Info-capitalism and resistance: how information shapes social movements

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Abstract

This article uses the lenses of information theory and critical software studies to examine how socio-technical forces like digital encoding and information circulation affect social movement struggles. Focusing on certain information designs and coding features of social media networks, the article analyzes ***how activist communication practices and modes of collective action evolve alongside available information infrastructure****. In particular, I look at the technical features of social media networks—their nodalities and protocols—and at three key elements of social media platforms—the platform itself, the interface, and the algorithms determining interface functionality—in order to reveal their impact on organizing practices. Emerging from this analysis are insights into how the mutual entanglements of code, network structures, and social struggles in information capitalism are literally "encoding," and in some cases limiting, different modes of collective action. Understanding the role that information architectures play in communication, I argue, opens up new potential for resistance and subversion by "recoding" activist practices.*

Keywords: Social movements; social media communication; platform politics; information theory; information capitalism; platform activism; software studies.

Control "matters" through information—and information is never immaterial.
Galloway & Thacker

Introduction: moving away from information as semiotic content

The sounds of a modem connecting to the internet through a dial-up system is a reminder that information, in its technical definition beyond semiotics, does not refer to the meaning of a transmitted message but to a series of signals unintelligible to the human hear in their basic forms. In fact, the message transmitted by a modem is abstracted from content and mathematically encoded by applying a value to it of 0 or 1. Information theory pioneer Claude Shannon—who was concerned with making bits of data travel effectively through phone communication channels—defined information mathematically as the ratio of signal to noise (1948). This means that information can be thought of as a statistical pattern of redundancy and frequency—a modulation of signal to noise. It describes bits of data that are abstracted from content but

recognizable by a channel as relevant, preventing those that are not relevant (noise) from reaching a target. Following Shannon, then, we can think of the modem—a *mod*ulator-*dem*odulator—as a device that modulates, or encodes, the data from a computer to transmit it over the telephone before this data is demodulated, or decoded, on the other side of the transmission channel. Here, the bits of data travelling do not only consist of the encoded message—the text of an email for instance—but also include other commands to the hardware and software necessary to make the content of the email reach its destination. The possibility to turn information into bits of data—phone calls, images, music, text, and so on—and to circulate them in large quantities, at high speed and long distances thanks to technologies like compression, error-correction coding, modulation and networking has revolutionized society (Gere 2002).

Today, our lives unfold in a data-heavy environment, where new modes of production and new forms of power thrive on information circulation in such an abstracted form. Marketplaces rely heavily on production and distribution within this world of information where they capture the value of the signs and symbols of consumer culture and communicate across borders but also extract profit from information in a variety of formats: information infrastructure and technology; high frequency trading in the stock markets; apps, servers and data systems; big data—to mention a few. Information is not just produced and circulated through channels; it also chaotically moves around and across them, creating noise. Many economic sectors depend on the circulation of information through cleared channels (e.g. advertising). In other words, they have to tap into informational dynamics—into the relation between noise and signals, with all its chaotic processes, entropy and variations (Terranova 2004b, 7). Let us call this type of economic system information capitalism, or *info-capitalism*. This article examines how digital encoding and information dynamics affect social movements struggling within info-capitalism. In particular, given the almost totalizing role social media and social networks now play in connecting citizens, it analyses their information designs and coding features to show how activist communication practices and modes of collective action are evolving alongside the information infrastructure that sustains info-capitalism.

The concept of info-capitalism does not denote a fit-all classification for a new kind of society but is offered in order to draw attention to the features of the data-heavy environment and dominant economic processes that form the context of contemporary social movements struggles in highly industrialized societies.[1] In info-capitalist formations, a sustained engagement with

[1] The term is used to underscore certain characteristics of what has also been defined elsewhere as communicative capitalism (Dean 2009) cognitive capitalism (Vercellone 2006) and semiocapitalism (Berardi 2009). Ignatow describes information capitalism as marked by the increasing importance of information under conditions of globalization and fast technological advancement and relates it closely to concepts such as Drucker's knowledge economy, Touraine's and Bell's post-industrial society, Webster's information society, and Castell's network society (2012). Fuchs has discussed at length labour in informational capitalism (Fuchs 2010, 2014), stressing how technology and networks have restructured society and radically changed modes of production. I use the term info-capitalism not to replace but to

informational dynamics is key to accumulating surplus value by breaking through overcrowded environments with noisy channels, controlling and recoding the overload from a variety of interconnected media, and reaching bodies that extend into appended communication technologies like smartphones. In other words, processes of capital accumulation unfold in an environment where "the dynamics of information take precedence over those of signification" (Terranova 54). The mining of data on social media, for instance, illustrates this: social media platforms on different devices promote the effortless circulation of information in the form of messages, while the metadata (i.e. data about data) accompanying and organizing it is collected into large pools to be analyzed by algorithms that will only afterward assign it any meaning for marketing purposes. Thus, when it comes to social media, we could argue that the act of communicating by circulating any kind of information, rather than the exchange of specific messages is what counts in info-capitalism.

