multiplying and distributing information at scale. In particular, open-source software represents an alternative to software regulated by many restrictions stemming from intellectual property protection, and it has influenced the business models of many companies over the last decades. More recently, the default business model of commercial online platforms has become to offer their services for free in a strategic move to accumulate users. Platforms often introduce monetization mechanisms ad hoc only after a sufficiently large user base has been established.

van Es and Poell (2020, p. 3) define platform imaginaries as "the ways in which social actors understand and organize their activities in relation to platform algorithms, interfaces, data infrastructures, moderation procedures, business models, user

practices, and audiences." Building upon their work it could be argued, that there is a "property imaginary" surrounding online platforms and that the free use of the intellectual property (software, content) is one of its core tenets. The imaginary was explicitly put forth by Anderson (2009) in a book focusing on business models incorporating the free use of products and services. This author argues that as prices of some commodities are driven to zero (they are considered free), other sources of value must be found so that whole economic segments will not collapse. Anderson envisions progress in that, through the application of the right business models, even more products and services will become free. This will eventually bring a future of abundance, which will transcend the constraints traditionally associated with the property.

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Another venue where free intellectual property was argued to be functional, is the discourse on peer production. In pioneering this discourse, Benkler (2006) argued that peer production makes cultural production more participatory and transparent than the formally organized ways of production governed by markets. However, Benkler assumes the decentralized nature of networks to be the main organizing principle behind peer production. The move from the logic of networks to the logic of platforms (Hands, 2014), which includes even staple instances of peer production, such as free and open-source software, has brought a centralization of resources needed for cultural production yet again. In the meantime, some authors have pointed to the limits in the participatory nature of peer production (Kreiss et al., 2011; Shaw & Hill, 2014). Later, Benkler et al. (2015) and Benkler (2017) have been acknowledging some of the limits of peer production while still remaining optimistic about the form of production as such. However, none of the acknowledged limitations is contextualized within the advancing process of platformization of cultural production, which creates a blind spot unattended to in the peer production literature.

It is also worth noting that both Anderson (2009) and Benkler (2006) see advertising as a major source of revenue that offsets the need to enforce copyright and thus enforce exclusive entitlement with regard to intellectual property. This relationship between advertising and intellectual property predates the emergence of digital media, with print and broadcast media serving as prime examples. The advent of digital media significantly broadened the pool of content producers who might employ these strategies. This has led to the much-lauded democratization of cultural production. However, in the current ecosystem of digital media, advertising is still being channeled through a few major intermediaries who act as centralizing forces. This warrants a search for alternative models that are better suited to fulfill the promises of digital media.

From these vantage points, this article explores the concept of ownership—called here *bounded ownership* for short—implicit in the imaginary that strives for information abundance while attending to the interests of owners. In general, bounded ownership loosens the restrictions on property used to generate benefits for its owners. More precisely, it involves refraining from exclusive control over the consumption of a resource, while enforcing control over its productive use. This hybrid configuration creates a unique dynamic: it fuels the cultivation and distribution of a resource while keeping it free (at least in some sense of the word). Eventually, as the resources governed through bounded ownership transform public space, its owners are put into positions of unprecedented power (van Dijck & Poell, 2015). Owners then govern not only the consumers who depend on the conditions under which they receive information goods for free but also producers, who become dependent on the information infrastructure provided to them (Nieborg & Poell, 2018).

Bounded ownership works from a premise that use adds value to the property and that its resulting value is therefore "co-created" by users. Typically, users are invited to use platforms free of charge, so that the platforms gain value by amassing content, audiences, and their data. To secure revenue streams, these assets are monetized by platforms through specific mechanisms, such as targeted advertising. As a result, users are regarded not only as consumers but also as producers of platform value, blurring an important distinction and providing an unrealistic image of users. Proponents of the "co-creation" business model portrayed users as inherently creative and active participants, while in reality, only a minority of users would qualify for such a description (van Dijck & Nieborg, 2009). The role of professionals has been neglected, providing an image of users supplying content just for fun or for other non-monetary incentives. Even in recent studies, some authors argue, that "creators are not recognized as stakeholders in current debates both academic and policy on platform governance" (Cunningham & Craig, 2019, p. 2).

