



Networks, Societies, Spheres: Reflections of an Actor-Network Theorist

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In one way or another, we are all in this room responsible for having given to the notion of network an immense, and some could say, a hegemonic extension.² Either because some of you have created the hardware or software infrastructure that has added digital networks to the already existing water, sewage, road, rail, telegraph, telephone networks, or because others, through media studies, sociology, history, political sciences, and even philosophy and brain science, have tried to capture what is so original in the new networky world generated by those new socio-technical assemblages. The reason I have welcomed the kind invitation of Professor Manuel Castells is that, because of the very extension of network (as a thing of the world as well as a concept), the time has come to check what it really means and maybe to shift somewhat its ambition and modify its real import. When a notion has become enshrined into a work of art like James Cameron's "Avatar" with the planet Pandora itself sprouting its billions of webby connections and the very notion of communication among the Na'vis and their creatures being materialized by a real plug-in of hair, tails, and manes, it might be time to stop and ask: "What have we done?"

I hope you accept that I include myself into this highly professional "we," not because I have contributed anything to the deployment of digital networks, not because I have studied the extension of the various sociotechnical systems of information and communication, but because, for about 30 years now, I have found in the notion of network a powerful way of rephrasing basic issues of social theory, epistemology and philosophy. Consider me, then, as a fellow traveler of the various network revolutions (if *revolution* is the word).

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² This talk was given February 19, 2010 at the end of the International Seminar on Network Theory "Network Multidimensionality in the Digital Age" organized at the Annenberg School of Communication and Journalism by Manuel Castells and Peter Monge.

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I am well aware that there is nothing more perilous than an after-dinner keynote, since the speaker is supposed to entertain the audience with witty anecdotes. I have chosen another tack: To make it more memorable, I decided to make it as earnest and as boring as possible.

In its simplest but also in its deepest sense, the notion of network is of use *whenever action is to be redistributed*.

This is well known in my field of science and technology studies. Take any object: At first, it looks contained within itself with well-delineated edges and limits; then something happens, a strike, an accident, a catastrophe, and suddenly you discover swarms of entities that seem to have been there all along but were not visible before and that appear in retrospect necessary for its sustenance. You thought the Columbia shuttle was an object ready to fly in the sky, and then suddenly, after the dramatic 2003 explosion, you realize that it needed NASA and its complex organizational body to fly safely in the sky—here is the hall where the disjointed parts have been assembled for the task force to inquire afterward into what went wrong (Figure 1). The action of flying a technical object has been redistributed throughout a highly composite network where bureaucratic routines are just as important as equations and material resistance. Yes, it is a strange space, that of a shuttle, that is just as much *in* the sky as *inside* NASA, but that's precisely the space—hard to describe and even harder to draw—that has been made visible by the deployment of network in my sense of the word.



Figure 1. The Shuttle Flies in Space and in the NASA Corporate Structure.

The same transformation has happened in epistemology. I borrow the following example from the great historian of science, Simon Schaffer: You believed Isaac Newton's *Principia Mathematica* (Figure 2) had been written in the complete isolation of a totally bodiless mind, and you suddenly discover that Newton was more like a spider in the center of a huge web that covered every possible type of witness carrying and sending information back and forth—these are maps of the world with the flags representing the precise spots from which Newton requested precise information (Figure 3). Here again, the notion of

networks points to a transformation in the way action is located and allocated. What was invisible becomes visible, what had seemed self-contained is now widely redistributed. Newton reaches the stars because he is also the center of a vast empire of information. Not because of an accident, as in the shuttle example, but, interestingly enough, because of the wide transformation in our worldviews that the very notion of network has introduced into the new history of science. The search for the production of object and of objectivity is totally transformed now that they are portrayed simultaneously *in* the world and *inside* their networks of production. This is the contribution of my field, science and technology studies, of which I am the most proud.