Social struggle in info-capitalism often addresses the social, economic, political and cultural repercussions of competing for control over information as a resource: movements have emerged against the flexibilization and precarization of work in the service and creative sectors, against e-waste, against resource extraction and the military industrial complex's involvement in the production of technology, against new consumption habits, against surveillance, against the "virtualization" of capital (financial speculation, debt, etc.) and against the monopoly of knowledge controlled by information giants (copyrights and patents, the abolition of net-neutrality, etc.). Other forms of activism that engage information on multiple levels are more subterranean and less recognizable: they oppose the powers that control the informational environment, for instance, through the production of free software that can be modified and shared through Free and Open Source Software (F/OSS) projects. In other cases, we are dealing with clashing forces, which have not reached the level of explicit struggles but have the potential to escalate—those of users resisting against the capture of data and violation of privacy on social media through creative interventions like the Facebook suicide machine (Les Liens Invisible 2009). The latter erases all data from Facebook accounts against the company attempts to retain information even when users have terminated their membership.

All these different forms of conflict offer important insights into how the direct and indirect engagement with information has consequences for movements' modes of resistance. While it is critical to investigate emergent social formations, looking at their composition (Borio, Pozzi, and Roggero 2002), their resource mobilization and dynamics of contention (McAdam, Tarrow, and Tilly 2001), the discourses and framing of their struggles (Gitlin 1980), the communicative practices of activists (Castells 2012), and even the impact of activism in general (McAdam 1999), it is also no longer possible to ignore the co-constituting relationship between information technology and organizing

build on these theories and to foreground the role of informational dynamics and the materiality of the production and infrastructure that are required to sustain it.

practices in social movements because so much organizing is now mediated. Contemporary and emerging information architectures affect the potential for action as well as its very meaning. In the context of activism, social media platforms face the paradox of enabling social struggles that are often, simultaneously emancipatory and feeding info-capitalism. More precisely, they facilitate organizing while promoting data mining, free labour, and closed, proprietary interfaces, and, importantly, they normalize or exclude specific forms of collective expression. Whether it is participation, organizing or other mediated practices like sharing and collaborating, the changes to activist practices become visible when we examine the information-rich environment in which action unfolds, the ways in which movements come together, but also how individual and collective subjectivities are engendered as information circulates through its infrastructures and systems.

We can better grasp these changes in organizing practices if we look at how the structures through which information is circulated and organized—e.g. networks and platform architectures—*encode* the actions of users. This relationship between information and action has not yet received sufficient attention in the context of social movement practices. Scholars seldom ask what happens as information circulates through channels and is recoded beyond them, because traditional models of communication conceptualize information as content that is simply exchanged between a sender and a receiver over channels whose form or structure is merely incidental. This basic model ignores the indirect impact of informational structures and diffusion on cultural or political expression. Yet, the patterns and structures that organize and extract profit from these flows of information foster specific *communication* habits that critically affect our capacity to *act*.

In what follows, after a brief historical contextualization of my study, I will examine the topology of social media networks and three key features of social media platforms: the platform itself, the interface and the algorithms that determine the interface's functions. By considering the layers through which information and interaction are organized we identify less obvious practices of resistance and see how actors can engage power. In particular, the organization of information through code, interfaces, and networks impacts political organizing as much as it affects practices of knowledge production, processes of meaning and value-making, and the constitution of being because this environment conditions our lives, our agency, and how we relate to ourselves and others. What emerges from my analysis are insights into how the mutual entanglements of code, network structures, and social struggle in info-capitalism are literally "encoding" different and in some cases limiting modes of collective action. At the same time, I argue that understanding the impact of information and recognising the hidden sites of struggle in info-capitalism—as many groups are doing—opens up new potential for resistance and subversion precisely by "recoding" how movements can act and imagine future action.

A focus on information and info-capitalism is not meant to provide a totalizing narrative but to offer a lens for viewing contemporary modes of struggle in the

light of subtle yet pervasive forms of power. Such forms of power cannot be separated from the force that information itself has to materially structure socio-technical formations. My discussion of activism in the context of info-capitalism draws on information theories applied to the social realm (Terranova 2004a) and critical software studies (Fuller 2008, Kitchin 2011), a field that investigates the co-constitution of social practices and information systems. These approaches offer a perspective of the role of information in activism by identifying practices of resistance that engage information to disrupt dynamic systems, be they technical or social.

A brief history of information activism and its challenges

The notion of info-capitalism helps us locate activist practices in a sociotechnical context, their viability and success requiring a constant engagement with information. For decades, scholars from a variety of disciplines have stressed the importance of communication practices and tools within social movements; they have looked at radical media projects (Downing et al. 2001), networked activism (van de Donk et al. 2004) and how social movements use technology (Della Porta 2006). Sociologist Manuel Castells was one of the first to systematically study the political impact of the internet on social movements with a case study of the transnational campaigns in support of the Zapatista in Mexico (Castells 1996, 2004). Anthropologist Jeffrey Juris (2008) has discussed how networked structures promote alternative accountability and organising models that are based on horizontality and autonomy. With the development of visualization tools, media scholars have also been able to visualize and analyse the shape and connections among different nodes in these networks (Lusher and Ackland 2011). Finally, activists themselves have discussed the impact of information on movements, especially information overload (Wright 2005, Cleaver 1999).

