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Protocol

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Protocol

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Protocol is a technological problematic. That is to say, the concept of protocol is an intellectual terrain on which one may contemplate a number of overlapping, sometimes contradictory and often interrelated theoretical problems at play today. I aim in this somewhat idiosyncratic entry to describe briefly a few historical waypoints for the concept, to identify some of the normative claims inherent in using the term today, plus suggest a few issues with which, going forward, any theorist of computers or networks will have to contend. Because of this, I deliberately avoid any discussion of the etymology of the term in diplomatic affairs, or the current institutional structure in place today for the creation and maintenance of Internet protocols. Instead I offer a singular perspective on the theme, one that could be contested as much as it could be confirmed.

A distributed network is a specific network architecture characterized by equity between nodes, bi-directional links, a high degree of redundancy and general lack of internal hierarchy. Protocol refers to the technology of organization and control operating in distributed networks. Protocol functions largely without relying on hierarchical, pyramidal or centralized mechanisms; it is flat and smooth; it is universal, flexible and robust. Protocol exists in contemporary computer networks, but it is also at play in a variety of biological and bioinformatic networks (see Thacker, 2004).

There exists a constellation of theoretical influences from science and philosophy that helps inform today's cybernetic, networked environment. 'If I were to choose a patron saint for cybernetics out of the history of science, I should have to choose Leibniz', wrote Norbert Wiener (1965: 12). Indeed both Gottfried Leibniz and Baruch Spinoza from modern philosophy articulate early approximations of machinic and network-like arrangements. Leibniz, with his *Monadology*, describes a smooth, universal network of 'monads', each of which is singular but also contains within it a mirror of the totality. In the *Ethics* Spinoza identifies a universal substance, from whose infinite attributes thought and extension emerge to form the human body. The affections of the human body superimpose onto substance a type of distributed network of relations and counter-relations. In the 20th century Ludwig von Bertalanffy (1976), with the science of general systems theory, and Wiener, with the science of cybernetics, helped describe open versus closed systems, how subsystems are nested within systems, and how communication and control pass from one part of a system to another. In roughly the same period Claude Shannon and Warren Weaver (1998) put forth their information theory which defined communication not solely in terms of semantics but in terms of the relative integrity of symbolic patterns. In mathematics, graph theory is also a key influence. It provides a vocabulary for understanding systems of nodes and links, known simply as graphs.

At the same time there also exists a faint counterpoint resonating within this historical overview that must be pointed out. This is the general assumption that networks have the potential to dehierarchize, disrupt and generally dissolve rigid structures of all varieties. This thread runs from Hans Magnus Enzensberger's chart of emancipated versus repressive media, to Gilles Deleuze and Félix Guattari's 'rhizome' (1987), to Peter Galison and his war against the center, and even to the RAND researchers John Arquilla and David Ronfeldt and their theory of netwar (2001). All these thinkers share the assumption that networks exist in an antagonistic relationship to authority, that networks are the sole form of organization that can possibly threaten entrenched, fortified power centers.

This trend was articulated distinctly in the 1960s by Paul Baran (1964) with the concept of the distributed network. Baran's network was based on a technology called packet-switching which allows messages to break themselves apart into small fragments. Each fragment, or packet, is able to find its own way to its destination. Once there, the packets reassemble themselves to create the original message. The ARPAnet, started in 1969 by the Advanced Research Projects Agency (ARPA) at the US Department of Defense was the first network to use Baran's packet-switching technology. In fact, the term packet-switching was not invented by Baran, but instead by British scientist Donald Davies who also invented a system for sending small packets of information over a distributed network, all the while unknowing of Baran's work. It was Baran's institutional affiliation with RAND and his proximity to the newly emerging ARPA network in America that solidified his historical legacy. I consider Baran to be the 'father' of protocological systems, not simply because of his position in the historical emergence of distributed networks, but because he explicitly understood that distributed networks create new, robust structures for organization and control; they do not remove organization and control. Compared to pyramidal hierarchies, networks are indeed flimsy, ineffective and disorganized. But this relationship of asymmetry is precisely what, in the long run, makes networks so robust. Baran understood that the Cold War model relied upon a decentralized system of targets – cities and military bases, mostly – and so, if a new targetless model of organization could be rolled out (the smooth, distributed network), then precisely through the inversion of the Cold War model a new strategic advantage could be gained. Distributed networks have become hegemonic only recently, and because of this it is relatively easy to lapse back into a time when the network was disruptive of the power center, when the guerilla threatened the army, when the nomadic horde threatened the citadel. But this is no longer the case today. The distributed network is the new citadel, the new army, the new power.

So the assumption above, that networks have the potential to dehierarchize, disrupt and generally dissolve rigid structures of all varieties, must be resolutely resisted. It is not the case that networks produce a general waning of organization and control. In fact, it is the opposite: distributed networks produce an entirely new system of organization and control that, while perhaps incompatible with pyramidal systems of power, is nevertheless just as effective at keeping things in line. This new system of organization and control, protocol, is adept at regulating flows, coding objects and sculpting life forms. Thus, the problematic of protocol suggests that in recent decades there has been a change in the nature of organization and control, not an 'emancipation' from it, as Enzensberger so hoped. The imperative today, then, is to understand the nature of this new logic of organization, and as Michel Foucault once said about power, not to become enamored of it.