This reflects a troubled relationship between content producers—newspapers, film and music studios, or independent producers—and owners of platforms such as Google, Facebook, or Youtube (Koetsier, 2020; Kravets, 2013a, 2013b; Lee, 2020; Ribeiro, 2020). Platform owners do not produce content, yet they source it as a free complementary product to populate their platforms. Moreover, revenue streams are controlled by platforms that mediate the interaction between content creators and their audience. The "free" business model promoted by Anderson (2009) assumes that the monetized products and the free complements used to raise the consumption of monetized products originate with the same entity. However, it is when complements originate from a different entity, that tension over monetization arises. Such tensions are more visible in what Anderson calls "imposed free," that is, piracy. This begs the question whether the more established platforms are, from the perspective of content producers, all that different from platforms considered illegitimate, especially since Anderson considers piracy functional in some regards for the original producers. In Anderson's argument, piracy represents a sign that free circulation of cultural works may be economically sustainable. There just needs to be a suitable business model, that takes advantage of the opportunities provided by wide accessibility of works while providing reliable ways of monetization.

The article aims to trace the origins of bounded ownership in the free software movement and to examine its further utilization in commercial online platforms. In this way, it aims to examine a crucial part of platform imaginary (van Es & Poell, 2020), which manifests in the expectations that intellectual property can be free to use. The article also points to relevant platform practices (Duffy et al., 2019) to suggest how bounded ownership could be used by content creators directly, making it less dependent on the mechanisms of online platforms, while maintaining the loosened control over property use.

The article first provides an argument for maintaining the distinction between production and consumption in online platforms. Bounded ownership then can be seen as a property system, where exclusive entitlement is enforced mainly toward productive use as opposed to acts of consumption. Second, Zelizer's concept of circuits is introduced to analyze non-monetary exchange in free and open source software. The exchange circuits in free and open-source software—established decades before the advent of social media and other commercial online platforms—assume property rights to be defended only toward productive use. Third, in the section "Making software antirival through bounded ownership" a parallel is drawn between the ownership practices in free and open source software and in online platforms drawing their revenue from advertising. It is argued that to achieve similar effects as free and open-source software, commercial online platforms need not publish their source code. This serves as a vantage point for discussing the relevance of bounded ownership beyond software in the article's conclusion.

Production, Consumption, and Digital Media

The entanglement between production and consumption is a complex one, and media scholars have been engaging with it for decades. In an influential work, Smythe (1977/2013) argued that consuming media content is productive for the capitalist system in that it constitutes a commodity to be sold (the audience) and in that labor power is reproduced through acts of consumption. Moreover, Jhally and Livant (1986/2013) argue that by watching advertising, audiences work for media conglomerates, which extract surplus value from this activity. These arguments have been developed as part of a Marxist critique of mass media capitalism. With the advent of digital media, this line of thought has resurfaced in a claim that by providing content and personal data, users represent labor input for online platforms (Fuchs, 2009). A popular concept of *prosumer* has been established, covering various forms of user participation in online platforms from users of Facebook or Google, on the one hand, to open-source software developers or Wikipedia editors on the other (Ritzer et al., 2012; Ritzer & Jurgenson, 2012).

The contention of this article is that it is analytically useful to maintain the distinction between production and consumption as it represents a key boundary in the platform imaginaries regarding property. To be sure, it is not the aim of this article to disentangle production and consumption as such but to make use of the analytical relevance these categories still have. The reference point of this article is the markets within which platforms are embedded, not the capitalist system as a whole. Production here refers to the production of commodities in terms of intellectual property, not the reproduction of labor power. Furthermore, while watching indeed has productive outcomes, it still remains just as well an act of consumption.

While some authors insist that a key difference between production and consumption is to be found in whether the activity in question is waged, or unwaged (Caraway, 2016; Gandini, 2021), it is possible to reflect whether the activity in question can be waged/unwaged in principle. This allows to retain the distinction between production and consumption even in contexts, where monetary exchange is not directly involved. For instance, volunteers among free and open source (FOSS) software developers clearly are substituting paid labor force (and the professionalization of FOSS projects spearheaded by the Linux kernel is a case in point). Users uploading content to social media are also productive to the point they substitute for professional suppliers of content, who would otherwise have to be contracted. However, much of the content uploaded has a personalized nature (e.g., everyday status updates of non-celebrities) that would seriously limit its potential to be traded on an open market as it is relevant only to a small number of individuals. Even more so, a single node of personal data (or metadata) is not a suitable object for trading on a market, unless it is being bought to be aggregated with other data to constitute a database. It could therefore be argued that these objects are inalienable in direct monetary exchange and that the primary source of value can be found in the aggregation and pre-formatting of content and data performed by online platforms. As Fish et al. (2011, p. 167) state with regard to online participation: "despite the fact that a great many resources are 'free' in one or more senses (*gratis* and free from restrictions), they must nonetheless be actively governed to be of value (emphasis original)."

