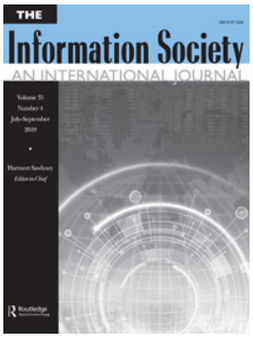

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PERSPECTIVE

The Internet as network, world, co-construction, and mode of governance

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ABSTRACT

The Internet is unlike anything else in the history of technology. It is neither a tool nor a machine, but a network. As such, it is a new type of technical system. It resembles the telephone system in some respects, but it also has similarities to broadcast networks that distribute entertainment, shopping malls that distribute goods, and transportation systems insofar as it opens new "worlds" to its users. What is more, the users of the Internet take on new capacities and identities through their participation in the network, most obviously the unprecedented absorption in mediated social relations exemplified by Facebook. This Perspective article will attempt to put some order in the understanding of the Internet in terms of three theoretical approaches, loosely interpreted to suit this new object. These approaches are actor network theory, the phenomenological concept of world, and Simondon's concepts of individuation and concretization.

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Introduction

Praise for the Internet as the alternative to hierarchy contends with condemnation of its commercialism. From very early, the Web inspired hopes for the reconstruction of a public sphere devastated by television broadcasting (Habermas 1989). Mass communication lost the power to impose cultural and political consensus as reciprocal interaction on the Net-favored diversity of opinion. The technology also supports flattened administrative hierarchies. On the Internet, all members of an organization can communicate directly, without going through the chain of command. The Web holds a great promise of democracy, both political and social.

Has the promise been kept? This is very much in doubt. The centralization of the Web around a few great enterprises looks suspiciously like the concentration of media power in the broadcast era. Capitalism, not democracy, is seen as the principal beneficiary of the new system (Fuchs 2010; Dean 2005). The growth of surveillance on which the Internet giants depend is subversive of democracy. Data mining creates personalized environments designed to flatter and manipulate online publics. Swarms of bots and trolls overwhelm and pervert online discourse. Erich Hörl calls the new system "environmentalitarian" (Hörl and Schott 2018). It is not totalitarian, it does not control its subjects directly, but rather creates a cocoon of information and affordances orienting behavior in a nearly automatic fashion.

All this makes for exciting but fruitless arguments. Both defenders and critics make good points, but they presuppose the unity of the Internet. But is the Internet a single entity subject to a single explanation? It is true that at the level of hardware and basic protocols, there is something that can be called "*the* Internet." But this is not the object of everyday and critical discussion. That object has a multiplicity of overlapping features serving very different purposes. Personal data, for example, serves in our social life but is also exploited by businesses to deliver targeted advertising. The Internet is not a social or a commercial medium, but both at the same time. I will come back to this example in detail in a later section of this Perspective article. Accounts of the Internet from the standpoint of a single method such as political economy or technical history are valuable but insufficient. The Internet is a palimpsest of imbricated layers of functionality. It calls for a layered explanation.[1]

The social constructivist "principle of symmetry" is a good place to start. The constructivists began by proposing a symmetrical treatment of winners and losers in scientific controversies. Claiming that the winners are more intelligent or open minded is to

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measure their virtue by their victory, a circular argument. We should resist the tendency to think reasons explains true beliefs, while false ones are due to irrational causes. For example, although Lavoisier was right to argue that oxygen explains combustion, Priestley was not merely stubborn for hanging on to the old idea of phlogiston: He had his reasons too. A mixture of reasons and causes characterizes both sides. Historians will recognize this principle as a version of their own skepticism about teleological explanations.[2]

The principle of symmetry was applied later to technology. Like science, this is a domain in which historical outcomes appear inevitable and rational despite the contingency of the process that has led up to them. The sequence of technical developments appears logical; it could not have been otherwise. But in the background lie unpredictable events that orient its trajectory, such as changes in the price of materials, legal regulations, or consumer preferences. Sometimes the obviously rational arrangement is due to a historical accident. Lighted exit signs in theaters make perfect sense, but it was not reason which first demanded their presence but rather the Iroquois Theater fire in Chicago in 1903 in which hundreds died seeking the unlit exits.

Contingency extends to the very purposes technologies are intended to serve. Take the Internet: It was created to support time sharing on a network of mainframe computers, but today it serves entirely different purposes. The shift is not explained by technical reasons but by social ones. Conceivably, the Internet could have evolved into something very different under different conditions. As this example shows, the purpose of technology is often indeterminate, especially in the early phases of development. That makes it impossible to treat the latest stage in a developmental sequence as its *telos*.

Not only has the purpose of the Internet changed over time, but today it solves very different problems for a wide variety of users. Design is pulled in many directions by actors with different interests and worldviews, for example, some pursuing profits and others involved in public life. No one social group has complete control so all must be treated symmetrically. In sum, the Internet cannot be reduced to a single one of its many dimensions.

In this article, I offer four approaches to understanding its diversity. I treat the Internet first as a *network* containing systems, second as a host to virtual *worlds*, third as a developmental *dynamic* affecting users and technology, and finally as the basis of a new mode of *governance*. The first approach can be described as operationalist. It abstracts from questions of meaning to consider only the effects of nodes in a network, including human nodes. The second approach is hermeneutic and considers the role of meaning in the life of the users. It considers the Internet as the support of multiple milieus in which groups communicate and act. The third approach is "co-constructivist." It considers the Internet as a developing process resulting from the interactions of systems and worlds. The fourth approach considers the implications of the Internet for democratic governance in a technologically advanced society.

The following discussion draws on actor network theory, Heidegger's early concept of world as interpreted by Augustin Berque, Simondon's concepts of individuation and concretization, and the critical constructivist theory of social rationality. I will make a very free appropriation of these theories, treating them as layers in an explanation that goes beyond the reach of any one of them taken alone. My concern here is not with the interpretation of these theories but with their application to a unique object.

Networks and systems

Let me begin with actor network theory or ANT as it is called in the field of Science and Technology Studies (STS). ANT is a descriptive methodology for studying sociotechnical networks. ANT's networks are composed of both human and nonhuman actors. These actors are associated in various ways as they are enrolled in a network. According to ANT, they have "agency" in the sense that their activities impact the network. Note that under this operational definition, both humans and nonhumans have agency. ANT calls this the "symmetry of humans and non-humans."