Indeed Foucault and Deleuze are quite useful for thinking about the protocological system of organization and control. Foucault, through his concept of biopower, was able to articulate a new form of total saturation of organization, one that pentrated not only the institutions of modern life, but also the very networks of human interaction, be they domestic, familial, sexual, or even intra-human at the level of 'raw' biology. Deleuze, in his book on Foucault, and additionally in a series of fragments and interviews he produced late in life, identified a historical epoch, concurrent with Foucault's rise of biopower, called the society of control. The society of control is characterized not by the power of the institutions of modernity or pre-modernity, the army, the prison, the university, the church, but instead by what he called the ultra-rapid forms of free floating control that are inherent in distributed networks. These networks may be computer-based, but, Deleuze suggested, one must also look to the biological networks of the life sciences. Indeed the informatic and the biological become intertwined under the societies of control such that the biological is always already understood as an informatic network of data (the genome), and at the same time the digital is always understood as a type of artificial life system which may produce 'intelligent' emergent properties just as organisms do.

The Internet protocols themselves are interesting as historical documents. A computer protocol is a set of recommendations and rules for implementing a technical standard. The protocols that govern much of the Internet are contained in what are called RFC (Request For Comments) documents. The expression derives from a memorandum titled 'Host Software' sent by Steve Crocker on 7 April 1969, which is known today as RFC 1. The RFCs are published by the Internet Engineering Task Force (IETF). They are freely available and used predominantly by engineers who wish to build hardware or software that meets common specifications. Since 1969, a few thousand RFC documents have been released, and they, along with a larger constellation of global technological standards, constitute the system of organization and control known as protocol. Protocols are systems of material organization; they structure relationships of bits and atoms, and how they flow through the distributed networks in which they are embedded.

A close reading of the RFCs is outside of the scope of this encyclopedia entry; however, I would like to identify a few details of this system that should have important ramifications for cultural workers of all varieties. The first is that informatic networks are relatively indifferent to semantic content and interpretation. Data is parsed; it is not read. Media objects are defined at the intersection between two protocols (two technologies), not as a result of some human being's semantic projection onto that data. (Any machinic understanding of the 'content' of data is derived as an epiphenomenon of human behavior, as seen in the page rank algorithm of search engines like Google.)

The second ramification is what might be called the political tragedy of interactivity. Interactivity and bi-directionality of media was famously held up as a sort of utopia by Bertolt Brecht in his short fragments on radio, and later reprised by Enzensberger as the heart and soul of an 'emancipated' media. However, today interactivity is one of the core instruments of control and organization. Today, organisms must communicate whether they want to or not. Organisms are 'captured', to use Phil Agre's terminology, using any number of informatic codes and rubrics. Behaviors are mined for meaningful data, tracked for illegal data, even the genome is prospected for rare or otherwise useful sequences. This is the political tragedy of interactivity, that what was so liberating for Enzensberger is today the very site of informatic exploitation, regulation and control. Today, interactivity means total participation, universal capture.

The third ramification is the tendency to privilege surface over source. I mean this in an entirely non-normative way, and indeed have little understanding of this above and beyond that it is merely happening. By 'surface over source' I mean the struggle between open source software and proprietary software, but it is also much more endemic than that. There is a certain philosophy in computer science known as encapsulation that pervades a whole variety of computer languages and programming environments regardless of whether that code is open source or not. Encapsulation is a technique whereby one segregates code into specific modular units, sometimes called objects or libraries, then provides a surface interface for that object or library. The interface acts as the sole conduit for communication into and out of the object or library. The source of the object or library itself is hidden. Computer scientists use encapsulation for a variety of reasons, all of them practical. It makes the code easier to maintain and simpler to implement. As stated previously, the ramifications of this are not altogether clear to me yet; however, I identify the tendency to privilege surface (or interface) over source at the level of code as quite significant and worthy of further critique. At the very least it should convince us that the open source movement is not enough, and that something like an 'open runtime' movement might be required.

Connected to this is a fourth concern: the problem of the de-politicization of algorithms. There is essentially no intellectual movement today dedicated to the political critique of algorithms. Likewise there exists no alternative movement dedicated to the creation and development of alternative, or 'progressive', algorithms. For the most part the political development of algorithms revolves around a philosophy of utility and efficiency. These being but a minute slice of the human condition, I call for the creation of an experimental school of alternative algorithms modeled around a variety of political and social goods. We need a viable critique of collaborative filtering. We need a language in which to appraise the Google page rank algorithm. An examination of the de-politicization of algorithms will help.

A final ramification of protocological organization and control is that it mandates the creation of new models for political intervention. Networks, rhizomes, 'grass roots' movements – these were all effective diagrams for political control under modernity. But after the powers-that-be have migrated into the distributed network, thereby co-opting the very tools of the former Left, new models for political action are required. A new exploit is necessary, one that is as asymmetrical in relationship to distributed networks as the distributed network was to the power centers of modernity. In the meantime anti-protocological movements have emerged such as Hakim Bey's model of the temporary autonomous zone (2003), or the Electronic Disturbance Theatre's system of online electronic swarming. And in the realm of the non-human, computer viruses and worms have innovated, perhaps totally haphazardly, a new model of protocological infection and disruption that takes advantage of the homogeneity of distributed networks and their ability to propagate information far and wide with ease. At the same time hackers seek out logical exploits in software that allow for inversions and modulations in the normal functionality of code. These techniques, if not fully formed themselves, will provide a way forward for understanding protocological control and counter-protocological practices.

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Hackers

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The figure of the 'hacker' is a new and distinctive one in the social history of the late 20th century. The hacker probably first emerged out of the electrical engineering labs at the Massachusetts Institute for Technology (MIT). As on many campuses, MIT students had a tradition of creating attention seeking pranks – which at MIT were called 'hacks'. The term hack migrated from this general student inventiveness to a more specific sense of creative invention with given materials in the context of electrical engineering, out of which computing as a distinct discipline was to grow.

Not all computing at MIT or elsewhere qualified as 'hacking'. It had distinct qualities. 'To qualify as a hack, the feat must be imbued with innovation, style and technical virtuosity' (Levy, 1994: 23). Hacking was at once an aesthetic and an ethic, in which cooperation among hackers