Already in the late eighties, before the birth of the World Wide Web, activists were quick to adopt networked communication technologies starting with the Bulletin Board Systems (BBS) that offered public message boards, emails and direct chatting. Between 1997 and 2000, the expansion of small Silicon Valley e-businesses led to the growth of a so-called dot-com economy, fusing libertarian neoliberal ideas about self-regulating markets and anti-authoritarian countercultures of the 70s, touting free information, human connection, and shared knowledge as fundamental values (Turner 2006). These ideas created a long-lasting connection between Silicon Valley and activism not only through F/OSS and hacker cultures, but also through various commercial start-ups that offered services for networking and collaboration to the non-tech-savvy (e.g. easy to set up websites through services like GeoCities, blogging sites, and social bookmarking sites like del.icio.us).

Many activist interventions at the turn of the millennium were developed building on this DIY and commercial infrastructure in an attempt to deal with information flows (Meikle 2002, Raley 2009). During the 90s, creative

information-based practices established themselves alongside the marches, rallies, and counter-information projects. As information increasingly took on a key function in the capitalist system, movements across the globe attempted to sabotage the capitalist communication machine through culture jamming, tactical media interventions, anti-branding campaigns, "subvertising," and sweatshop boycotts that heavily used networked communication (Klein 2000). Repetition, short slogans, and spoofs of ubiquitous logos became part of a diversity of tactics to reach out in an informational environment where capital competes for niches to sell products and services, together with the lifestyles that require them and the political discourses that legitimate them. At the same time, production software and diffusion platforms facilitated projects that thrive on capitalist info-dynamics, anticipating the model of so-called "prosumption" (production/consumption) typical of Web 2.0 (Toffler 1980). The information overload of images and messages circulating on the net was folded back into a field of experimentation through blogs and vlogs, viral video mash-ups and websites to convey political messages that subvert the language of consumption and of institutional politics (Meikle 2002, Renzi 2008). In these unstable informational environments where information tends to escape its circulation channels to be coded and recoded, activists are not only confronted with the challenges of co-option, distortion, and dispersion of meaning, but also with an information overload that weakened their messages (Garcia 2006, Wright 2005).

With the dot-com crash around 2000, many of the rapidly growing Silicon Valley start-ups folded, leaving surviving companies like YouTube, Yahoo, and Google to dominate the web, increasing their control over the gateways to and channels for information (Vaidhyanathan 2011). The financial success of these giants is heavily dependent on the management of information flows through the use of algorithms in recommendation software, the collection of metadata for effective searches, ranking, and network building that are now a fundamental aspect of so-called Web 2.0 in general, and of social media platforms in particular. Moreover, modes of accumulation that thrive on mining and controlling data also underlie the increasing black boxing, interface simplification, network gatekeeping that distribute power on the net. While generating profit, the mostly free services that new communication giants offer facilitate access to user-generated content through multi-platformativity and interoperability; they organize information, promote networked interaction, and allow data mobility and ubiquity by storing content and software on the cloud. These mechanisms shape the very structure of networks, platforms, and interfaces that activists have adopted as their new communication infrastructure.

Governments supporting the free market often legitimize these monopolistic tendencies, in many cases reaping the benefit of easy access to information for surveillance purposes, especially after 9-11. Surveillance, however, is only one outcome of these challenges for social movements using these technologies. The forms of information control that characterise Web 2.0 have given rise to topological structures and protocols that indirectly shape and modulate activist

practices at the level of the network, the platforms and the interface. Web 2.0 facilitates organizing through social media outreach, the rapid circulation of viral content and the diversification of advocacy campaigns at little or no cost. At the same time, anti-capitalist campaigns feed profit to those who own proprietary interfaces. Most importantly, the use of social media platforms, can be said to enable and normalize only specific actions, shape specific forms of sociality and collective expression, and constrain the capacity to imagine what is possible outside of the boundaries they set.

Contemporary network topologies

Despite their seemingly horizontal structures, contemporary IT networks are structured by what could be described as "data containers" designed for compatibility among nodes and devices, as well as by gates that open, close, or channel access to services and sites for communication, knowledge production, and interaction, through sign-in interfaces and preferential networks, for instance. Economic logics and market structure play a key role in the design of information architectures that place corporations in powerful positions to define emergent models of social organization—what Ulises Mejias dubs "the technologizing of society through social networking services" (2010, 604). Mejias' work on the limits of networks in organizing sociality reminds us that the models of participation that social media afford are mostly shaped by the agenda of the (commercial) institutions that provide the technology and normalize specific forms of social participation from which they extract value (605-6). In this context, social networks come to be characterized by a so-called "dual processuality" with corresponding, contradictory effects: increased user freedom to form groups and create content *and* corporations deciding on new communication features, on expulsion of members, or even on the future of the network; increased opportunities and tools for content production *and* the transfer of property rights to the corporation; proliferating user-generated content *and* commodification of collaboration through the embedding of ads in the content shared among users; diversity of voices *and* the homogenization of platforms that are increasingly layered and interoperable; the level playing field of voices having the same chance of being heard *and* the reproduction of social inequalities through the modulation of access to certain positions within the network, not just access to it (Mejias 2010, 608). This dual processuality clearly frustrates our ability to conceive of social movements' ability to struggle against the forces of info-capitalism as emboldened by technology.