There is also an argument that production and consumption converge because both are covered by legal contracts (terms of service; Fish et al., 2011). From the perspective developed here, it is not the presence of contracts that matters. Consumers of proprietary software have been subject to legal agreements long before user-generated content and data constituted a valuable resource. What matters is the role contracts play in creating market value. Legal agreements that concern consumers serve as instruments to create suitable conditions for data extraction, consumers are not contracted to produce anything of value (Robinson, 2015). It is, to reiterate, mostly through the aggregation of data that market value is generated. This market value is then protected by very different contractual arrangements aiming at third parties (i.e., advertisers).

Property and the Boundaries of Exchange

While the topic of digital labor has been discussed predominantly from the perspective of Marx's theory of value (e.g., Caraway, 2016; Fuchs, 2009; Koloğlugil, 2015), my point of reference is Weber's concept of property, which is more suitable for the analysis of exchange I intend to carry out. Weber's (1978, p. 44) definition of "free property" as an

exclusive right that is alienable and inheritable is of particular interest here as it discusses the nature of social relationships in which property is embedded. In this regard, Weber (1978, pp. 40–43) distinguishes between communal and associative relationships and between open and closed relationships, determining whether the relationship is based on the feeling of belonging together (*communal*) or on adjustment of rational interests (*associative*) and whether the relationship is accessible exclusively to certain parties (*open/closed*).

It is tempting to align these categories into a mutually exclusive opposition between market exchange (open, associative) and sharing or gift-giving (closed, communal). Where there is market rationality, there is no sense of belonging together and vice versa. However, Weber already characterized the "monopolized advantages" of property rights as guaranteed by closed social relationships (Ford, 2011; Weber, 1978, p. 44). The exchange of property is associated with the issue of political membership (Arendt, 1958; Ford, 2017). In this sense, associative exchange is coupled with closed relationships, blurring the seemingly clear-cut dichotomy.

The general takeaway from Weber is that specific ways of ownership and exchange are bound to social contexts, which are defined by other than economic criteria. This point has more recently been developed into an analytical perspective put forth by Zelizer while examining relationships of intimacy and care associated with family life. According to this author (Zelizer, 2005b, p. 37), there are social "spheres" or "worlds" defined by four elements: relations (sets of understandings and practices), transactions (short-term interactions), media (tokens and accounting systems), and boundaries (drawn around configurations of the previous three elements). Zelizer (2000, 2005a, 2008, 2011) works from the premise that perceiving the personal and the economic as separate is inhibiting our ability to account for the ways the worlds are reconciled in everyday life. As a result, a key focus of this perspective is on the boundaries of exchange, which can be found as spontaneously erected in social life and marked by creating an interface for the different kinds of media with which transactions are carried through on either side of the boundary. Such boundaries are not always perceived as given and are often subject to negotiation or explicit contestation in the legal arena (Zelizer, 2005b).

While Zelizer has argued that law represents the arena in which acceptable connections between market and non-market matters are negotiated, there is now a new layer of regulation. In an analogy to language in general, software has long been considered a "predefined constraining context" for computer-mediated communication (Raeithel, 1992, p. 391). The design of online platforms determines possible courses of action for their users and administrators alike. These possibilities—strategically selected by owners and architects of platforms—are established first and their legal status is often determined after the fact. As a result, platform design can be

considered as setting up the rules of a significant new organizational context, where market and non-market exchanges are reconciled.

In what follows, I will use Zelizer's (2006, 2008, 2011) concept of *circuits*, which represent bounded spheres of exchange in which particular medium is used or where a common medium is earmarked to carry a particular meaning. Members of a circuit share social relations, economic activities, and their meaning. Two further characteristics of circuits are of special interest here. First, circuit members maintain a certain level of control over the circuit boundary and the transactions that cross it. Second, circuits generate credit, trust, and reciprocity, while their boundaries serve to exclude outsiders from these resources. Drawing upon these characteristics, I will attempt to show how circuit boundaries align with—and sometimes substitute—formal property regulation in online platforms.

Exchange Circuits in Free and Open-Source Software

Works of intellect are typically regarded as nonrival goods. This means that their consumption does not diminish the overall availability of the goods. This is the case with software, for instance, as using a copy of a program does not diminish the "stock" of the program that is available. The ease of making digital copies creates suitable conditions for establishing a culture of sharing. This was, in fact, the default mode of exchange, under which computers were initially operated by small communities of professionals or enthusiasts (Levy, 2010). As commercial interests grew stronger, intellectual property regulation was introduced to the software to facilitate its monetization.