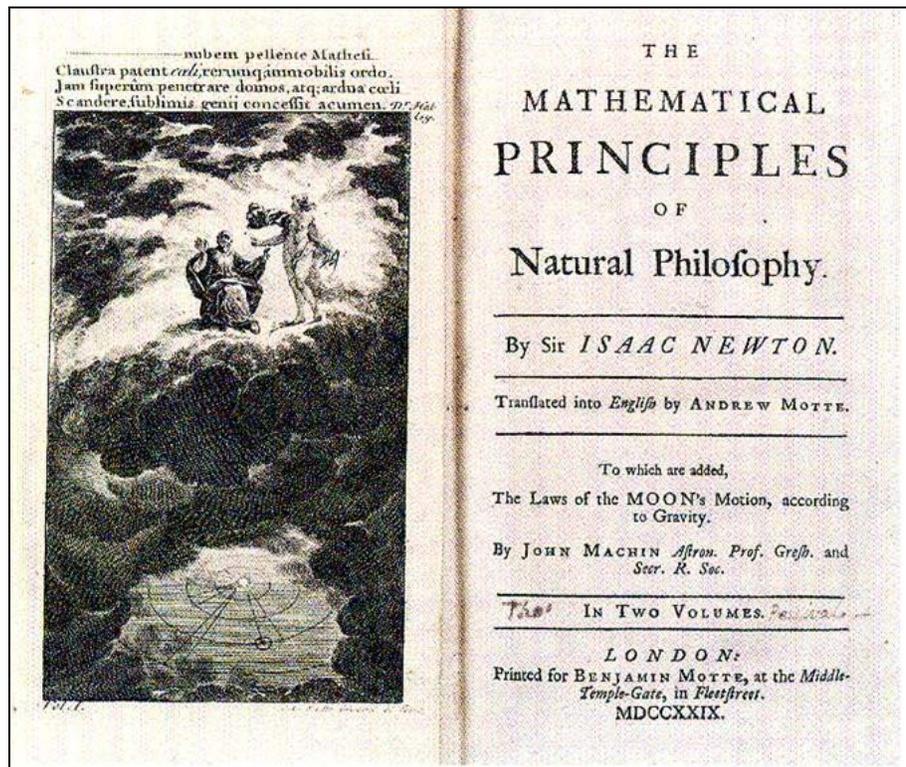


Figure 2. The First English Translation of
 The Mathematical Principles of Natural Philosophy (1729).

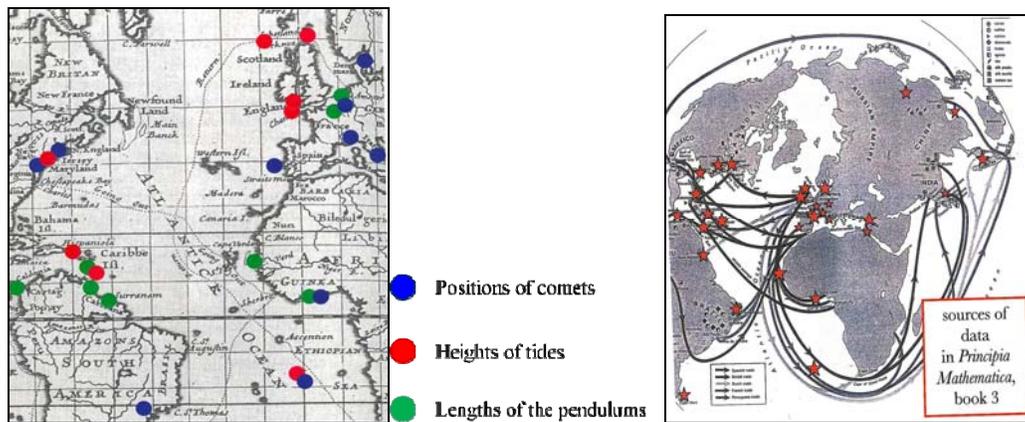


Figure 3. Source of data for Mathematical Principles. From Simon Schaffer, The Information Order of Isaac Newton's Principia Mathematica, Salvia Smaskrifter, Upsalla (2008).

You see that I take the word *network* not simply to designate things in the world that have the shape of a net (in contrast, let's say, to juxtaposed domains, to surfaces delineated by borders, to impenetrable volumes), but mainly to designate a *mode of inquiry* that learns to list, at the occasion of a trial, the unexpected beings necessary for any entity to exist. A network, in this second meaning of the word, is more like what you record through a Geiger counter that clicks every time a new element, invisible before, has been made visible to the inquirer.