Moreover, Mejias' discussion of "nodocentrism" and "paranodality" provides us with conceptual tools to inquire into the consequences of thinking about struggle exclusively in terms of networks. Nodocentrism refers to the tendency to perceive of something as real or valuable only if it functions as a node in a network. Conversely, paranodality is "the conceptual space that lies beyond the borders of the node [...] that do[es] not conform to the organizing logic of the network" (Mejias 2010, 612). The first generation of networked activism during the 90s and early 2000s facilitated the connection of people and organizations

through mailing-lists and similar technologies that delimit the scope of the network (Juris 2008); the form of the network today is one that is open and more heterogeneous and is often facilitated by commercial social media platforms. While more and more research is produced that attends to both online and offline practices of social movements, a nodocentric bias is becoming entrenched as movements themselves take the social media network to be their structure for organizing, absorbing or else ignoring paranodal sites of resistance. Importantly, nodocentrism as it is structured by the networks of today, alerts us to important changes to the ways in which movements grow. These changes take place along technologically constructed notions of sociality that are seldom acknowledged as communities and groups engage in struggle.

First, since social media are overwhelmingly what make networks visible, nodocentrism disqualifies the connections that are not managed and legitimized by their information architectures. In social movements we especially see how the topology of networks as it has developed more recently affects inclusivity, rendering in/visible and predetermining who can form coalitions. For instance, groups mobilizing against poverty or homelessness who have little access or time to spend on social media but have highly developed on-the-ground knowledge of social problems are not invited to collaborate on campaigns for social equality because they are not on other activists' radars. Similarly, other groups who prefer to keep their online visibility low because of their vulnerability (e.g. sex workers and groups fighting racial profiling or police brutality in specific communities) are excluded from movement building events or are not easily reached by calls for participation. Finally, networks can exist in parallel spaces hardly crossing: the problematic homogeneity in age, class, and especially race that we encounter in a movement like Occupy can certainly not attributed to the structure of social media but we can see the existence of parallel and isolated activist networks of people of color as a relay of racial segregation. Ultimately, the bias of considering only what is part of an increasingly homogeneous network shapes the form of alliances and coalitions, it cuts off activists from exposure to different kinds of practices and knowledge, and obfuscates issues of online access and visibility.[2]

Second, the nodocentric bias has an impact on the potential to strategize for the long term. Social movement scholars Lance Bennett's and Alexandra Segerberg create a typology of movements that differentiates between a logic of collective action—sustained by established issue-advocacy organizations who step back from their group branding to reach wider audiences; and connective action. This new pattern is typified by the *indignadas* and Occupy protests; it substitutes established political organizations with technology platforms and applications that organize networks (2012, 742). For Bennett and Segerberg, connective action brings "the action dynamics of recombinant networks into focus" (2012, 760) and the formative element of sharing—"the personalization that leads

[2] Without having to opt out of networks, it may be good for organizers to be aware of the impact of the nodocentric bias on their practices and expressly reach out to groups outside of their network.

actions and content to be distributed widely across social networks" (2012, 760)—accounts for the circulation of personal expression across networks, facilitating action. Their work helps us explore digitally networked action (DNA) characterized by varying degrees of technology-mediated spontaneity, self-organization without central or "lead" organizational actors, and easy-to-personalize action themes spread over personal networks (2012, 742). Their study attends to both movement practices and technology, and generates important questions about how connective action works.

Unfortunately, a focus on content circulation and networked communicative practices alone—one that often conceives of social movements as "publics" whose practices are mostly communicative—cannot provide answers to the questions about stability, scalability, and agency in movements that Bennett and Segerberg pose. In order to discuss stability, scalability, and agency it is necessary to understand the coexisting and contrasting notions of participation that drive the use of technology in both connective and collective action. While both modes of action may rely on the use of social media, the drive towards participation and agency comes respectively from notions of individuality and collectivity. More precisely, as Jeffrey Juris notes in his study of #Occupyeverywhere, collective actors are already constituted in organizations, networks and coalitions, while connective actors (who function along a logics of aggregation) come together qua individuals and

> these individuals may subsequently forge a collective subjectivity through the process of struggle, but it is a subjectivity that is under the constant pressure of disaggregation into its individual components, hence, the importance of interaction and community building within physical spaces. Whereas networks are also given to fragmentation, the collective actors that compose them are more lasting (Juris 2012, 266).

Groups that tap into connective action in most cases strive for growth and endurance. They attempt to appeal to a wider network of individuals through mediated, networked communication tools. Yet, when reaching out to broader audiences too fast they may only temporarily grow, unless they are able to forge stronger ties that outlast the intensity of the initial mobilization (Tufekci 2014). Scaling up and enduring become even more complicated if practices like sharing, participating and committing are shaped by the commercial functions that are embedded in information architectures, and that tie users to predominantly online interaction (one can go from reading an article to liking a comment, to watching a video to posting on a blog, to following events on twitter, and so on). From this perspective, tending to strong ties and paying attention to paranodality are not only necessary to investigate how information architectures are organizing agents, but also to understand the ways in which we discuss and conceive of action within and among networks.