This principle is intended to guide the researcher toward an appreciation of the role of "hybrids" composed of persons and things. A person behind the wheel of a car or holding a gun forms a distinct entity the properties of which cannot be reduced to either its human or its mechanical component. While there is clearly something right about this notion, ANT's application of the principle has strange consequences.

In a famous article, Michel Callon described an experiment in improving the harvest of scallops. The scientists constructed a network by "recruiting" the mollusks and the fisherman to their project. Success required the "cooperation" of both actors. Callon attributed "agency" to both although the scallops were influenced by causes, and the fishermen by meanings

(Callon 1984). As this example shows, ANT's networks include all the elements significantly associated either causally or symbolically. Calling both "agents" erases the difference between the modes of action of people and things. This flattens the distinctions we ordinarily make between intentional actions and causality since both are evaluated operationally in terms of their effects.

ANT also introduces a notion of program which refers to the principles of selection by which a network is constituted from the resources in the environment. Programs simplify objects and enroll them in the network in order to carry out or "translate" the intentions of the programing agent.

Network boundaries are not always defined by a single program. The simplifications may fail partially or the implementation of the program may have unintended consequences. This is what happens in the case of environmental pollution. For example, the program implemented by the managers of a factory may generate effects beyond the scope of their intentions. A nearby stream may be contaminated by wastes, enlarging the network to include the residents of a nearby community. They in turn may devise a program to protect the stream through a lawsuit. Networks may thus contain several overlapping programs. I will use the term "system" to distinguish the subset of the network selected by a given program from the network as a whole.

The numerous systems that coexist on the Internet are assemblages of features, functions, and usages. They can be grouped in three main models that share similar social and technical characteristics. Each of these models represents a possible future in which one of them will have become sufficiently dominant to achieve closure, that is, the power to impose a design that marginalizes the others. Despite the complaints of critics of the Internet, who dismiss it as a mere electronic mall, that has not yet happened.

Here is a brief description of the three main models, constituted of systems that complement each other and conflict in a variety of ways.

The first is a consumption model that distributes entertainment and facilitates commerce. This model relies heavily on surveillance and data mining to predict user preferences and target advertising. It centralizes online activity around a few privileged sites.

There is also a coexisting community model which brings together functions that serve social life. This model is notable for having significant consequences for the public sphere where it plays a role in supporting democratic debate and mobilization. Online communication also makes possible what is called the "sharing economy" through services such as Airbnb and Uber. As I explain further below, the community model favors the centralization introduced by the consumption model but it could perhaps be equally served by a different configuration of the network based on the inherently decentered character of the TCP/IP protocol.

Finally, there is what I will call the cyber-political model, imposed by state and quasi-state actors to spread propaganda and to disrupt adversaries with trolls, bots, and malware. I distinguish this model from conventional politics on the Internet by its source, computer professionals pursuing a secret agenda with manipulation and lies on behalf of clandestine actors. This model threatens the viability of the other two.[3]

The three models are characterized by overlapping features and functions. I will give just two examples: the storage feature of the Internet and anonymity, employed in very different ways within the consumption, community, and cyber-political models.[4]

The function of storage in the consumption model is to distribute entertainment and goods. Anonymity is important wherever privacy is valued or stigmatized activities are involved, for example, in the distribution of pornographic material. Online communities store their histories for later consultation. In the absence of spatial separations, anonymity plays an important role in permitting individuals to participate in various online communities and activities with appropriate and distinct identities. Cyber-politics exploits the same databases produced by business as well as material collected through espionage. The material is processed to identify potential supporters or adversaries. It can be used to identify trends that can be magnified by anonymous interventions to the benefit or detriment of political factions or targeted countries.

All three models collaborate and compete on the Internet. Huge businesses such as Facebook and Google operate the dominant systems but they are not uncontested. Other systems are assembled by subordinate actors. Some of these systems correspond to what ANT calls an "anti-program," that is, a program that conflicts with the implementation of another program. For example, phishing is the anti-program to security. There are many such anti-programs on the Internet, but there are far more of what we might call alter-programs which do not block or interfere with each other but simply coexist. Some of these alter-programs become unintended anti-programs beyond a certain threshold. The passage from one state to the

other is illustrated by advertising on social networking sites. It is tolerated up to a certain point, but there is a density of intrusions that is self-defeating and discourages participation or the adoption of an adbocker.

As I have already noted, the three models share various functions today, but they have different technical requirements. Business requires speed and security, protection of intellectual property, and product placement. It violates privacy to serve up advertisements. These technical requirements may interfere with community applications. This is the case with the end of network neutrality, advocated by certain business interests such as ATT and Comcast. They can now speed up paying content such as Netflix to the disadvantage of free communication. Network neutrality is thus necessary to protect online community from being priced out. The centralization of network resources by Google and Facebook also poses a threat to community where biased interventions of various sorts sap confidence in the transparency of the medium. Cyber-politics threatens both these programs through its saturation of the network with disruptive activities. Its main technical requirement is simply the absence of regulation and control. Each model imposes its conditions in collaboration or resistance to the others. Beyond a certain threshold, coexistence would become impossible but so far that point has not quite been reached.

The same methods should be employed to study both programs and anti-programs. The misguided tendency to focus on "official" actors and to accept their programs as normative at the expense of those with less prestige, power, or wealth must be resisted. The fact that one or another program is well financed or legitimated by law is irrelevant to the analysis except as a factor of power. I call this methodological principle "the third symmetry" with reference to the first two symmetries introduced by STS researchers.

As noted above, the first constructivist symmetry holds that the same methods must be applied to winners and losers in controversies such as debates over the design and regulation of the network. Actor network theory introduced a second symmetry of humans and non-humans. Again, the same methods are to be employed but in this case to study such concerns as the relation of users to features. The third symmetry of programs and anti-programs accounts for cases where many groups contend for control. Facebook's commercial power and its legal position grant it no privilege in the analysis by comparison with users' communicative program, including activities that violate or challenge Facebook's terms of service. The symmetry between programs requires each to be treated on its own terms and not reduced to a mere function of the other. The fact that Facebook profits from users' communications does not detract from the social function those communications fulfill. Direct interference, for example censorship of sexual content on web platforms, reveals the power relations operating behind the scenes, but there is little evidence of a systematic attempt to control opinion by the major platforms in the West (Gillespie 2010).

