Transnetworks and the Fluid Nexus Project

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Transnetworks

My paper focuses on two necessarily interrelated strands of thought: the first being the ways in which networks have moved from not only a means of describing the world, but also a representation of it; the second being the ways in which this particular ontological stance enables or disables certain types of agency from within networks, and potential means of resistance that focus on reinterpreting network infrastructure.

This is related to what I am provisionally calling *transnetworks*. I mean here a use of the prefix "trans-" in the sense used by Félix Guattari when referring to transdisciplinarity;[1] namely, something that is not just multi- (meaning more than one) or inter- (meaning something in between), but rather something that reaches across different notions of networks, infrastructures, protocols, and our relations with them, and hopefully

[1]Félix Guattari, *Chaosmosis*, trans. Paul Bains and Julian Perfanis (Bloomington, IN, USA: Indiana University Press, 1995).

creates novel arrangements of things. Gary Genosko, in his elaborations of Guattari's thought, coins the somewhat unwieldy phrase "transdisciplinary metamethodology" to denote both research that is about the formation of new assemblages and linkages across formerly disparate disciplines, as well as the need to think methodology on a "meta" level in order to not too easily fall into traditional disciplinary ruts.[2] I draw parallels here with the work of the science studies scholars John Law[3] and Annemarie Mol,[4] who both see ontology in an active sense; that is, ontology does not describe "being" as pre-existing and eternal, fossilized and stable, but rather as in motion, in flux, and that does not necessarily exist prior to certain configurations of methodologies. Law writes in his recent book *After Method: Mess in social science research*,

> Method, then, unavoidably produces not only truths and non-truths, realities and non-realities, presences and absences, but also arrangements with political implications. It crafts arrangements and gatherings of things—and accounts of the arrangements of things—that could have been otherwise.[5]

The methods we use to study networks, following this line of reasoning, thus help to structure how those networks appear to us. To grasp the complexity of networks, then, requires a heterogeneous set of methods that does not accept any one method's purported

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[2]Gary Genosko, "Félix Guattari: towards a transdisciplinary metamethodology", *Angelaki: Journal of the Theoretical Humanities* 8, no. 1 (2003): 129–136, ISSN: 0969725X.

[3]John Law, *After Method: Mess in social science research* (New York, NY, USA: Routledge, 2004).

[4]Annemarie Mol, "Ontological politics. A word and some questions", in *Actor Network Theory and After*, ed. John Law and John Hassard (Malden, MA, USA: Wiley-Blackwell, 1999), 74–89; Annemarie Mol, *The Body Multiple: Ontology in Medical Practice* (Duke University Press, 2003).

[5]Law, *After Method: Mess in social science research*, 243.

claims of authority; rather, we need to follow a transdisciplinary trajectory that constructs a varied path through a variety of disciplines, creating a notion of *transnetworks* that does not belong to any one of them.

This paper is an opening onto these issues. I want to quickly set out a quiver of problematics that open up future areas of investigation. First I will look at the the etymology of the word network and the use of language within computer science. Second, I will examine the relationships between networks and protocols, and what happens when there is a protocol incompatibility. Third, I will introduce the notions of "nodocentrism" and "paranodality", terms developed by the communications scholar Ulises Mejias that are useful for diagnosing problematics of networks. Fourth, I will detail the Fluid Nexus project itself and how it relates to these issues. Finally, I will explore some expressions of "fear of networks" that I have come across when trying to get funding for this work, and that ultimately highlight some of the problems and potentials of this type of research.

"Network" as a Term

The word network has a long history of its own, originally describing the lattices and finery on clothing and therefore maintaining a strong connection to corporeality. Yet the word today most often describes something highly abstract and many of the original meanings have been lost in regular discourse. Network, as a term appropriated by computer science thought, has turned into a word that is both highly specific and highly

flexible. This mutability in the use of words by computer scientists, as ably demonstrated by Phil Agre in his book *Computation and Human Experience,* enables the extension of once limited terms to a wide variety of phenomena.[6] For the word network, this results in the expansion of a word once used for clothing to be used to describe everything from the propagation of viruses to the transmission of bits across copper or fiber optic wires. Especially prominent today is the modification of the word "network" by the word "social", thus extending the term even further into the space of human communication.