Opposing approaches to software development and distribution were eventually established in the division between free software and proprietary software. The latter has at its disposal a broad range of tools to control what is produced: legal concepts such as license, trademark, patent, or even trade secret can be invoked. A common point of criticism aimed at proprietary software is that it uses regulatory tools originally developed to protect published works while keeping software source code away from the public and even from the individuals who buy it.

For free software adherents, criticism of proprietary software is a matter of rights and moral principles. Richard Stallman, the founder of the Free Software Foundation (FSF) and the original author of the GNU General Public License (GPL)—a standard among free software licenses—maintains that his views on software development are guided by the "golden rule" (Vainio & Vadén, 2007, p. 3) and are thus based on ethics revolving around reciprocity. Stallman's activities were prompted by a frustrating experience of a company trying to enclose a product of collective effort (Chopra & Dexter, 2007). The license, which codifies Stallman's practices originating from the development of the

EMACS text editor (Lin, 2007), is known to leverage copyright to attribute the rights to use, modify, and distribute the licensed source code to *anyone*. In practice, GPL-licensed source code seems to be a property of "none." Moreover, in an attempt to enforce reciprocity and defend against co-optation, the GPL stipulates that any derivative work must be distributed under the same conditions (this makes it a "copyleft" license). In this way, Stallman used legal tools to carve out space for a community lifeworld (Coleman, 2010) that would retain sharing practices in an environment increasingly governed by economic interests.

Given that in free software, source code contributions from volunteers constitute the currency through which status in the community is built and maintained, such a way of licensing creates a form of earmarking that differentiates the medium of software source code and makes it run in its own circuit. The earmarking affords control over the productive use of source code, excluding individuals and organizations from adopting it in their works. In contrast, no such form of control is performed with regard to users who run the software on their computers.

It is important to note that the FSF also maintains the Lesser General Public License (LGPL), which omits the copyleft provision, making it possible to create works derived from the licensed source code without additional restrictions (FSF, 2007). In the perspective developed above, the LGPL surrenders control over the circuit boundary. This is seen as undesirable by the FSF, which explicitly discourages its use.

Licensing terms similar to the LGPL are common to open-source software. In 1998, Bruce Perens and Eric Raymond founded the Open Source Initiative (OSI) to make a more pragmatic case than the Free Software Foundation. The most immediate difference between OSI and FSF, therefore, lies in the rationale for keeping software source code public. While Stallman employs moral rules emphasizing reciprocity, Raymond sees publishing source code as increasing the technical effectivity of software development—a broad and engaged audience facilitates testing and error correction (Raymond, 1999). Another difference lies in the fact that Raymond retorts from Stallman's emphasis on community and approaches software development from an individualistic vantage point by claiming, for example, that the best motivation for participation is "scratching one's own itch" or by assuming a development model where an individual (the founder or maintainer) harnesses other participant's input (Yeats, 2007, p. 30). As a consequence of its pragmatic individualism, the OSI endorses "permissive" licenses which allow for free use, modification, and redistribution of source code but which lack the copyleft feature protecting the collective work.

The preference of permissive licensing over copyleft is not a purely ideological matter. Abolishing the last hurdle for source code appropriation provides additional economic value to the software. In attempting to explain the success of open-source software, Steven Weber (2004) argues that software is not only nonrival, but it can also become *antirival*. With this concept, Weber accounts for the fact that the use of software not only does not affect its overall availability (*nonrivalness*) but also for the fact that the more it is used the more valuable it becomes (*antirivalness*). As pointed out earlier, open-source software benefits from wide availability through increased participation on development. Wide availability also facilitates network effects in the face of compatibility issues. A freely available and modifiable software is better suited to become a standard, drawing further resources toward its development. As a result of the antirival treatment of software, value is generated through abandoning some of the property rights to which the authors of source code could be entitled. Abstaining from enforcing exclusivity in possession becomes economically rational.

However, even permissive licenses, which omit the copyleft clause, are coupled with mechanisms that allow to maintain a threshold level of control. These mechanisms are associated with how software development projects are organized and are based on access to infrastructure. The exclusivity of administrative access to infrastructure such as domain names or correspondingly named source code repositories is usually backed by informal status based on endogenous criteria of the community (Ducheneaut, 2005; Stewart, 2005). The informal entitlement then generates a right to release official versions, that is, the power to decide and classify what can and what cannot carry the developed program's name. Software names—Apache, Drupal, or Firefox, for instance—constitute an earmark of software source code, enabling a circuit whose boundaries are guarded by those with access to infrastructure. This form of earmarking is so important across free and open-source software that it often gets formalized. The informal *earmarks* constituted by software names often reach the point of formal exclusivity of *trademarks* (see e.g., The Linux Foundation, 2020).