This first approach, based loosely on actor network theory, shows that both sides in disputes over the impact of the Internet are partially correct. It disaggregates the Internet without losing the connections between the parts. But it misses something equally important that animates popular discourse on the Internet. The symmetry of humans and non-humans requires rhetorical contortions that block an appreciation of the manner in which the Internet is experienced and lived. The missing element is the meaning of the worlds online communities construct. These online worlds must be distinguished from purely informational uses of the Internet which are adequately explained by ANT. Where individuals gather to pursue a common project or to socialize, a different approach is required.

Worlds of meaning

The second approach to analyzing the Internet is based on a distinction between worlds and environments, first introduced by Jacob von Uexküll, a famous early 20th-century animal ethologist. Uexküll distinguished between the *Umwelt* or surrounding world of the animal and the larger *Umgebung*, the totality of the natural environment. The *Umwelt* is the perceived world of a particular species, selected for its relevance to survival. As such it is a small subset of the *Umgebung*. Uexküll's concept goes beyond ANT's operationalism to recognize the special role of the perception of meaning. This implies a fundamental difference between living agents and non-living things, and so violates ANT's principle of symmetry.

In this section, I will argue that Uexküll's distinction corresponds roughly to that between system and network, although networks are themselves subsets of the natural environment. Systems can be conceived as worlds for their members in something like the sense in which each species has its *Umwelt*.

Uexküll's theory had a wide influence in 20th-century European philosophy as well as in his own field.

His influence on Heidegger is especially consequential. Heidegger called the active human subject *Dasein* and distinguished it from things along the lines anticipated by Uexküll. *Dasein* encounters the environment through a process of interpretation by which it receives those aspects that belong to its world. Like the animal species Uexküll studied, *Dasein* cannot be conceived independently of its world, its *Umwelt*. *Dasein* is essentially bound up with things in a unified "being-in-the-world" (Heidegger 1962).

According to Heidegger, worlds consist in functional references that bind together the useful objects that make up *Dasein's* immediate surroundings. In relating to these meanings, *Dasein* takes each of its objects "as" something or other. This piece of wood is taken "as" a board, that piece of metal "as" a hammer, and so on. This "taking" is understood as enacted in practice rather than as a mental process or image. The meanings are most fundamentally lived rather than conceived, although they can be conceived under certain circumstances.

Heidegger's phenomenological approach shows up not only in his emphasis on the lived experience of functions but in his cryptic claim that the totality of these lived functions constitutes "signification," *Bedeutsamkeit*. I take this to be his way of saying that the world constituted by the functional relations is not reducible to those functions. He illustrates his thesis with the example of the carpenter's workshop. Every tool in the workshop relates to other tools and, ultimately, to the carpenter, but the carpenter encounters the workshop, not just the tools one by one. We live among objects of use but those objects form a whole which transcends particular uses. We relate, for example, to the university as a world in which to act in many different ways among which we can choose. We understand both tacitly and explicitly what a university "is" beyond any of these specific actions.

Heidegger has surprisingly little to say about what he calls "signification," and his account of the social aspects of worlds is excessively abstract.[5] Augustin Berque has attempted to give substance to the hermeneutic concept of world. As a geographer, he has developed a theory of the "milieu" essentially correlated with living beings. For example, Berque applies a roughly Heideggerian approach to landscape, an aspect of the natural environment transformed by human action into a milieu, a world. The labor of peasants throughout centuries has created a "nature" selected and modified from nature in the raw. This "nature" is a workspace for its creators, but it has become an esthetic object for city dwellers. The urban fascination with nature inspires retreat from the city which in recent times has fueled suburbanization (Berque 2014a). This concretization of Heidegger's concept makes clear the full significance of world as a free space of action and an object of imaginative investments.

The systems formed by online communities are meaningful wholes and so resemble worlds. These worlds are more than an assemblage of functions because functions are more than functions. As mentioned earlier, the storage feature of the Internet enables online communities to consult their past. But what does it mean to consult the past? This is not a simple matter of data retrieval. Personality hinges on memory, and the storage feature serves as a collective memory. As such it institutes a temporality and an identity and grants the community a continuous existence. The members of the community belong to a world which includes their own history and that is significant for their relations to others and their future actions. Storage thus cannot be reduced to the uses to which it is put, its simple functional role. It is an opening onto a certain mode of being that characterizes human communities and situates them in a shared world.

This is often taken to mean that the Internet's virtual worlds are separate from "real life." But worlds on the Internet are not separate from face-to-face interaction and material objects. Rather they bring those "realities" into a virtual space of discussion. For example, a web forum or Facebook page organized by medical patients with a specific illness confronts the fate of the members in their relation to the medical institution. The functional relations in the "real" worlds of the participants are "cited" in the online world. It is not a self-enclosed "second life," but is imbricated in the "first life" we all live.

We might compare this peculiar relation between individuals and their online worlds with Leibniz's monads. The monads each have their own world which is hidden from the others, and yet all these separate worlds are coordinated by God in a "pre-established harmony." In our case, the pre-established harmony results from the imposition of similar technical arrangements on institutions throughout the globalized world. There is no need for the "hypothesis" of divinity, as Laplace would have said, because under the rule of the technical disciplines the order of things takes care of itself.[6]

The theory of worlds suggests an unusual ecology of the Internet. Berque draws on the Japanese animal ethologist Imanishi Kenji for a concept of "speciety,"

a biological version of society, to refer to the coexistence of species and their worlds in the natural environment (Berque 2014b). We have seen that consumption, community, and cyber-politics coexist on the Internet. Each serves as the environment of the other, just as species serve as each other's environments in the natural order.

Take the case of privacy. The users interact on systems operated by businesses such as Facebook. They require privacy to protect their personal affairs from outsiders; however, they open themselves to members of their close community, their so-called friends. These communities are spaces of interaction on the basis of a shared identity which is reinforced as the members reveal information about themselves.