The topology of networks is not only made up by the shape and location of its nodes: it is also influenced by the very principles of information organization—

i.e. the protocols—embedded in the computers that form networks. Protocols like the one defined in Request For Comments documents (RFC) outline the technical standards that govern much of today's internet (Galloway 2004). Protocols are based on a voluntary principle of standardization of code that is necessary for packets of information to be successfully encoded, transported, or for different devices to communicate with each other. This is the case, for example, with the Transmission Control Protocol/Internet Protocol (TCP/IP), which is the basic communication language for the transmission of data among computers, and with the Domain Name System (DNS), the large database that connects IP addresses to websites names. While exclusively located in the realm of technology and operating at the level of code, these rules and regulation exercise indirect and unprecedented control over what is possible on the internet. Protocols are not an explicit form of censorship, since they are only interested in the packaging of the information, and are indifferent to content (Galloway 2004, 52). But they do stratify, layer, and hierarchically organize the structure of the internet, managing its nodes.

Needless to say, the process of standardizing certain information structures and behaviours automatically excludes others, giving the internet its "shape." This is a particularly important issue today, when powerful economic actors, regulatory agencies, and legislators can make decisions that have profound social and cultural implications. From this perspective we can say that protocol is indeed political because it subtly controls or, better, it modulates how information is circulated. If, following Eugene Thacker's take on protocological control, we consider the status of individual and collective action in participatory networks, we will see how protocols engender networks in which participatory practices are hollowed out, coded into secure servers, e-surveilled, and embedded into "predatory locales and a new kind of gated community" (in Galloway 2004, xvii). We are all familiar with the ways in which information has been handed over from servers to surveillance agencies and how internet services for activist groups have been shut down for violations of the terms of service. The revelations of Edward Snowden are only the latest example of how surveillance agencies like the NSA capture data from all layers of the network, in some cases despite encryption.

Protocols have at least two important implications for movements: 1) they are agents of info-capitalism that structure the development of activist networks; and thus 2) they require modes of resistance that engage protocological control. With regard to the first implication, protocols are fundamental principles organizing and shaping the realm of possibility for information circulation—its control, production, reproduction, and distribution, processes of accumulation and financialization. Therefore, protocols have a stronger impact on activist practices than we may think: they are principles of control that bring a network together. As a technology they regulate flow, direct netspace, code relationships, and connect life-forms (Galloway and Thacker 2007, 30), and, as a key component of the technological realm that makes up so much of our daily lives, protocols directly govern the relationships within networks and indirectly affect those outside of them (Galloway and Thacker 2007, 28). When protocols

prescribe how algorithms should be used, they are also implicated in more benign forms of compliance by constantly enforcing on users the request to relinquish information in exchange for accessing parts of a network. As mentioned earlier, the role of protocols (prescribing the rules of possibility for the circulation of information), and their relationship to algorithms (the commands allowing information to circulate) provoke new questions about our ability to conceptualize movement's communication outside of info-capitalism.

Regarding the second implication of protocols for movements: resistance to protocol unfolds at the level of protocol itself through hacking, coding, contesting, or subverting the rules of protocol. Examples of counter-protocological resistance are the struggle over net neutrality, anonymizing systems like the Tor Project, or different kinds of interventions into the flows of info-capitalism, such as swarming and DDoSsing financial sites.[3] Information architectures, here, amount to more than tools for organizing; they also become a terrain over which contrasting visions of justice and freedom confront each other by resisting certain forms of standardization and channelling. Beyond technological fixes, we also find the counter-protocological translated into non-technological practices of resistance. This is the case, for instance with the Strike Debt Campaign, which challenges the power of financial capital by questioning the legitimacy of debt itself. Under the motto "You are not a loan," the initiative draws attention to the ability of info-capitalism to isolate and reduce individuals to data and numbers (Strike Debt 2012). The Strike Debt Campaign devises strategies that work from within the system to divert and capture the flow of capital by, for instance, buying back debt, and then releasing debtors (Rolling Jubilee). When taken as a broader set of subtle mechanisms of control that also code relationships and connect humans and machines, different forms of resistance to info-capitalism can be understood as protocological. The continuity between protocological sites of struggle over communication and life under info-capital presents a rich field of potential for reinvigorating activist practices.

Platform architectures

In addition to the forces of control and information management at the level of the network, activists comply with structures that regiment their actions whenever they use social media platforms. For less than a decade Web 2.0, and now smartphones with their social media apps, have been delivering on the promise of a mobility that plugs us into endless and overpowering flows of data, whether it is our Facebook friends sharing links, or the tweeps (Twitter people) from the politically engaged scene, or the on-going video streaming at the Occupy encampments. Yet, if we were to briefly explore the meaning beyond the term *social* of social media or social networks, through the lens of information, we would find very little of the heterogeneity that characterizes sociality

[3] These are Denial of Service (DoS) attacks where systems are usually infected with a Trojan and are used to target a system causing its service to break down.

conventionally understood. Rather, what defines social media is a common, and increasingly more homogeneous (interoperable), standard of communication that centralises services and organises information. The standard of communication that has emerged since technologies have enabled the commercial exploitation of user data and of social relationships are what Geert Lovink dubs the "algorithmic exploitation of human-machine interaction" (2013, 13). For Lovink, the culture of users who produce and share is one that requires a reduction in complexity and user freedom in order to access easy-to-use interfaces, free services without subscription, and large databases with free content and user profiles to browse through (2013, 13). It is a trade-off.