Under everyday circumstances—setting aside the possibility of forking (establishing a parallel development project)—maintainers of software projects effectively control the development process in terms of who will be allowed to take part in it. Not every volunteer contribution gets to become part of the codebase. Some are excluded in the review process not only for reasons of quality but also for not conforming to certain conventions or design principles. Again, limits are placed on how and by whom source code can be developed further while disregarding any form of exclusivity toward end-users.

The analytical treatment of FOSS has so far identified two circuits of exchange (see Table 1), none of which uses money as an exchange medium. Monetary exchange is introduced to FOSS by formal organizations, which insert themselves into the governance structure by hiring software developers who are in positions of control within the established hierarchies (Andriez du Preez, 2007; Kelsey, 2007). This practice establishes an interface between circuits where contributions to

Table 1. Circuits of Exchange in Software Development.

Circuit	Medium	Derivative works	Earmark	Boundary excludes
Free software	Source code	Copyleft licensing required	Copyleft Names/trademarks	Software developers
Open source	Source code	Any licensing (including proprietary)	Names/trademarks	Software developers
Proprietary software	Source code	Defined by license owners	License terms Trademarks	Users and software developers

source code are exchanged informally and circuits where relationships are formalized and exchanges are monetary. Through this interface, financial capital is transformed into influence over the course of development. The value generated when the concept of property is largely suspended can then be "captured" (Morgan & Finnegan, 2014, p. 228) by formal organizations and made exclusive toward third parties. This closes the loop by generating further financial capital.

Making Software Antirival Through Bounded Ownership

The preceding examination of FOSS ownership practices brought two main points. First, software can be treated as antirival good that benefits from what would otherwise be considered unauthorized use, or free-riding under a more traditional property regime. The antirival treatment of software provides an economic rationale for licensing, which omits exclusive entitlement to many practices usually associated with ownership. Second, even though FOSS projects seemingly constitute an intellectual property "no-man's land," two forms of control over exchange are still practiced. The earmarking of software source code achieved through copyleft licensing, or through naming/trademarking constitutes distinct circuits of exchange. It is important to note that in both cases, the boundary established by earmarking can be used to exclude other software developers from the exchange of software source code. Earmarking the source code thus represents means to keep its development within the bounds of a particular group of developers, while no boundary is drawn with regard to end-users. This form of exclusivity solidifies the relationship between authors and their creations as is the case in the protection of intellectual property in general, but only with regard to certain ways of usage. Here the distinction between production and consumption becomes useful. Only further development of software through the exchange of modified source code is conditioned by licensing or trademarking. Software developers, who intend to *produce* must meet the requirements while end-users wanting to *consume* the software (i.e., using its functionality) are not subject to any.

The two branches of FOSS differ substantially with regard to the ends toward which control over exchange is practiced. When open source split off from free software in 1998, the differences between them were mainly ideological and resulted in differing licensing preferences (copyleft versus permissive). On the level of practice, as Kelty (2008) has argued, there seemed to be no difference. However, the platformization of the web brought further divergence. A demand for open-source software as building blocks for online platforms has resulted in unprecedented commercial success. Open source managed to position itself as an interface between the interests of communities and firms. But with platformization, the latter seems to prevail: If open-source software is run by users through third party controlled servers (and other uses of the software make little sense), the freedoms afforded by its transparency are largely neutered. Meanwhile, perhaps in response to this, free software has become increasingly radicalized in its rejection of commercial interests (Kelty, 2013). In the following, I will focus on open source specifically, as its involvement of sponsors constitutes what will be called multi-sided markets below.

Another important point is that software exists in two forms: while developers modify a program's source code, users run the program's binaries, which are compiled from the source code. The two forms match the distinction between production and consumption, and the antirival treatment of software in open source makes use of the public availability of both. Since software is also developed in a proprietary fashion (and proprietary extensions are built on top of open source software), where only binaries are available, a question may be posed: Can software be treated as antirival when only its binary form is publicly available?

For a long time, proprietary software has resisted the non-rival and antirival dynamics with various forms of intellectual property protection. However, I believe that the recent rise in online platforms, which are free for end-users, provides an affirmative answer to the question. The analogies between open-source projects and online platforms, as developed below, can also be read as a case to consider open-source projects as platforms. This is especially visible when platforms are not treated as unitary objects, but as an assembly of various forms of infrastructure and "platform tools" (Foxman, 2019) and "middlebroware" (Lesage, 2015), which act as "glue" holding together the digitized process of cultural production. But first, the term "platform" needs to be qualified. The term has received a lot of attention as it was brought to the spotlight by the work of Bogost and Montfort (2008) on video games. In the following, I will focus on software platforms that can be accessed online. Specifically, I

Table 2. Comparison of Open Source and Advertising Platforms.