But for the participants the point of these encounters is not informational. It is "personal" in the sense that it constitutes experience in all its complexity. Each community is a site of experience for its members. In their shared world, they feel pride and shame, seek comfort and support, even love, and grow and develop as persons, or, on the contrary, lose themselves in destructive relationships and behaviors (Feenberg and Bakardjieva 2002).

The online world is exposed to commercial exploitation through its electronic mediation. The operators who manage that mediation collect the data users reveal, mine it, and sell it to advertisers. Their world, the inner world of Facebook, for example, is organized around economic objectives in terms of which online communication, the whole rich experience of the members, is mere raw material for processing and sale. They must de-world the worlds created by online communities in order to transform them into pure data and on that basis into behavioral models. The users depend on the system operators for a meeting place, and the operators depend on the users for data. The two worlds are imbricated as are symbiotic organisms in the biological realm. This is speciety on the Internet.

The operators no doubt see themselves as offering the users easy access to the consumer products they need. To the extent that this is true the users' world is enriched. The consumption and community model are thus complementary. But only to a certain extent. There is also interference between worlds where violations of privacy are experienced as manipulations overshadowing whatever service is performed. This is particularly the case with the intrusions of cyber-politics. Government or political surveillance is inevitably seen as malevolent. This erodes the trust in the mediation that makes online community possible.

The Chinese government has exploited the possibilities of cyber-politics most effectively in a culture long accustomed to censorship and in a network environment protected from foreign intrusions. The reaction to similar activities in Western democracies has yet to be measured. Here, a high value is placed on privacy and freedom of speech and so far there is no protection from Russian propaganda. Conflicting priorities must somehow be resolved.

Cyber-politics has already had catastrophic effects now that bots, trolls, and abuses of big data in electoral politics have begun to significantly distort the functioning of online communities and the public sphere. A once trusted space is increasingly perceived as a space of manipulation. A threshold has been reached in the coexistence of worlds. The speciety of the Internet risks breaking down. This has provoked public outrage and given new impetus to research on encryption, block chains, and new peer-to-peer architectures that protect online community from the excesses of business and cyber-politics alike.[7]

This second approach enriches the results of the first by introducing a hermeneutic concept of world but it has no associated concept of technological development. In the case of a rapidly developing technology such as the Internet, this is a problem. How can one analyze such a moving target? For an answer to this question, I will turn now to a third approach based on the work of Gilbert Simondon.

Co-construction: Individuation and concretization

Simondon's concepts of individuation and concretization are useful for the analysis of the Internet. He argues that things are not independent of each other but always exists in and through relations. For example, he explains personal individuation as a function of the process in which the social group of the individual is also formed. Individuals do not preexist groups and create them by association, nor are groups determining for the individual who make them up.

The basis of his relational conception is a theory of ontogenesis according to which things emerge from an underlying "meta-stable" "pre-individual" environment in which they coexist as correlated potentials awaiting realization. Simondon illustrates this notion with the crystallization of a supersaturated solution. He treats the solution as a pre-individual within which a process of individuation occurs. A slight interference, for example a speck of dust, may set off a process that divides the solution into two individual

entities, the precipitated crystals on the one hand and water on the other.

In the case of human beings in society, the pre-individual cannot be an existing thing such as a solution in a glass of water. Instead, the process of individuation/group formation draws on a pre-individual "nature" carried by all members of the human species. This theory makes sense in terms of language, a potential of the human brain, i.e. nature, which can only be realized in community. One cannot construct language from the standpoint of the individual or the community taken in isolation. It is a product of the individuation process in which both are co-constructed.

Simondon's theory of individuation is more complex and speculative than required for this analysis of the Internet, but it does suggest an analytic strategy for explaining the mutual co-construction of users and technologies. On the Internet, user roles and the system features that serve those roles emerge together. For example, the online purchaser and the software that handles the purchase correlate and exist only in relation. They emerge from the potential contained in packet switching.

Here, we have symmetry between humans and non-humans of the sort postulated by actor network theory. But what makes such relations possible is that fact that the Internet constitutes a world or milieu as well. It is not just a tool; it is an environment, like the carpenter's workshop, which we encounter as a whole and move around in freely. This freedom makes innovative uses of the system possible, the many inventions and results of hacking that have modified its nature.

Simondon's framework suggests a developmental analysis which goes beyond both the operational and hermeneutic approaches. That analysis depends on a second concept which Simondon calls "concretization," a specific type of technical advance that enables one structure to perform many functions. He gives the example of the air-cooled engine. Instead of a separate radiator to cool the engine and an engine case to contain the pistons, the air-cooled engine combines both functions in an engine case designed not only to contain the pistons but also to radiate the heat they generate. This concretization brings together several disparate functions in a single elegant structure.

The evolution of the Internet exhibits multiple interlocking individuations and concretizations. Concretization is exemplified by multifunctional features such as storage and anonymity, employed by both business and community. A single software structure that enables saving and retrieving files can be used to fulfill very different functions, for example, distribution of films by Netflix and texts to an online class. Cassettes, DVDs, photocopying, and the seminar table are dissolved in the acid of a multifunctional feature. And as we have seen, the users of these functions are cast in unique roles. The relational constitution of individuality is at work in such concretizations.

Among the many concretizations characterizing the contemporary Internet, the one that made online community possible has had the greatest impact in setting it on its current path (Rheingold 2000; Feenberg and Barney 2004). The innovation in question seems surprisingly modest, and in fact, its importance was overlooked at first by most technical experts. A comparison with other electronic mediations reveals its significance.

Until recently electronic mediation supported only two social forms: The telephone brought couples together and radio and television supported one-way broadcasting to a mass. Work, play, politics, family gatherings, groups of friends, classes, business meetings, discussions among hobbyists, and medical patients, all of which are group activities, required face-to-face contact. The Internet has transcended that limitation.

To understand how this has happened, consider the communication system of an ordinary face-to-face group. That system involves internal communication among members who meet together, and external communication by nonmembers who do not meet with the group. Several "technologies" mediate these communications: a meeting room and table for the internal communications and various means of receiving external communications and making them available to the group, for example mail and telephone messages relayed by a report and filed for consultation by members. Note that external communications require a local relay without which they do not concern the group.