The term "platform" is also one that hides more than it reveals. Technically, it refers to the pre-existing environment where a piece of software runs while using this environment's facilities and obeying its constraints. A platform is the backend environment where code performs operations that are requested by users through the interface. At the same time, the platforms that support social media can be seen as important agents in shaping our perception of emerging technologies and their potential for social engagement. In fact, the meaning of social media platforms has gone beyond one referring to code to a metaphorical platform on which individuals can interact (democratically). The notion that these technologies empower users is promoted not only by industry, but also within mainstream culture. Their meaning is constructed so as to influence how the technology will be understood and judged; the accepted meaning of social media platforms therefore has consequences for the ways in which users relate to social media (Gillespie 2010, 23-25). The assumption is that, beyond problems of institutional censorship, surveillance, and data mining, social media platforms are neutral and democratic tools, whose in-built features do not impact content, availability, organization, and participation. Still, while granting seemingly endless freedom to experiment, social media platforms impose a series of structural limits to social exchange and to movement building. This is not to deny the utility of many platforms but to underline the complex forces that subtend the relationship between information and movements, even when there is some leeway for manipulation. To make visible the forms of control that affect the relationship between social movements and social media platforms, I will focus on three aspects of the information infrastructure: the platform itself, the interface, and the algorithm.

The platform

Let us use the example of media activism to discuss the role of platforms in emerging activist practices. Beyond relying on popular social networks like Twitter and Facebook, activists have been quick to adopt new platforms to communicate and to report on protests and social justice events. Movement media centres have gone from using simple open publishing like that of indymedia (IMC), which allowed for un-moderated posting of text, images, and video and hosted discussions, to embedding a variety of tools that connect across platforms. New platforms can integrate the traditional features from IMC

with feeds from various social media and live streaming. For example, the one used during the anti-G20 convergence in Pittsburgh and Toronto, and during the protests against the Vancouver Olympics automatically published YouTube videos, tweets, text, and a map to locate events as they were happening (G-infinity media is a project of the Pittsburgh Independent Media Centre).

Live streaming has become ubiquitous during the wave of protests that followed the financial crisis in Europe and North America especially—and it has nearly become a mass medium following the social unrest in Ferguson, MO. Sites like Global Revolution and Occupy Streams provided 24-hour coverage of protest camps around the world, while chats and direct connection to sites like Twitter and Facebook offered an interactive experience (Costanza Chock 2012; Juris 2012). Streaming to such sites is supported by newer, for-profit platforms like Livestream and Ustream, raising once again the issue of dual processuality discussed earlier in the context of networks. But streaming technologies have also radically changed the content and the reporting practices that make up media activism in many countries from reports and analysis to embedded journalism and live correspondence.

What is also changing is the role of grassroots media from one of simply informing audiences about events to facilitating participation. More precisely, the availability and transferability of standardized platforms and media activist toolkits is creating a sort of media centre franchising that brings new actors who were previously not involved in movements to protests and other kinds of political events as reporters. Platforms embedding commercial social media connect new actors who feel at ease with their familiar features to protests and other kinds of political events as reporters, participants, makers and voyeurs. Thus, media platforms like Occupy Streams are impacting the relationship between movements and their audiences, denouncing violence, giving insights into experiments in direct democracy and overall redefining participation, allegiance, and group boundaries.

Media activist platforms extend and connect life at protests and camps to their outside. In this context, platforms, both autonomous and corporate, are not only the means or tools to connect individuals but active agents in shaping activist social formations. While their buttons and log-in functions that connect different platforms enable the extraction of value from data, standardized platform elements like the chat boxes, twitter rolls and related live channels that frame the main feed of sites like Occupy Streams harness feelings of familiarity, participation and interactivity. The platforms' technical elements resonate with each other and mediate our interaction with others. For this reason, streaming platforms that seemingly leave very little space to do more than create a voyeuristic experience, yield insights into the continuum between communication and action. The individual's engagement with a platform's different elements produces connections to others that are dependent on presence and action. Action here is clearly not limited to the "communicative action" often ascribed to social media public spheres but exists alongside and in connection with *direct* action. For instance, the live feed of CUTV during the

2012 Quebec student protests was a fundamental tool to update and draw to the streets a viewership of students who followed this established university channel and became involved in five months of intense mobilizations against tuition hikes. At the same time, the streaming of the Occupy Toronto channel functioned as a monitoring system to quickly gather critical mass at the encampment to prevent impending evictions. Whether the ties fostered can be made to endure is a question for activists to consider.

Finally, social media platforms allow for the collection, storing and distribution of digitized content, from video to comments and manage this content by classifying it through metadata. Metadata is data that provides a piece of information about other data (e.g. the time a video was uploaded). In so doing, social media platforms constitute an archive of social change: they allow for the recording, sharing and transmission of texts, videos and images. Platforms transform media into data that can be managed, stored, and correlated with other kinds of data in quasi real-time. While this information can prove very useful for surveillance and policing purposes, it also presents new opportunities for movements. In fact, both data and metadata can be used for data analysis that is carried out by activists, yielding new insights into patterns of mobilization, as well as to create flexible and remixable archives that can be used for documentation, analysis and creative interventions. This aspect of media activist platforms needs to be further explored to better understand the potential to collect histories and foster movement building.