	Open source	Advertising platforms
Programmable	Through contributions to source code; control is maintained through decisions on inclusion of contributions.	Through API; control is maintained through selective availability of functions in API.
Layered	Depends on source code hosting platforms and provides source code to other layers.	Depend on open source projects for software components and provides API and SDKs to other layers.
Supporting content	Aggregates of data and content freely available; public data management	Content freely available, aggregated data exclusive; proprietary data management
Multi-sided markets	The main product (source code) is free; complements provided by third parties (professional services) are monetized	The main product (user data) is monetized; complements provided by third parties (content) are free

Note. API = application programming interface; SDK = software development kit.

will draw on the affinity between open-source projects and advertising platforms (Srnicek, 2017), and I will argue that both can be characterized as (1) programmable, (2) layered, (3) supporting content, and (4) creating markets with multiple sides (Steinberg, 2019). See Table 2 for an overview of the four characteristics.

(1) Online platforms such as Facebook or YouTube may be built upon components that are developed as open-source software, but the platforms themselves are proprietary. Their source code is not publicly available, and they are products of development taking place internally within a single company. Instead of the full source code, online platforms commonly provide an application programming interface (API). This means that a platform can be utilized by other software: from embedding a YouTube video on a website to programming a game that can be played by users on Facebook. According to Helmond (2015, p. 4), the purpose of API is to support data streams across the web. Data are "decentralized" through flows from a platform to another part of the web (e.g., embedding a video from YouTube) and "recentralized" through flows back to the platform (e.g., data on viewers and their actions). The data streams are managed and platforms pre-format them through software development kits (SDKs) provided to external developers.

Open-source projects, on the other hand, are programmable in a different sense. Here, the behavior of software can be modified by direct interventions to the source code. In other words, open-source software is programmable through contributions made by volunteers, or hired developers. While API used by advertising platforms maintains control over the software by providing highly selective access to software functions, open-source projects maintain control by decisions about the inclusion of contributions into the official version. Open-source projects differentiate data streams into a circuit dedicated to productive use (software source code) and another dedicated to consumption (software binaries). While decentralization takes place with regard to both source code and binaries, recentralization does not apply to binaries. In open source, the exchange with consumers has consisted predominantly of one-way data transfers: binary executables

are distributed to users so that they can install and run the software. There are instances, to be sure, where data are transferred also in the opposite direction (e.g., for diagnostics), but it can be argued that this is not inherent in the open source model.

On advertising platforms, data transfers run both ways by default. Users receive content packaged in binary data of the software that constitutes the platform (and its various extensions). The software then sends user data back to the platforms. In other words, open-source projects' data exchange with consumers takes place only through decentralization while advertising platforms employ both decentralization and recentralization in exchange with their users. If recentralization is associated with productive use, it could be seen as establishing the status of producers for users of advertising platforms. However, as was already argued, the act of production consists of aggregation and pre-formatting of data; this is what recentralization consists of, not the actions of users.

(2) Online platforms exhibit a layered structure where a service of one platform may itself become another platform. Platforms such as Facebook provide their own services in the form of APIs and SDKs, and third-party developers assume those in building another layer above the platform. The layer below Facebook usually consists of projects developing open-source software, which themselves utilize services of another type of platform. For instance, Facebook provides API through the React Javascript library. The React library itself is developed as open-source software, and its main source code repository is hosted on GitHub, a platform dedicated to sharing source code. In the current "platform ecosystem" (van Dijck et al., 2018, p. 12), open-source projects constitute a layer that is dependent on the services of other platforms (source code hosting) and that also provides services utilized by others (software components to build online platforms).

(3) Both open-source projects and advertising platforms use interfaces that display content to users and other human operators. In open-source projects, content can be conceived as a broad category; any data—from source code to chat

logs—can be displayed in the interface available to end-users. It is especially important to note that the interface displays even aggregated inputs (i.e., the whole source code as opposed to contributions provided by individuals). In advertising platforms, on the other hand, content represents only a subset of the data flows. Some flows are hidden from the interface, and aggregated data can only be purchased. It also needs to be noted that the difference does not lie only in the accessibility of data but also in their composition when displayed. While in open source data are managed publicly (e.g., through version tracking of source code, or archiving mailing lists), advertising platforms use custom algorithms to select and prioritize content.