In online groups, this configuration is reversed. All communications arrive from outside the face-to-face context of the members. All communications are thus "external" in the sense that they are electronically mediated. But no local relay is required for them to become part of the group process. The mediation makes them available to all members of the group through a remote file. The messages are delivered not to the members directly but to a file on the network to which all members have access.[8] This deceptively

simple reversal makes online community possible. The two technical functions that are "concretized" are mail and filing, mail for the messages and filing for group access. Just as the air-cooled engine eliminates the radiator, so online community eliminates the separate meeting room and table. Their functions are now combined with the reception of external communications.

This innovation has gone through several stages. At first, online communities formed primarily around projects. Given the cost and difficulty in the early days, there had to be a good reason to meet. The members engaged in activities such as business meetings, discussions among hobbyists, and academic classes. Participation in such online communities is meaningful for the participants and like any meaningful encounter has the potential to change them in a variety of more or less significant ways. Challenges met, friendships formed, skills acquired, and accomplishments achieved, all these familiar aspects of personal growth occur in online communities wherever true collaboration occurs. A process of individuation is initiated as a new world correlates with a new subject.

Among the consequences of online community is a new form of civic public, exemplified by MoveOn and the many social movements that employ the Internet for discussion and mobilization. For the first time, individuals are active rather than passive on a network. The Internet is an "anti-television" that realizes the idea and to some extent the reality of horizontal communication in an open public space (Sandvig 2015). This is a significant progress for democracy compared to broadcasting but it is now in jeopardy.

The threat emerged from an unexpected quarter. In the period when online community flourished, many people also created what were called "homepages." These were static pages dedicated to self-presentation. They offered no opportunity for discussion but this was not perceived as a deficiency. Eventually blogs introduced a modicum of interaction. This evolution culminated in social networking, the so-called Net 2.0. These sites concretized online community and homepages in a single structure, an interactive profile organized around a personal identity. Online community became immensely popular in this form, eventually reaching billions of Internet users. Social networking is still available for projects, but more often serves as a kind of mutual interactive homepage for a restricted group of "friends."

The move from project-based to personality-based communities has seen a decline in the positive impacts of the Internet. Yuk Hui and Harry Halpin argue that this is a consequence of implicit assumptions about human individuality realized in the design. Interaction is not organized around a project but around a persona. The individuals appear as reified profiles which preexist their relations. "Friends" are mere accidents of their substantial being. This construction of human relations flows logically from a conception of networks as a collection of atomic nodes, the famous "graph." The result is a social space occupied with trivialities and narcissistic posturing in which surveillance profits the platforms. This is the "industrialization of social relationships" to which Hui and Halpin contrast the project-centered online group "that produces a co-individuation of groups and individuals" (Hui & Halpin 2013, 115; Cf. Bakardjieva 2014).

Regardless of its specific form, the generalization of online community has brought about many social changes. The public sphere is opened up to independent voices with significant political consequences. The boundaries of the public, work, and private worlds are weakened. When work goes online, the distinction between work and leisure is blurred as members make themselves available after-hours. The network also supports the projection of fantasies into public space through gaming and pornography. Similarly, private online social interaction occupies individuals in real public spaces. We observe the effects daily as we dodge young people strolling along with their eyes fixed on their mobile phones.

The coordinating power of the Internet shows up in the "sharing economy." Initially based on voluntary exchange among peers, it has received a tremendous infusion of skill and capital, creating huge systems such as Airbnb. Open source projects such as Wikipedia continue the earlier non-commercial model. Consider also the powerful modernizing effects of online education in poor countries with few teachers and dispersed populations. The insertion of a relatively rich online world into such impoverished environments has a transformative impact.

But this is not the end of the story. The new individuation affects the structure of the Internet as well as society. Online community, along with email, has released an unanticipated potential of the meta-stable environment of the network. A cascade of innovations and social changes results. The invention of online community can be compared to the speck of dust that precipitates the super-saturated solution.

Individuation in the technological domain corresponds to the "innovation cascades" described by

David Lane and his associates. This concept refers to the emergence of a developmental sequence of new artifacts and organizational changes stimulated by an original innovation. The important point is the unpredictability of the sequence, its emergent quality, as it moves from stage to stage. Lane calls this process "Exaptive bootstrapping, … a positive feedback dynamic that can drive cascades of change in agent-artefact-[functional] attribution space. One thing leads to another" (Lane 2003, 2; Lane 2016).

Exaptation is a term derived from evolutionary theory that refers to the adaptation of a trait to a new function. The classic example is feathers which originated to control the body temperature of dinosaurs but ended up "exapted" to flight in birds. Exaptations such as this differ from simple adaptation to new uses because the niche within which they operate does not preexist them. Rather, they create the niche in the course of adapting to it, or to put it another way, the innovation, the function it performs, and the organization within which it operates emerge together.[9]

This is very abstract, but to make it concrete consider the difference between the adaptation of LED technology to home lighting and the invention of the personal computer. In the first case, the technical and functional niche preexisted the adaptation of the technology. In the second case, it was unclear what function the technology would serve in what social context; it was exapted to a variety of old and newly created niches with the invention of video games, word-processing, and so on. This latter example resembles the evolution of online social networking.

Communication on the Internet gives rise to a "network effect." One important measure of the value of a communication environment is the number of links that can be established within it. Email and online community are the gateway into the augmented value of multiple encounters and random connections. Once having achieved a critical mass of users, the dominant network becomes the unavoidable meeting place for everyone. Users gather on a single system, Facebook, because users gather on that system. The remarkable result is a simultaneous concentration of social capital in online communities and economic capital in the accounts of Facebook and Twitter.

The consumption model is based on the network effect and a second fundamental technical innovation that was exapted to the cascade provoked by online community. Data mining the products of surveillance on social networks makes possible what Antoinette Rouvray and Thomas Berns call "algorithmic governmentality," a new way of subjugating populations through behavioral manipulations based on profiling user attitudes and preferences. The data consist in traces left behind by communicating subjects which can be correlated to construct predictive instruments such as the electoral maps and targeted advertising employed in recent elections.