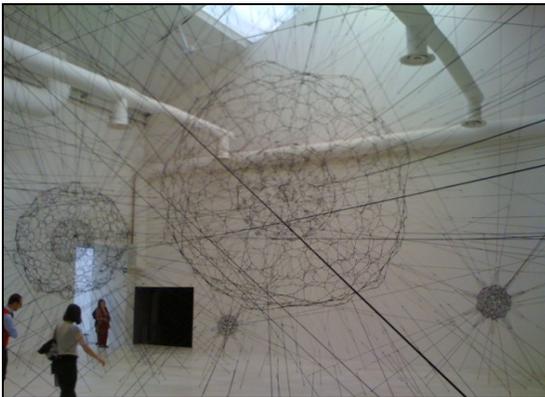
To put it at its most philosophical level (not a thing to do, I know, after dinner at night . . .), I'd say that network is defined by the series of little jolts that allow the inquirer to register around any given substance the vast deployment of its *attributes*. Or, rather, what takes any *substance* that had seemed at first self-contained (that's what the word means after all) and transforms it into what it needs to *subsist* through a complex ecology of tributaries, allies, accomplices, and helpers. (I chose the word *ecology* on purpose, as will be clear later). The shuttle Columbia was not an object whose substance could be defined, but an array of conditions so unexpected that the lack of one of them (a bureaucratic routine) was enough to destroy the machine; Newton's sublime system was not a self-contained substance, but a vast empire of information necessary for the system to subsist and expand. Whenever a network is deployed, a substance is transformed from an object into a thing, or to use my terms, from a matter of fact to a matter of concern. If we still want to use the term "network revolution," it is in that sense, I believe, that it can be said to be a revolution and clearly a *political* one.

The ability of the notion of network to follow this strange movement that goes from substance to attributes and back, as if you could follow the movement of a fan that one could choose to close or to deploy, is at the heart of this rather (in)famous social theory known as actor-network theory, abbreviated in the felicitous acronym ANT. By the way, I am sorry to say that what I mean by actor-network bears no

relation with the same term in Albert-Laszlo Barabasi's *Linked*, by which he means the league or the union of real actors from nearby Hollywood! No, alas, mine is a purely conceptual term that means that whenever you wish to define an entity (an agent, an actor) you have to deploy its attributes, that is, its network. To try to follow an actor-network is a bit like defining a wave-corpuscle in the 1930s: any entity can be seized either as an actor (a corpuscle) or as a network (a wave). It is in this complete *reversibility*—an actor is nothing but a network, except that a network is nothing but actors—that resides the main originality of this theory. Here again, network is the concept that helps you redistribute and reallocate action.

Now, this is where things become complicated and where the digital expansion given to information techniques is going to have huge and fascinating effects.

But before I review some of those effects, I'd like to introduce you to the work of the artist Tomas Saraceno, because he has offered a powerful view of how networks, spheres, and tensors could actually fit together (Figure 4). As you may know, one of the criticisms often made about networks (particularly by Peter Sloterdijk) is that they are extremely poor metaphors, since they remain entirely made of nodes and edges to which are often added some conveniently drawn potato-like circles. (I will come back to this impoverished visual vocabulary later.) To say that something is a network is about as appealing as to say that someone will, from now on, eat only peas and green beans, or that you are condemned to reside in airport corridors: great for traveling, commuting, and connecting, but not to live. Visually, there is something deeply wrong in the way we represent networks, since we are never able to use them to draw enclosed and habitable spaces and envelopes.