Networks thus can refer to the materiality of both humans and data. Therefore viewing things as a network means we see things in terms of connections and links. And I do mean viewing, as network theory suggests a one-to-one correspondence between an abstract mathematical formalism and visual representation. While the mathematical techniques of *graph theory* underly much computational work in networks, this use of symbols necessarily has a direct visual correlate. In social networks this is the commonly-seen jumbled mess of dots and lines with the now-well-known legend: dots refer to people, known as nodes, and lines refer to connections between them, known as edges. The use of the language of nodes and edges allows one to use mathematical operations from graph theory to perform computations on these networks, creating numbers that are meant to suggest degrees of "connectedness" or "centrality". These numbers, computations, and visual representations enable a type of slippage between vastly different ways of consid-

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[6]Philip E. Agre, *Computation and Human Experience* (New York, NY, USA: Cambridge University Press, 1997).

ering the world. Single numbers come to represent complicated relationships, condensing a staggering amount of complexity into a small set of symbols.

Networks and Protocols

If we delve a bit into this view of networks a number of questions immediately arise. What are the conditions by which the network is instantiated or *individuated*, to use the term of Alexander Galloway and Eugene Thacker in their recent book *The Exploit: A Theory of Networks*?[7] Who gets to decide when a particular network is individuated? What are the means of controlling access to the network, the protocol that individual nodes have to follow to become part of the network? When someone creates a visual representation of the network, who is represented, what types of connections are represented, and to when is the representation supposed to refer? The general representational strategy of graph theory flattens difference within the network by re-inscribing fixed relations via the discourse of stable nodes and stable edges—thus the messiness of people and their connections becomes inscribed as stable people and stable relationships. This concern about the representational strategies of networks and graph theory would suggest a response that focuses less on the qualities of nodes and edges, and more on the topology or infrastructure of networks. It would be an examination of the interrelationship between networks and *protocol,* using the definition given by Galloway: "protocol is a language

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[7]Alexander R. Galloway and Eugene Thacker, *The Exploit: A Theory of Networks* (Minneapolis, MN, USA: University of Minnesota Press, 2007).

that regulates flow, directs netspace, codes relationships, and connects life forms".[8] Protocol in networks delimits what is possible, and, by extension, what is is *not* possible.

No matter how we approach protocol and networks we are faced with choices about who, what, how, when, and why to represent. We are still faced with the problem that once we decide to represent a network, we are forever fixing, within that particular representation, one view of the world, and one that will privilege certain actors, people, and connections versus others. Indeed, this is one of the main critiques of actor-network theory, or ANT, within science and technology studies. ANT aims to flatten the ontological space between humans and non-humans by showing how both must be marshaled together in order to create a particular scientific fact or technological artefact. This combining of forces and abilities, and the need for the people and objects within the network to agree upon the means of exchange, sets up an inner/outer dichotomy that privileges actors within the network. To join a network means to become standardized, to be subject to rules and protocols that might have been constructed and decided upon without your consideration. For the late Susan Leigh Star, in her well-known critique of ANT, this means that the "standardized network often involves the private suffering of those who are not standard—who must use the standardized network, but who are also non-members of the community of practice".[9] Her critique, written over fifteen years ago, has been echoed recently by Thomas Berker who asks how we can look at suffering within

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[8]Alexander R. Galloway, *Protocol* (Cambridge, MA, USA: MIT Press, 2004), 243.

[9]Susan Leigh Star, "Power technologies, and the phenomenology of conventions: on being allergic to onions", in *A Sociology of Monsters: Essays on Power, Technology, and Domination*, ed. John Law (London, UK: Routledge, 1991), 43.

these networks as the "uneven distribution of enabling and disabling effects" as well as the "uneven distribution of the ability to switch between networks".[10] Suffering within networks occurs not only because of inability to move in and out of a network, but also because of an inability to create a network in the first place. To create a network would mean choosing the rules by which people and things become individuated, as well as choosing the means by which people can join or leave the network.

Nodocentrism and Paranodality

This point about the creation of networks is important because of what Ulises Mejias calls "nodocentrism", defined as follows: "a network is quite incapable of recognizing things that are not nodes. If something is available in the network, it is perceived as part of reality, but if it is not available it might as well not exist".[11] He continues: "nodocentrism constructs a social reality in which nodes can only *see* other nodes. It is an epistemology based on the exclusive reality of the node".[12] We can see here echoes of the critique of Leigh Star's that I previously mentioned. In contrast to nodocentrism Mejias writes of the "paranodal", "that which networks leave out, that which resists being part of the nework".[13] Exploring the paranodal requires an attention to infrastructure; the idea is

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[10]Thomas Berker, "Networks and Suffering", in *Proceedings of New Network Theory, 28-30 June, 2007, Amsterdam, Netherlands* (2007), 182–191.