Considerations of intention and meaning are eclipsed through an exclusive focus on data. The objectivity of the data and its algorithmic processing strips it of conventional norms and privileges the immanent and unreflected normativity of the prevailing prejudices and behavior. Each identifiable group is reinforced in its identity by propaganda tailored to its peculiarities. Preemptive manipulation of the environment makes it possible to control the individuals within a certain margin determined by their identity. Through such manipulations "Algorithmic governance … seeks not to govern reality, but to govern on the basis of reality" (Rouvray and Berns 2013, 24). A world is created which favors specific types of action. Contrasting this development with Foucault's theory of the disciplinary society, Erich Hörl calls this the "environmentalization of power," "which produces … a different, more embedded, more intensive form of subjectivation and individuation" (Hörl and Schott 2018, 5).[10]

Data mining is part of a process that leads to profound technical change in the form of the network. While much of the underlying technology remains the same, the original highly decentralized organization of the network experience, determined by the TCP/IP protocol, is eroded now, as a few Internet giants receive most of the connections. Whereas at first all nodes were nominally equal, commercial operators responding to the network effect and the laws of the market have focused attention on a few privileged sites. A distributed system of mutual exchanges is transformed into a new kind of segmented or personalized broadcast network. If you search for snow tires, ukiyo-e, or baby clothes, you will receive ads for these items along with the thousands of others who initiated similar searches.

Once this mutation was well established, the cascading consequences of online community precipitated a further individualization process. Segmented broadcasting was employed for political purposes by political and state actors. The effectiveness of cyber-politics was tested in the election of Donald Trump. The end of network neutrality has the potential to accentuate this feature to the point where the Internet as we know it no longer exists. Our contemporary Internet has a place for ordinary human

communication alongside manipulation and entertainment. That place can be expected to shrink if nothing is done to defend freedom of assembly online from commercialism and contamination by cyber-politics.

For a brief period of about 20 years, the Internet constituted an online world relatively free of propaganda. Now, the old political actors have figured out how to use the system to spread propaganda even more effectively than they could with television. The combination of data mining with the mobilization of trolls, bots, and malware produces a persuasive veil of lies because the source adopts a trusted disguise. Televised propaganda has an acknowledged source that can be held responsible for its content. It must conform to some sort of community standards, for example, avoiding open racism and random lies, at least those not propagated by the authorities. But a Russian troll is your neighbor on the Internet where, in actual fact, as a famous cartoon had it, "No one knows you're a dog."[11]

Egged on by vicious bots and trolls, the anonymous user emerges as a persona resentful of privilege and inclined to scapegoat the vulnerable members of society. This was always a potential consequence of anonymity, which enables dissent, but also bullying and otherwise socially unacceptable expressions of prejudice and hatred. Now it has become a political force. The Internet has not created the wave of populism now threatening democracy, but it has certainly played a role, providing a "safe space" for racism and breaking down the distinction between what could be said in private and public discourse.

Despite these developments, the Internet remains a complex and conflicted phenomenon. To be sure, the big Internet businesses have accumulated great power and wealth. And, yes, propaganda and surveillance threaten democracy. But the network still functions very much like a common carrier for online communities of all sorts. Billions of people communicate more or less freely on the network.

Here is an example that shows the persistence of project-based online community. In 1995, I studied early discussion forums for patients with ALS (Amyotrophic Lateral Sclerosis, or Lou Gehrig's Disease). There were only a few such forums on commercial sites such as Prodigy. The patients discussed living with the disease, and shared information about symptomatic treatment and clinical research. They also demanded that their voluntary health agency lobby the government for more research funding (Feenberg et al. 1996). Today, similar patient forums proliferate on the Internet and create a very different social environment for medicine. I did a Google search for ALS forums which brought up dozens of results.[12] These forums continue the ethos of the early Internet.

Critical constructivism and the question of governance

The social role and significance of the Internet is in suspense today. The technology has not reached closure but is still in rapid development. No one program has been able to marginalize the others. The impression of stabilization produced by the size of the major companies such as Facebook and Google belies their actual fragility. The pathologies that accompany their data harvesting discredit them in the eyes of their users and provoke more or (so far) less effective attempts at regulation. The abuses likely to result from the end of network neutrality will intensify the resistance to a purely economic conception of the Internet. Hegemony without legitimacy is difficult to sustain.

Because the Internet is a medium of communication, it cannot be contained within the bounds of the economy. That it has an economic dimension is obvious, but like radio and television, it impacts public life and that impact is subject to judgment on non-economic grounds. Economic and public purposes are not necessarily irreconcilable, but they are potentially in conflict and that conflict is now bursting forth with unpredictable consequences. What provokes the conflict is the political manipulation of voters on the basis of data produced by users and exploited by Internet firms for commercial ends.

In what follows I will confine my remarks to democratic societies. Two different types of rationality coexist in these societies, instrumental rationality and democratic rationality, the one oriented toward efficiency and control, the other toward public information and deliberation. Critical constructivism does not consider these two forms of rationality as abstract features of human nature, but rather as concrete social realities. As such they overlap and need not conflict. But the differentiation of social spheres in modern societies tends to obscure the connections between them. Technical disciplines pretend to be value neutral, while democratic debate too often proceeds without consideration for the technical background of social life. Organizing the interactions of these domains is one of the essential tasks of governance in technologically advanced societies (Feenberg 2017).

Modern societies subject human beings to technical control as traditional forms of authority decline. This is theorized in the Marxist tradition through the concepts of management and deskilling in the sphere of production. Today these concepts apply far beyond production to many forms of social activity including medicine, education, leisure, and even the household. The generalization of technology goes along with generalized administrative control. This phenomenon is described by Foucault as "biopower," the management of populations by modern states.

The political consequences of these developments are dire. The invention of "public relations" and propaganda in the 20th century extends technical control to the human mind. Algorithmic governance belongs to this sequence of developments which culminates in the so-called neuro-marketing, the attempt to bypass consciousness altogether and control behavior through manipulation of the brain (Nemorin and Gandy 2017).