The interface

Unlike HTML-based linking, features such as liking buttons and recommendations characterize the closed systems of platforms that introduce new layers of interaction and connection among users (Lovink and Rasch 2013, 13). These layers have consequences that are far-reaching in the social field. Ascribing participatory or community involvement to users of social media platforms neglects the role that interfaces play in steering users and their communities: "in the emergent participatory culture, 'participation' is [...] an ambiguous concept" and the assumption that these tools promote active citizenship is a generalization (van Dijck 2009, 45). It is well known that community engagement and participation often translate into clicking on default buttons for sharing and liking content that conceal users' very limited agency. What is less discussed is how the layout of an interface structures human-to-human exchanges because it encodes particular kinds of interaction among users.

Many platforms automatically perform tasks like pooling information from address books and interconnected platforms (e.g. Google), or they create "affinities" among profiles to visualize friend lists, groups, or even networks. These so-called semio-technologies partake in processes of meaning making and form the basis for emerging social relationships. For Ganaele Langlois, aggregation processes that create pools on for-profit platforms must always take

place in the absence of disruption, where we can have friends but no enemies (2011). Semio-technologies, with their modes of meaning production and circulation, create homogeneous communicative worlds that are visualised through interfaces that agglomerate and measure, that build prestige and connect communities. In these platform worlds—supposedly devoid of privacy violations, surveillance, or control—technology is a tool for democratic interaction, and an individual's social status is judged according to the size of their circle of "comrades," or social issues they post on. Many studies have discussed the ways in which interface features like "friending" affect daily relations among users, especially youth (Boyd 2006; Ellison et al. 2007). Features like friending, liking, and sharing that institute a social system—in which people gain status and visibility through a quantitative accumulation of online relations—may have consequences for organizing that range from surveillance to favouring weak over strong ties.

Moreover, research on movements' adoption of social media interfaces has shown how the latter may impact the collective creativity of certain groups. A recent study of a labour movement organization in the UK draws attention to the troubles that groups face when using platforms life Facebook and YouTube for the collective construction of meanings and messages. As the study shows, activists complained about how interfaces on sites like Facebook support individual posts and flatten, instead of prioritize, content within the group's page (Fenton and Barassi 2011). This is because different kinds of political and less political content are all given the same level of importance on the interface. Fenton and Barassi cite at length from interviews with organizers frustrated by the fact that in a Web 2.0 environment that favours individualism and self-representation through blogs, individual websites, and social networks, the messages of a person have the same social value, and are encoded and distributed in the same way as those that are carefully crafted through the negotiation among collective actors (2011: 187). Facebook is a particularly interesting example of how the information architecture that we only perceive as interface affects the possibilities for political communication. The latter is quickly overshadowed by new information that fleetingly appears on an interface that prioritizes real time over permanency, for instance in the timeline. In the case of YouTube, the pressure to retain constant visibility and to support interaction by moderating discussion in the post sections requires constant effort on the part of activists, even when the energy drain outweighs the benefits and contributes to an information overload. Ultimately, the features introduced and normalized by social media interfaces play out in the context of activism and normalize practices that are not always vetted on the basis of their effects.

Algorithms

The normalization of rules of behaviour on platforms is literally programmed into code by determining the possible behaviour that regulates interaction. These rules are directed toward specific people or content through algorithms that promote and rank according to criteria that rarely match the priorities of

those who are using the platforms. Nevertheless, algorithms manage our interactions on social networking sites and other platforms, foregrounding or excluding information, deciding what is "trending," and providing "a means to know what there is to know and how to know it, to participate in social and political discourse, and to familiarize ourselves with the publics in which we might participate. They are now a key logic governing the flows of information on which we depend" (Gillespie, Boczkowski Pablo J., and Foot 2014, 167). Crucially, as Tarleton Gillespie rightly emphasises, behind algorithms lies a logic that is not purely machinic but involves the warm human choices of their developers (2014, 168).

A case in point for this logic are e-petition platforms. While e-petition services seem to simply offer a hosting site for petitions, they are actually implicated in complex information dynamics where algorithms and data analytics feed activism back to petitions' signers while the creators of the platform harvest data for other uses. The work of David Karpf on petition platforms (Karpf 2012, Elmer, Langlois, and Redden 2015) shows us how the same technologies, metrics, and marketing strategies used to develop other commercial platforms are employed to develop new tools to engage civil society. Petition sites combine a mix of algorithmic ranking and employees skills to craft user experience. Their "organizational logics" is driven by data analytics that influence the kind of petitions that are launched, publicized and even how they go viral (Elmer, Langlois, and Redden 2015). These tools for civic engagement enable new campaign tactics that reach wide audiences while extracting value from social engagement.