(4) Open source as well as advertising platforms can be regarded as instances of multi-sided markets. They serve as intermediaries in an exchange among other parties. In other words, platforms are "connectors" in an exchange between users and "complementors," who provide content or services (van Dijck et al., 2018, p. 16). Platform owners then use this position to enter other markets (such as advertising).

Open-source projects operate as intermediaries between software developers (complementors) and users. At the same time, the developed source code can serve as means to enter other markets beyond simply providing software to end-users. The business models of companies involved in open-source software rely on providing further services (e.g., consulting, certification, implementation, or custom development) around the developed software. It is important to note that in open-source complementors directly enter the markets where content is monetized. That is to say, in open-source complementors establish multi-sided markets for themselves. In advertising platforms, complementors are less autonomous. Monetization takes place in a market entered by the platform itself and financial resources are redistributed according to conditions determined by platform owners. Although in some cases, complementors have their own monetization channels, they are still dependent on the influx of users determined by platforms through their presentation of content (see previous point).

Another important difference between open source and advertising platforms lies in what is monetized in the multi-sided markets. It could be argued that the main product of a platform is the outcome of data recentralization. In open source, this amounts to source code, and in advertising platforms, the main product is aggregated user data. On the other hand, there are complements that help to amass the main product. In open source, companies that monetize complementary services usually contribute to software development. In advertising platforms, content is what draws users to the platform so that their data can be aggregated. As a result, the multi-sided market in the open-source platform context is set to monetize complements and provide the main product for free, while in advertising platforms, the opposite is the case.

To further elaborate on the nature of the main product, Olleros (2018) argues that rival nature of goods does not preclude antirival effects to emerge. This can be observed in what Srnicek (2017) calls lean platforms (e.g., Airbnb, or Uber). On lean platforms, users do not pay for access to the platform itself. Instead, they pay for services provided by third parties. Owners then exercise exclusive control over the platforms by claiming part of the monetary reward third parties make by providing their services. However, due to the rival nature of services (transportation, accommodation) and of tokens used for exchange (money as opposed to data), these platforms do not constitute what Olleros (2018, p. 10) calls "inclusive goods." Only a combination of the nonrival nature of the goods (i.e., information), with mechanisms creating antirival effects (i.e., multi-sided markets) produces inclusive goods. These conditions are met by both open-source software and advertising platforms, and this further strengthens the parallel between them.

In generating antirival goods, the main product is subject to a feedback loop that makes the product better with use (Olleros, 2018). This point constitutes another dimension in the analogy between advertising platforms and open source. In the former, algorithms are trained over the accumulated datasets and deployed to maximize the efficiency of the platform. In the latter, software "learns" through the contributions and feedback from its users. The feedback loop provides further rationale for bounded ownership as increased use of property contributes to its value even in the absence of multi-sided markets. This can be illustrated by product platforms (Srnicek, 2017). For instance, Netflix uses data on viewers to improve its suggestion algorithms as well as its own content (Markman, 2019). However, product platforms do not employ bounded ownership in their business models (users pay for access to the platform). Product platforms treat themselves as rival and as a result, do not constitute inclusive goods.

An important point is that antirival effects are produced for the platform as a whole, i.e., the assembly of software, content and databases. And the allocation of benefits stemming from antirival effects is controlled by platform owners. This means that the benefits do not necessarily reach platforms complementors. In other words, content does not necessarily get better with use on platforms and creators often need to find other ways of monetization external to platforms where their content circulates. It seems that the benefits of inclusive goods have so far been reaped by platform owners. But there seems to be potential for extending the strategies for producing antirival effects to other types of nonrival goods (content). At stake here is not only the possibility to create more inclusive goods. The power asymmetry between platform owners and complementors could be leveled, if works currently sourced as platform content could achieve the status of antirival goods themselves.

Conclusion

If the content is to constitute the main product (instead of just being a complement helping to aggregate user data), while also maintaining the inclusiveness it gained on advertising platforms, it needs to be able to render antirival effects for its own sake. That is to say, it needs to be able to constitute multi-sided markets and get better with the usage through user input by its own means. To get a grasp on how bounded ownership could be applied to content directly (not through the intermediary of advertising platforms), a last recourse to free and open-source software needs to be made.

FOSS has been characterized as a "recursive public" (Kelty, 2008, p. 3) because it is preoccupied with its own infrastructure. Software tools used in FOSS development are usually themselves developed as FOSS projects. Software licenses are provided by organizations deeply integrated with the movement (such as the FSF or OSI). Even the principles and philosophies that motivate this approach to software development represent issues intensively reflected and debated in FOSS communities. Furthermore, before all-encompassing platforms such as GitHub emerged, the online presence of FOSS projects spanned multiple spaces (popular instances were Freenode, Sourceforge, or Bugzilla). Because of the recursivity and multiplicity of infrastructure, FOSS was able to operate with high degree of autonomy.