Bernard Stiegler points out that the increasing automation of everyday life activities has the effect of generalizing the deskilling observed by Marx in the sphere of production. Automation has led to a relaxation of intellectual effort as activities are routinized and shorn of intrinsic interest. The microwave does for the kitchen what the assembly line does for the factory. Stiegler calls the passage from artisanal skills to deskilled mechanical performance "proletarianization," and he proposes to extend the concept to every domain in which skills are lost as technology and management intrude (Stiegler 2015).

The Internet already plays a role in this process of proletarianization, and it is expected to do far more in the future. Consider the ubiquitous "Like" button which relieves the approving observer of the need to articulate a personal viewpoint. This is the equivalent at the level of personal recognition of the microwave and the assembly line. The Internet of Things promises to extend proletarianization into the most trivial activities, such as the control of room temperature and lighting. To the automated environment envisaged by this much-hyped development corresponds a human being reduced to passivity, clicking its life away in a technical surrogate of the maternal womb.

Proletarianization is a consequence of the technification of the environment. Like the "one-dimensional" man Marcuse denounced in the 1960s, it integrates society. But as technology intrudes into the public sphere, it inspires some of its subjects to new forms of resistance, the opposite of its intended effect. The form and style of this resistance today is largely continuous with the New Left of the 1960s and 1970s (Feenberg 1983). Resistance focused on the Vietnam War and racial and gender discrimination, but in the background lay a visceral opposition to cultural and political manipulation through the mass media. Popular single-issue movements supported by innovative forms of direct action took over as the old left declined. Party militancy was replaced for the most part by small committees coordinating punctual protests.

Rejection of technocratic pretentions accompanied the movements of the 1960s and 1970s and soon bled into opposition to corporate and government environmental practices. Medicine too was affected as AIDS patients and the women's movement rejected pseudoscientific alibis for undesirable and discriminatory arrangements (Epstein 1998; Michaels 2014). This was a new type of politics that aimed to bring together and empower members of technical networks, subject to routine management in the normal course of events (Feenberg 1992). The significance of the Internet for democratic politics must be understood against this historical background.

Generalized management casts members of technical networks in potentially oppositional roles, just as industrial workers once assembled in factories gained new possibilities no earlier lower class had enjoyed. The women's and AIDS movements worked to transform medical networks on the basis of preexisting political organizations. Various environmental movements around pollution and toxic wastes illustrated a different pattern in which local communities were mobilized by recognition of the harm done them by their unwanted participation in an industrial network. Their politicization followed rather than preceded their movements of resistance. This then became a pattern for resistance to the abuses of large-scale technical institutions.

These were not revolutionary movements like the socialist movements of an earlier period. Their object was not transformation of the state but modification of the technical code presiding over the networks. Radical critics of capitalism often question the significance of such movements. They are said to be "reformist," but the multiplication of reforms in many domains over the last 50 years has significantly altered the trajectory of development of capitalist societies. The complaint that capitalism has survived and prospers should be read as an incitement to further struggle rather than as a dismissal of the slowly growing public influence on the technosystem.

The intersection of this New Left heritage with the Internet gives rise to new methods of dissemination of information and ideas, new forms of public discussion, new techniques of mobilization, and, most significantly, the emergence of new publics. The Internet plays an essential role in the manifestation of democratic rationality in the context of the increasing technification of society. This counter-trend to proletarianization forbids dystopian conclusions even if it does not promise revolution in the foreseeable future.

The Internet serves many political purposes today, but it is unique in enabling protests rooted in the tensions and problems of technical networks. It reshapes political participation in two different ways: mediating radical movements and bringing technical networks to conscious self-awareness.

Mediation. The dissemination of dissenting news and small group discussion provides a medium within which explosive short-term movements emerge and coordinate. The Internet has accelerated the dissemination of protest and has also made it possible for groups dispersed along the lines of technical networks to stay in touch. Their protests focus on the political agenda of their society and force the acknowledgement of inconvenient facts the media and the authorities prefer to ignore. Although deliberation often prepares these movements, their most important contribution to the public sphere consists in reframing the issues (Feenberg 2017). They modify the boundaries of the "space of reasons" admissible in public debate.

Although sometimes quite radical, these movements have not so far led to the creation of socialist parties such as ones that challenged capitalism in the 19th and early 20th century. When the enthusiasm declines, the movements disappear without leaving an organizational trace, but their effect on public opinion can be significant. The Occupy movement is a good example of this dynamic. Before Occupy politicians of all stripes dismissed talk about economic inequality as outdated. After Occupy, Trump and Sanders made inequality a central issue. The agenda of public debate was transformed but no new radical organization carried on the fight.

Self-consciousness. The highly technological society in which we live generates latent social groups wherever the technical networks create common conditions of life for individuals scattered across the national space. The Internet is the communication medium through which these latent publics can become self-aware and organize.

Here is a mundane example. When it was proposed to install smart meters in millions of British homes, customers of the electrical utility became aware of common concerns. Were the new meters safe? Would they increase costs? Like the AIDS patients and women protesting medical procedures discussed above, these customers formed a potential social group because of their enrollment in a common network. Their reactions to the proposed change in the network are documented in dozens of forum discussions on the web. Often the discussions are intelligent and informative. The individuals learn together and whatever the outcome, their interactions exemplify a democratic form of rationality different from that of technical control. Every technical network is a potential site of such discussions. The public will inevitably make mistakes in evaluating technical issues, but so far the balance sheet of public participation is largely positive. Without it we would not have the environmental protections to which we have become accustomed nor the communicative applications of the Internet.

This has implications for any technologically advanced society. The fall of the Soviet Union is the definitive refutation of technocratic socialism. Obstacles to the flow of information had dire economic consequences. Economic performance was distorted by the exclusive focus on quotas without adequate means of adjustment to changing conditions (Lebowitz 2012). Economies cannot be successfully planned without building in feedback mechanisms, but the Soviets suppressed both markets and political protest while giving managers strong incentives to lie to their superiors.[13]

Communication by computer already plays a large role in mobilizing opinion and enabling the public to criticize and ultimately improve the performance of the technical networks that organize modern social life. This has had a significant impact under capitalism in domains such as urban planning and health care which are not adequately represented by either markets or law alone. In such cases, communicative exchanges, often organized on the Internet, rather than individual consumption decisions or voting mediate the interaction between lay publics, technical experts, and political authorities. This form of communication will prove even more essential in a socialist society that relies less on markets for the circulation of information.