[11]Ulises A. Mejias, "The limits of networks as models for organizing the social", *New Media & Society* 11, no. 8 (2009): 11, doi:10.1177/1461444809341392, http://nms.sagepub.com/cgi/content/abstract/1461444809341392v1.

[12]Ibid., 12.

[13]Ibid., 12.

to identify what current, predominant networks leave out, what aspects of reality resist being codified into current network infrastructures, and think about what alternative structures might be possible.

It is important to state that the terms nodocentrism and paranodal exist in relationship to each other; there is no absolute space where the paranodal does not have a referent, or where some nodes are not valued above others. Rather, analysis has to define the precise nature of the relationship between these two terms. Given the dominant networks, does a new structure enable those excluded by the main networks to participate? Have the mechanisms of power been shifted via a new configuration of edges and protocols? In Galloway and Thacker's words, "Because networks are (technically) predicated on creating possible communications between nodes, oppositional practices will have to focus less on the characteristics of the nodes and more on the quality of interactions between nodes".[14]

This would be a focus on a less stable notion of networks. If we look on the underside, into the spaces in which networks are less fixed and more fluid, networks can be an active agent in creating a particular view of reality, an ontological device to suggest situated realities, rather than an inert visual and mathematical tool that waits to be filled with data. We can then stop using networks as a means of fixing what already exists but instead use them to craft certain ways of representing the world over others. Responses to the questions I just raised are then not merely parameters to be chosen within a particular

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[14]Galloway and Thacker, *The Exploit: A Theory of Networks*, 99.

software package, but rather a making of differing ontological politics that have broader ethical, social, and political meaning.

Fluid Nexus

Fluid Nexus[15] is a mobile phone application designed to enable activists and relief workers to send messages and data amongst themselves independent of a centralized mobile phone network. The idea is to provide a means of communication between people when the centralized network has been shut down, either by the government during a time of unrest, or by nature due to a massive disaster. During such times the use of the centralized network for voice or SMS would not be possible. Yet, if we can use the fact that people still must move about the world, then we can also consider how people might also carry data with them. This is related to ideas from computer science known as "sneaker nets" or the derogatory term "data mules". We could thus create fluid, temporary, ad-hoc networks (via short-range wireless technologies like Bluetooth) that pass messages one person at a time, spreading out as a contagion and eventually reaching members of the group. This could allow surreptitious communication via daily activities. For details of how the application works, see Figure 1. The initial prototype of Fluid Nexus was developed with the support of the Medialab-Prado in Madrid, Spain, and the help of Bruno Vianna, Luis Ayuso, and Mónica Sánchez.

Fluid Nexus relies on, yes, a fluid view of reality and of networks. It requires no rep-

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[15]For more information about the project, and to download the application, see `http://fluidnexus.net`.

Fluid Nexus

How it works.

1 The person first downloads Fluid Nexus to their mobile phone.

La primera persona baja Fluid-Nexus a su móvil.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Praesent eros ante, viverra vel, pulvinar ac, malesuada vitae, neque. Suspendisse quam tellus, venenatis eget, tincidunt vitae, rhoncus vitae, sapien. Vestibulum vitae nisi vel nisi consequat dictum. Sed non justo. Etiam tempor bibendum odio. Phasellus sit amet nibh. Fusce metus. Mauris volutpat mollis est. Praesent accumsan. Proin magna

2 Next, the user types a message in the interface.

Enseguida, en usuario escribe un mensaje en la interfaz.

4 The message is broadcast via Bluetooth to nearby phones running Fluid Nexus.

El mensaje es emitido para otras personas utilizando FluidNexus en las cercanías a través de Bluetooth

phone

3 The message is saved in a database on their phone.

El mensaje es guardado en una base de datos dentro del móvil.

5 As the message is passed from one phone to another, it is passed from one person to another—a viral spreading.

En la medida que el mensaje pasa de un móvil a otro, la información pasado de una a otra persona-una distribución viral.

BIP!!!

6 ··· inf The message can be passed for as long as possible, potentially getting sensitive information out of a dangerous situation.