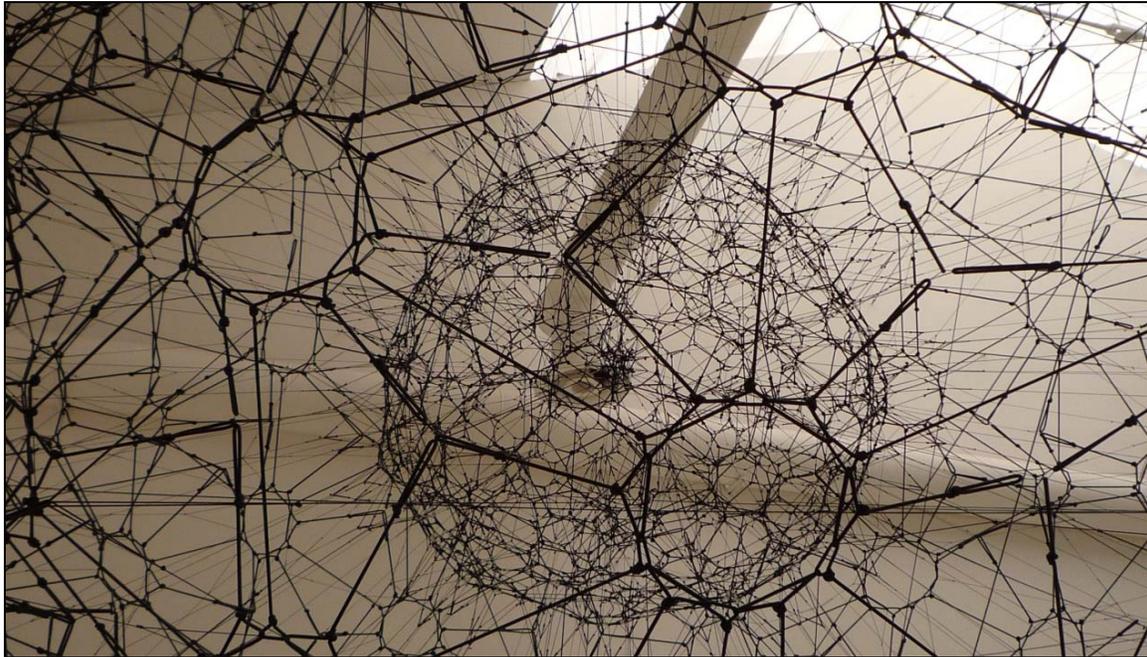


Figure 4. Art installation "Galaxies Forming along Filaments" by Tomas Saraceno, Venice Biennale, 2009. (Photos by author.)

Well, the great virtue of Saraceno's installation (this one in the latest 2009 Venice Biennale) is that he has managed to obtain comfortable and enclosed spherical sites which are nonetheless entirely made of networks. The trick, as you can see, is in changing the density of connections until a net ends up being undistinguishable from a cloth. And the work of art is even better because neither spheres nor nets are actually the real physical thing, which is made of elastic tensors carefully arrayed and fixed on the walls. A beautiful case of action being redistributed, since visitors are able to check for themselves (when there is no guard around, that is), by pushing or pulling a tensor, *what else* is moving in the whole array. Like his mentor Olafur Eliasson, Saraceno is one of those artists who is exploring, often more daringly than social theorists, visual possibilities where self-contained substances are captured with their attributes fully deployed. This is why they are rightly called "ecological artists." Is not ecology anything but the deployment of all the attributes necessary for any self-contained entity to subsist? To be self-contained—that is, to be an actor—and to be thoroughly dependent—that is, to be a network—is to say twice the same thing. As Gabriel Tarde (a figure to whom I will return) said: The reason why this is not common sense is because philosophers have been carried away by the verb *to be* and its problem of *identity* and not by the verb *to have* and the range of its *properties* and *avidities*. But the Web is changing all of that, and fast: "To have" (friends, relations, profiles . . .) is quickly becoming a stronger definition of oneself than "to be."

I am sorry to insist so much on the conceptual aspect of network, but this is because I found this notion useful long before it gained its new incarnation in real life-size nets, webs, and Gaia-like planets (like Earth or Pandora). What I have always found great in the metaphor of the net is that it is then easy

to insist on its fragility, the empty spot it leaves around (a net is made first of all of empty space), the subversion it introduces in the notion of distance (the adjectives “close” and “far” are made dependent on the presence of conduits, bridges, and hubs), but above all, what it does with universality: The area “covered” by any network is “universal,” but just as long and just where there are enough antennas, relays, repeaters, and so on, to sustain the activation of any work. Thanks to the notion of networks, universality is now fully *localizable*. In network, it’s the *work* that is becoming foregrounded, and this is why some suggest using the word *worknet* instead.

But what I like most in the new networks is that the expansion of digitality has enormously increased the *material* dimension of networks: The more digital, the less *virtual* and the more *material* a given activity becomes. Nowadays, everyone knows that there is no GPS without three satellites; collective games without fast connections; drones in Pakistan without headquarters in Tampa, Florida; bank panic without Reuters screens; and so on. When Proust could read a novel alone hidden in the shack of Combray, it was possible to say that his imaginary mental world was virtual, but we can’t say that of our kids who have to hook up their modems, buy game stations, swap disks and pay their server for a faster connection, with our credit card. Young Marcel could build castles in Spain for nothing; Now he would have to buy real estate on *Second Life* with hard Linden dollars. When Harold Garfinkel described the skills necessary to “pass” as a member of a society, you could say it was a totally intangible social phenomenon that could be only *qualitatively* described, but not today when every detail of your avatars on the Web can be counted, dated, weighed, and measured. Then you know that everything that before had melted into air has become fully incarnated. Go tell Google engineers that their vast arrays of servers are just virtual! This is probably the greatest and yet the least celebrated feat of your collective work—to have rendered fully visible what is needed to think and to imagine and to trust; to have taught all of us that those cognitive competences are now paid in hard-won bits and bytes—and have become, for that reason, fully describable.