Democratic socialism will require a new mode of governance that employs technical expertise without succumbing to technocracy. Market socialism has

been proposed as a solution, but by itself it will not suffice in a society in which so many non-market functions are organized by technical networks. These networks are ultimately defined by technical disciplines which may contain persistent errors or biases that eventually provoke public resistance. The Internet can provide the infrastructure of a new type of public sphere that addresses issues that arise in this context.

Conclusion

The Internet supports a variety of systems, worlds, co-constructions, and modes of governance. These worlds and functions can coexist up to a point, but there are also conflicts and incompatibilities. Generalized technification and administration lead to generalized deskilling and passivity. Technical problems and abuses provoke new forms of resistance that express themselves on the Internet. The conflicts are coming to a head at present. Will the Internet become an electronic mall, a personalized television, an apparatus of political propaganda, or will it continue to be a widely used public space? I have tried in this article to offer a balanced analysis of its complexity.

On this account, it is premature to write off the future of the Internet. Indeed, to do so is not merely an analytic error but disarms resistance to the assault on free communication. It is furthermore provincial. Intellectuals in the wealthy nations of the West seem willing to condemn, if not personally abandon, a technology that is essential to political discussion and resistance in the rest of the world.

I would like to conclude the analysis with corresponding policy recommendations for the management of the Internet today. These recommendations may appear unrealistic, even utopian, but they all have precedents. They respond to the high value we ought to place on democratic discourse, one of several potentials of the Internet, and surely the most important from a normative point of view. The question is how to privilege that potential over commercial and populist alternatives. Users must play a role through their choices and actions, but government must also intervene. We take the regulation of many industries for granted and depend on the guarantee of safety it provides. We rely on it every time we buy food in the supermarket or take a medicine. It is time that government protected our minds as well as our bodies.

The Internet requires protection from cyber-politics most urgently. Government and social networks must impose the requirement that political advertising on the Internet be identified by its source. This works for television, and it can be tried on the new medium as well although the extraterritoriality of many actors poses an obstacle. Aggressive retaliation against foreign interference is therefore required. Algorithmic identification of bots and trolls is possible and can enable their exclusion from social networks. This will be a struggle, but it has hardly been engaged so we do not know how effective it can be.

The uncontrolled collection and sale of personal data must be outlawed, except where necessary to improve services and identify intrusions. Social networks must become subscription services, like Netflix, or receive government support. Participation in advertising campaigns must be based on choice, not surreptitious data collection.

Espionage should not be universal but should be limited to actual threats. This is perhaps the most difficult recommendation to realize given the immense power and independence of the national security apparatus, but it is a desideratum nevertheless and there have been periods when the US Congress limited surveillance significantly.

Internet monopolies should be broken up without interfering with the underlying network resources. This has been done for the energy industry and telephony and would have a salutary effect on the Internet. There is no reason why users of Facebook must all confront the same interface privileging the same behaviors and managed by the same company. If AT&T could be broken up without interrupting telephone service, so can Facebook.

The sharing economy needs government support to free it from venture capital. It should be administered democratically by management teams chosen by participants (Scholz 2017). The communicative resources of the Internet are available for the organization of such a democratic system of administration.

Finally, government should support the development of a decentralized system of social networking which alone can provide privacy. Some sort of peer-to-peer or other decentralized system could replace the huge server farms of the Internet giants, the main function of which is to process personal data for sale. Since no venture capitalists are likely to fund this research and development, government must step in, as it has in the case of basic medical research.

These policies would preserve the Internet as we know it and reverse the uncontrolled slide toward an online world in which human beings become quasi-mechanical relays between the vast systems of production, consumption, and state action.

Notes

1. For a different type of layered explanation, see Bratton (2016).

2. This principle is particularly difficult to apply to the Internet, whose history appears inevitable as it has developed step-by-step toward its present form during our lifetime. For a discussion of this problem, see Russell (2012). An example of the complexity of the process in one case is analyzed in Schafer (2015).

3. For more on cyber-politics, described as "cyber-war," see Dyer-Witheford and Matviyenko (2019).

4. A more complete analysis can be found in chapter 4 of Feenberg (2017).

5. Herbert Marcuse already noted this limitation of Heidegger's phenomenology of worlds in a 1928 article. Marcuse asks, "… is the world 'the same' even for all forms of Dasein present within a concrete historical situation? Obviously not. It is not only that the world of significance varies among particular contemporary cultural regions and groups, but also that, within any one of these, abysses of meaning may open up between different worlds Precisely in the most existentially essential behaviour, no understanding exists between the world of the high-capitalist bourgeois and that of the small farmer or proletarian. Here the examination is forced to confront the question of the material constitution of historicity, a breakthrough that Heidegger neither achieves nor even gestures toward" (Marcuse 2005, 16).

6. When asked by Napoleon why he had not mentioned God in his explanation of celestial mechanics, Laplace replied, "Sire, Je n'avais pas besoin de cette hypothèse-là."

7. Distributed social networks such as Diaspora and Lorea attempt to revive the spirit of early online communities.

8. Other configurations are possible, for example, the duplication of every message on all the computers of the members of the group.

9. Stephen Jay Gould's (2002) notion of "exaptation" describes evolutionary developments in which inherited structures are adapted to new and different functions. Lane "exapted" Gould's theory to the study of technology.

10. There is certainly an element of questionable prediction in such general analyses. Only traces of a new stage of capitalism are visible at this time, but the traces may turn out to be important in a future in which closure is finally achieved around the consumption model, should that come to pass.

11. The cartoon by Peter Steiner appeared in *The New Yorker* on July 5, 1993. See https://en.wikipedia.org/wiki/On_the_Internet,_nobody_knows_you%27re_a_dog. Does this analysis violate the symmetry of program and anti-program? Indeed it does and it must insofar as its object is a system of intentional deception.

12. For examples, see http://www.alsa.org/community/support-groups/.

13. It is interesting to note that in the 1970s the systems theorist Sir Stafford Beer attempted to use computer networks to improve the flow of information between planners and production units. He implemented such a system in Chile under Salvador Allende's socialist government shortly before it was overthrown in a CIA sponsored coup (Medina 2011).

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