El mensaje se puede transmitir durante el máximo de tiempo, hasta posiblemente sacar información importante de una situación de peligro.
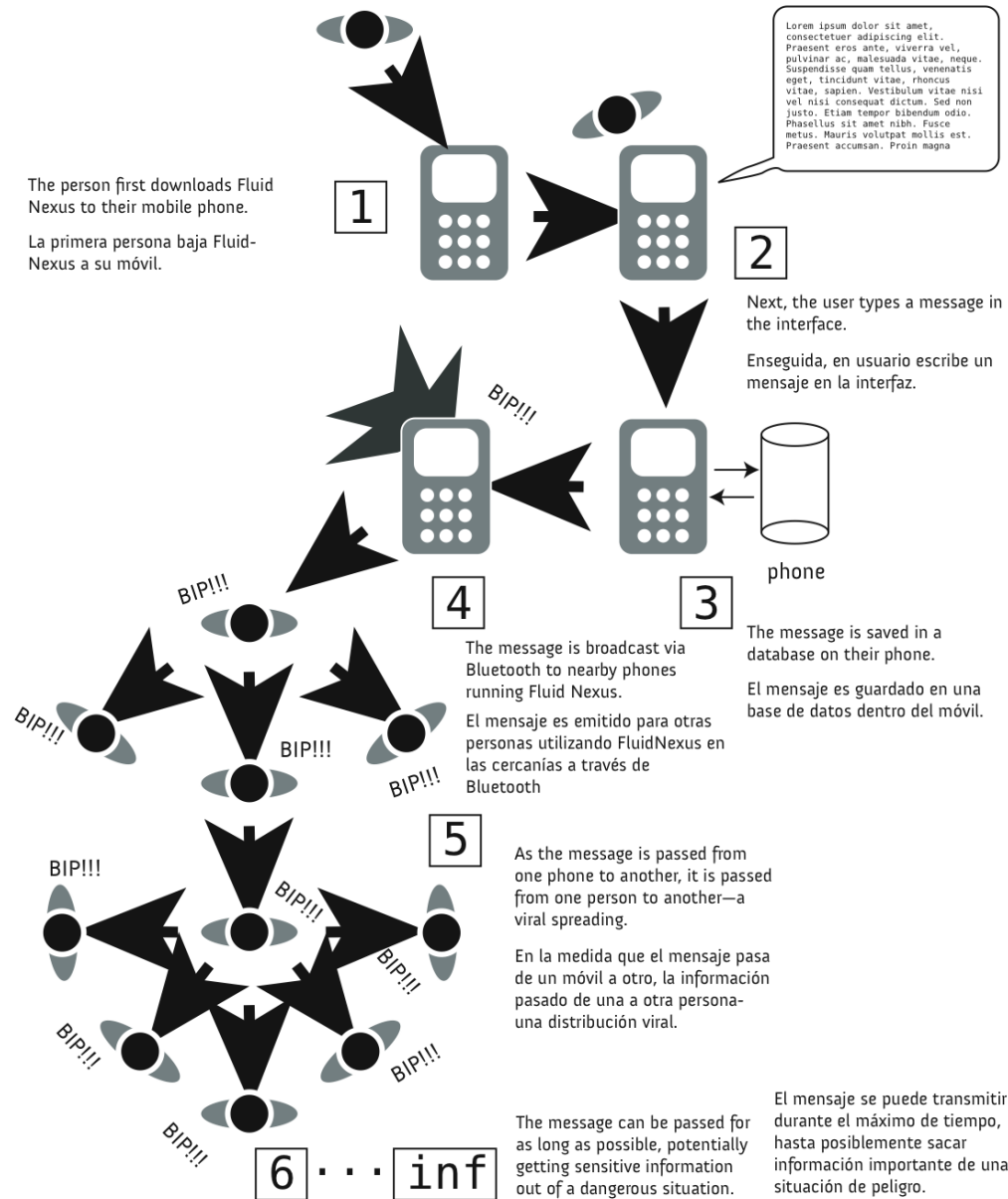
Figure 1—Fluid Nexus explanation

resentation of the network to function: it gets its strength from temporary links between people that disappear as soon as they are created. These ad-hoc connections do not necessarily have to correspond to real-life links between individuals; messages and data can transfer based on physical proximity instead of social relationship. People can therefore retain their identities without having to necessarily change their behavior to join the network. By displacing the stabilizing of the network, Fluid Nexus works to redistribute power over network individuation and protocol to those often seen as Other, providing a counter to centralized control of often-State-run infrastructure.