To sum up: Whenever an action is conceived as networky, it has to pay the full price of its extension. It’s composed mainly of voids. It can be interrupted. It is fully dependent on its material condition. It cannot just expand everywhere for free. (Its universality is fully local). Networks are a great way to get rid of phantoms such as nature, society, or power, notions that before were able to expand mysteriously everywhere at no cost. As the study of metrology, standards, empires has shown so well, smooth continuity is the hardest thing to get.

I hope you now understand that if we accept talking about a network revolution, it is because of the coincidence between the conceptual notion of network (action is radically redistributed) and the rematerialization allowed by digital techniques. As a sociologist of sorts, I have been especially interested in what this revolution does to social theory. And what it does is truly amazing: It dissolves entirely the individual versus society conundrum that has kept social theorists and political scientists busy for the last two hundred years. To sum up a long argument: We have the social theory of our datascape. If you change this datascape, you have to change the social theory.

Why do we think that they are individuals who are “in” a society? Because of a *discontinuity in the available data*. When we gather statistics—and this is what social theorists have done for the last 150

years when they were not doing qualitative field work—the sheer difficulty of getting the data means that you are going to focus on the individual as little as possible in order to get as quickly as possible at the aggregates. Inevitably, you are going to begin to grant to those aggregates some sort of existence by themselves. This is where the notion of society is generated, a special way to grasp collective phenomena that Durkheim has defined by the term *sui generis*, or that you find just as well in the tired old cliché that “the whole is superior to the sum of its parts.” Once you are there, social theory is finished, sterilized for a whole century: You have parts, and you have a whole. And then the only remaining question is to find a possible solution to combine or reconcile the parts with the whole, a question which, as you know so well in this benighted country of yours, is not an academic one, since it throws people in the street—as the tea party movement demonstrates vividly enough. Self-contained individuals fight for a place in the self-contained society.

My claim, or rather ANT’s claim and that of the revisited tradition dating from the great French sociologist Gabriel Tarde at the turn of the 19th century, is that the very idea of individual and of society is simply an artifact of the rudimentary way data are accumulated (Figures 5 and 6). The sheer multiplication of digital data has rendered collective existence (I don’t use the adjective *social* anymore) *traceable* in an entirely different way than before. Why? Because of the very techniques that you, ladies and gentlemen, have brought to the world.

Expositions | Exhibitions

Reprise d'un débat Tarde - Durkheim | Remake of a Tarde - Durkheim debate

Partie 4
La place des individus et le rôle de la psycholo

Partie 5
Les relations du tout et des parties

Partie 6
L'illusion ontologique

Partie 7
Mystique et milieu social

Partie 8
Q'est-ce qu'une science sociale?

Fin

24:21 / 24:38

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Figure 5. The Tarde/Durkheim 1904 Debate Replayed in Paris.