In fact, although some platforms like Moveon.org are not for-profit enterprises, others like Change.org are commercial enterprises—so-called benefit corporations—with a certain degree of social responsibility. And while Moveon.org collects data to make its own campaigns more efficient by looking for trending issues, Change.org seeks to grow. In both cases the choices of the issues that will be prioritized is not left to the creators of petitions but to the organizations. The protocols and algorithms implicated in driving these platforms are organized according to an accumulation logic driven by numbers when not outright by profit. In Thacker and Galloway's words, "information surveillance and the extensive data-basing of the social promote a notion of social activity that can be tracked through records of transactions, registrations and communications" (Galloway and Thacker 2007, 79). In addition to this, the data gathered is turned into metrics used to shape future campaign practices and platforms. For example, the platform *Upworthy*—a MoveOn splinter that makes "important stuff" go viral—was inspired by the work and algorithms used during move-on campaigns (Upworthy 2012). Both in the cases of the petitions and the platforms, the architecture of the platform (including the interface) structure not only what political issue is prioritized but also the language and approach to such issue. Of course, it cannot be denied that e-petitions have been useful in many cases. In particular, their ability to reach wide audiences without having to mobilize on the streets has helped understaffed organization's campaigns. At the same time, they do away with the face-to-face interaction

that, in many cases, makes movements grows and, because of how they engage the information dynamics and accumulation mechanisms characteristic of info-capitalism, should not be considered neutral tools with no structuring effects on social movements' campaigns.

Conclusions

This article used information theory, software studies and the concept of info-capitalism to foreground the dynamics of information circulation and the mechanisms of financialization shaping contemporary modes of social movement struggle, as they develop campaigns and coalitions that tackle the forms of oppression typical of info-capitalism (surveillance, information monopoly, precarious labour conditions, etc.). The lens of information and software studies—as opposed to that of communication, which is mostly focussed on the transmission of meanings—helps us foreground how technical solutions like the use of a specific code or interface feature impact organizing. Critical software studies has also drawn attention to how the backend of platforms shaping the interface is structured by economic forces and by the need to meet technical standards for networked information exchange (Galloway and Thacker 2007, Zimmer 2008). Yet, until recently, hardly any attention was paid to how Web 2.0 architectures increasingly play a key role in mediating the relationship between individuals and their social world during struggles.

Building on these theories and concepts, we were able to see how information is organised into different architectural layers that make up the contemporary environment for activist communication practices against info-capitalism (i.e. networks, platforms, interfaces and algorithms), showing how the encoding of practices, the normalisation of habits, and the shaping of sociality take place across these different layers. Indeed, Web 2.0 architectures, especially social media, can be said to shape specific forms of sociality and collective expression, and constrain the capacity to imagine what is possible outside of the boundaries they set. This impact became visible when we examined how information structures activist networks and practices while they conform to network protocols, attempt to do outreach and circulate messages effectively through available platforms, and use the interfaces and features of social media platforms to interact. Among the effects we discussed are the paradoxical logic of simultaneous emancipation and enslavement on networks and platforms (what we called dual processuality), the totalizing focus on online networks that excludes non-nodes, the protocol-based forms of control on networks, forms of connective action enabled by platforms that scale-up mobilizations quickly but then leave no organizational depth, as well as a variety of interface features and algorithms that directly organize interaction.

In this context, the organization of information through code, interfaces, and networks impacts political organizing as much as it affects practices of knowledge production, processes of meaning and value-making, and the

constitution of formations. This is because the environment through which information circulates requires that we develop habits that condition our lives, how we relate to ourselves and others, and therefore they set boundaries to our agency. In other words, the links between nodes, the functions of interfaces, the buttons we can click, the feeds that reach us mobilize people and populations by making them feel good, bad, angry and so on. That is, they function as circulation and organization channels with effects on the senses before, and autonomously of any rationalization of the users (Grusin 2010). We can think here about the circulation of viral content on networks but also about the strong connection created between viewers and protesters through live feeds like the ones in Egypt during the uprisings. The ability to mobilize and indirectly control emotions is an important element of these socio-technical forces that shape movements more and more. For instance, it leads to rapid and large mobilizations on the streets but it also causes cycles of struggles to easily peter out.

Through the insights provided, this analysis aimed to trouble common assumptions about the neutrality and horizontality of technology in social movements. Still, this article does not deny the value of networked and social media for activism. Rather it aims to expand and update existing scholarship and debates on the use of technology within social movements. Ultimately, the reliance on rigid, black-boxed and often for-profit platforms affects a movement's potential to communicate and organize, yet movements can also device tactics and strategies to subvert, hack and recode the forces of information. This dynamic relationship of co-constitution between technology and movement practices needs to receive more attention from scholars and activists alike. In the context of scholarship, there is a need to include more studies of the sociotechnical composition of the forces shaping social struggle and its practices. In the context of activism, it is worth including discussions about the power of technology and information to encode struggle in the debates about the value of information technology for activism. These debates started already in the nineties with discussions about the risks posed by information overload and over-communication (Wright 2005) and now focus overwhelmingly on surveillance (Lovink and Rasch 2013). In this sense, the article should be read as a call for more studies and organizing practices that treat technology as an agent that opens up, makes obsolete, or precludes certain modes of struggle, rather than as a tool that is neutral. Understanding the impact of information in info-capitalism can indeed garner new potential for resistance by reprogramming (socially and technologically) how movements communicate and imagine future action.

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