Similarly, an increased preoccupation with infrastructure would afford greater autonomy to current platform complementors. There already are instances that indicate a shift in this direction. Newspapers are increasingly adopting subscription-based business models (Williams, 2016), restricting access to their content and drawing their revenue independently of advertising intermediaries. This move can be read as an effort to regain control over digital infrastructure. However, in doing so, newspapers will essentially become product platforms, that is, exclusive, treated-as-rival goods.

At the same time, content producers seem to be increasingly reflexive of the platform infrastructure they depend on, especially of the rules and algorithms that determine the visibility of their products. This reflexivity can then be put to work through optimization of content (Morris, 2020, p. 5) or through organizing producers to constitute mutual audiences and thereby provide baseline engagement stats (O'Meara, 2019). Such attempts at "gaming" the mechanisms determining visibility are usually considered illegitimate by the platforms in question and are often met with attempts to drive them out (Petre et al., 2019). The biggest drawback of this strategy, however, is that even though producers are able to improve their position, it actually increases their dependence on the given platform.

Finally, there are platform practices (Duffy et al., 2019), which retain the content as inclusive (both nonrival and anti-rival) good that is free for consumers and at the same time decrease dependence on single platform vendors. Independent creators substituting or supplementing default monetization schemes with third-party mechanisms can be a good example. For instance, the streaming platform Twitch has been known for the breadth of monetization models employed by its streamers (Johnson & Woodcock, 2019). Although such multiplication of infrastructure has generated tension and pushback from the platform (Partin, 2020), it can generally be considered as a move by creators to increase their autonomy. Another practice has been to promote content through its free use and generate income by monetizing tangible goods (merchandise) or services (live performances) (Anderson, 2009; Gateau, 2014). Or to offer content through services—such as Bandcamp—that diverge in key aspects in how platforms usually operate (Hesmondhalgh et al., 2019). The emerging applications of blockchain technology (such as the Mycelia service for musicians) could also make possible new strategies of monetization by reducing the resources needed for intellectual property rights management so that it becomes feasible even for independent content producers who do not wish to give up control of their works entirely. Overall, the platform practices can be read as attempts at returning to the original logic of the internet, as an intermediating network among various communication technologies, instead of relying on a single infrastructure provided by a platform. In other words, there is a tendency not to use all the "platform tools" (Foxman, 2019) from a single vendor to avoid the undesirable consequences of lock-in.

Interestingly, online piracy in the form of unauthorized streaming or file-hosting may be read from this perspective as diverting content to different platform infrastructures to release it from established forms of control. There is also a historical commonality since the success of FOSS has served as inspiration for pirate parties, the political agents pushing for loosening protection of intellectual property (Fredriksson, 2015; Fredriksson Almqvist, 2016). Online piracy is different from the instances listed above in that the move toward autonomy is not performed by producers of content and that the main beneficiaries of this move are the owners of new infrastructure and its users. It could therefore be argued, that by employing bounded ownership, content producers could draw more of the benefits also to themselves.

The practices pointed to earlier essentially aim to achieve one thing: to establish their own circuits of exchange. Circuits whose boundaries they could control, whose infrastructure they could swap and from which they would be able to draw financial resources. According to Zelizer (2006), each circuit operates with a distinct medium of exchange or earmarks an existing medium. In online piracy, existing content is earmarked with the differing conditions of its availability, just like different forms of licensing establish circuits in FOSS. For producers, establishing a separate circuit requires succeeding in presenting content as distinct. This happens when content is not perceived as just another information presented by platforms, when content earmarks platforms with its presence, not the other way around. Content then becomes a new layer on top of existing platforms, utilizing their services toward its own ends.

The perspective put forth by this article opens up new venues for research. First, the argument for maintaining a distinction between production and consumption in online platforms can serve to further refine the assessment of participation on online platforms (Kelty et al., 2015). Second, a further use of Zelizer's theory for the study of online platforms seems promising. In particular, it would be interesting to follow various platform practices in more detail while looking for the exchange circuits they establish. Third, the concept of bounded ownership as a generalization of particular platform imaginaries can help establish a line of research on business models, platform practices, piracy, or technological advancements aimed at exploring the ways to produce and distribute content that is both nonrival and anti-rival and whose use benefits its producers.

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