The technical details of Fluid Nexus are that it presently requires Nokia Series 60 phones that can run code written in the Python programming language. The choice of Nokia is merely based on expediency; Nokia phones are some of the most prevalent in the world, meaning that we can easily latch onto existing devices without having to create demand for new ones, an important consideration given the damaging effects of the extraction of rare minerals needed for high-performance electronics.[16] As well, Nokia phones provide a low-cost programming platform, without the need to purchase expensive devices and pay yearly developer's fees, such as with Apple's iPhone or iPad. We have in alpha form a version for Google's Android platform, but certain unnecessary technical restrictions made by Google prevents Fluid Nexus from being fully functional. Finally, we are working on a desktop version, allowing messages to pass between mobile

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[16]Jeffrey W. Mantz, "Improvisational economies: Coltan production in the eastern Congo", *Social Anthropology* 16, no. 1 (2008): 34–50.

phones, laptops, desktops, and back again, further increasing the reach of the network.

Fluid Nexus could of course be re-appropriated by the State for their own purposes, thereby reestablishing stabilized networks. However, we should not see the application as a kind of general solution, but rather a tactical move in a continual cat-and-mouse game. We have to regularly respond to moves of stabilization with counter-moves of fluidity and destabilization. The critiques of networks outlined earlier suggest a way of conceptualizing how discourse about networks directly transforms into questions of ontological politics that can consequently be mapped into operational questions of technology.

Fear of Networks

But perhaps the worry is not re-appropriation, but rather the prevention of this work happening in the first place. To end the paper I want to relate an anecdote that highlights some of the fears I have come across while trying to secure funding for this project from my home institution. As I mentioned earlier, this project was initially funded by the Medialab-Prado. When I returned to the US I attempted twice to get grants to continue the project. Both of these grants were denied; this is of course not a novel result. However, the comments by the reviewers make for troubling reading. The first reviewer wrote:

> The proposal's outcome of interest, changes in power, is also unclear—is
> power within the youth community of interest, or power of the youth com-
> munity versus external authorities? How is either sort of power to be mea-

sured? The technology developed by the authors seems a potentially signifi-
cant one, whose effects might be positive or negative; I can imagine it being
of as much interest to criminals or terrorists as to oppressed youth or revolu-
tionary democrats.

The second reviewer wrote the following, similar in tone:

A final question is how does such a technology stay out of the hands of orga-
nized crime, and other powerful folks wanting to work offline?

These comments are all the more strange given that academic research in peer-to-
peer or ad-hoc networking—the technical roots of the project—is extensive. So what is
the worry? Is it because of my specific political stance? Is it simply the fear of the un-
known? Is it concern over unintended consequences? Does it relate to a fundamental
misunderstanding of the technology, of technology's multistability? I am not sure. How-
ever, I want to note a couple of things. When making a presentation on this work to a
group of computer science researchers, many of whom do work in this area and receive
funding from the US Defence Department, I asked them if they had received similar ques-
tions regarding their work; they of course answered no. Recently, a professor from my
institution was awarded a major grant from the Defence Department to study teenage use
of social networks in order to create models of how "terrorists" might hide their activities
online; in his own words, "We're going to try and detect hidden networks within these
high schools under conditions in which we don't have to worry about the subjects trying

to hide".[17] And finally, activists protesting at the G20 meetings in 2009 in Pittsburgh, PA, were arrested for relaying police movements they had overheard on a police scanner over Twitter; remember that in the US at least, listening to police discussions over the public airwaves is legal. Nevertheless, after their arrest by local police, their apartment in Queens, NY was raided by the FBI. While the local charges have been dropped, the activists are still trying to determine the cause for the FBI raid[18]. These actions are all the more schizophrenic given the lauding by the US State Department of the use of Twitter during the protests in Iran in the summer of 2009.

I recount this anecdote to not only share information about the context of this research in the United States, but also to foreground the fear that is raised by alternative network infrastructures, in all of their abstractness. Recognizing that this fear exists suggests, to me at least, that investigating these different organizational and infrastructural forms remains a potent tactic in present times.

Acknowledgments

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[17]George Lowery, "Sociologist receives $797K to develop methods to identify terrorist social networks", June 11, 2010, `http://www.news.cornell.edu/stories/June10/TerrorismGrant.html` (accessed June 20, 2010).

[18]For more information see `http://friendsoftortuga.wordpress.com/`.

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