From http://www.bruno-latour.fr/expositions/debat_tarde_durkheim.html

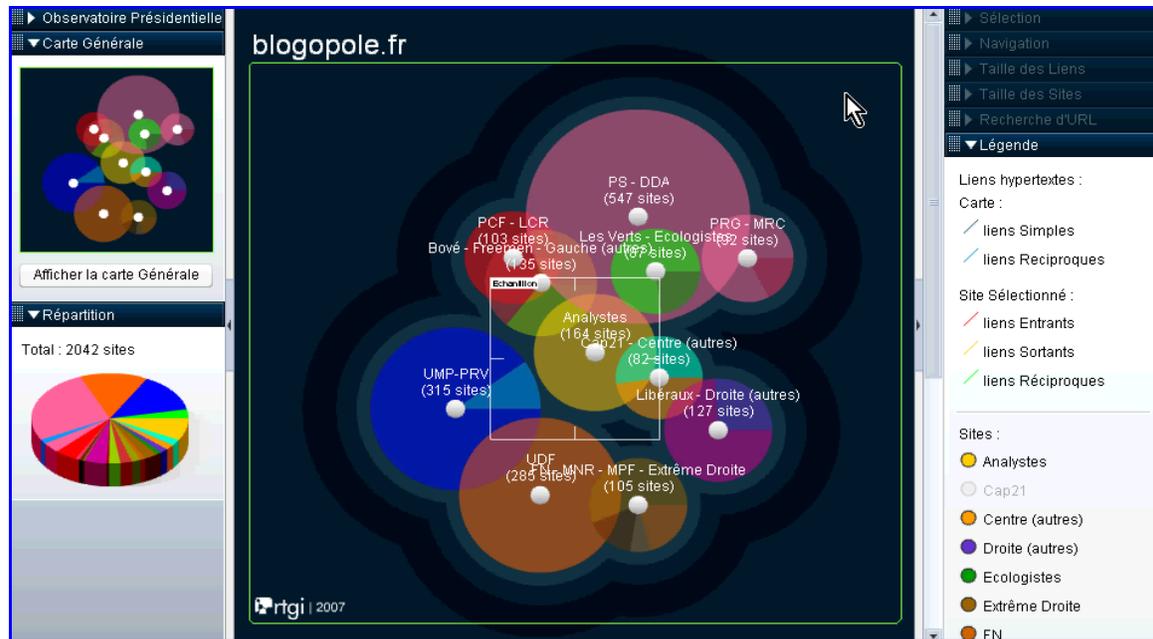


Figure 6. Map of the Blogosphere Built Around French Politics.
 From RTGI, now Linkfluence, <http://fr.linkfluence.net>

There is nothing easier now than to navigate back and forth from an individual profile to an aggregate of hundreds and thousands of profiles. But the whole novelty is precisely in the possibility of going *back and forth*. Before, in the old days of traditional statistics, these were exactly the steps that one *could not* easily retrace. Of course, you could in principle go back from a compiled questionnaire to the individual tick on the form, but the guy who had ticked the form has long disappeared—no inquirer could trace it back. Hence a *discontinuity*, a disjunction introduced in the traceability of the associations. The less you can go back to the individual transaction, the more tempting it is to give to the aggregate a substantial reality. But today, every one of us, because of the navigational movement made possible through the datascares on the screen, is able to reintroduce a continuity from individual contribution to the aggregates in a much more smooth way than before. (The experience is possible only in front of the screen; it's much harder to keep this focus on a piece of paper, and this is why it is not described so much.)

And what is the result of this new habit of navigating back and forth through datascares without stopping at either of their two end points? Well, the two extreme points at which the whole of social theory had solidly fastened their Big Questions—that is, the individual versus the society, who should take precedence, and how power is exerted from one to the other, and so on and so forth—begin to lose their undisputed privilege and even, after a while, vanish away. Instead of THE individual versus society problem, we are now faced with the multiple and fully reversible combinations of highly complex individual

constituents and multiple and fully reversible aggregates. The center stage is now occupied *by the navigational tools*.

I believe it is the unique and unexpected combination of, first, the datascares, second, the navigation skills acquired on the screen, and, third, actor-network theory, that has totally redistributed the classical arguments of a society made of individuals. It is not a small paradox that this alternative theory of the social had been anticipated a century ago by Gabriel Tarde, a keen connoisseur of contemporary statistics who had detected immediately in the project of his young colleague Emile Durkheim the danger of introducing much too fast a discontinuity between *two levels*: that of individual psychology and that of a *sui generis* society—and the perversity of their debate is that it is Durkheim, the one who invented the two-levels principle, who has been able to persuade his readers that it was Tarde who occupied *one* of the two positions, that of individual psychology, whereas Tarde had, on the contrary, denied that there were two levels and tried to bypass entirely the two end points of individuals and society. Needless to say, Durkheim won and Tarde lost, until, that is, the Web came in to vindicate him by offering at last, if I dare say so, a non-individualistic grasp on the individual!

The reasonable thing for me to do, so late at night, would be to stop there and to crack a few jokes to help you digest your dinner before having a sip of cognac. And yet, I cannot resist the temptation to explore further with you some of the odd consequences of this redistribution of action allowed by the concept of network combined with the development of digital datascares. I am afraid cognac will wait a bit.

Even though it seems commonsense to say that the whole is superior to the parts, a minute of reflection is enough to realize that this is due to the introduction of the *discontinuity* in data collection I mentioned earlier. You notice individuals reduced to very few properties walking or working in downtown Los Angeles; then you look at the huge skyscrapers that tower above them; and then it seems reasonable to say that “the whole is superior to the parts,” or that there emerge out of individual interactions many things that the individual had not anticipated. Possibly. But this does not mean that at some point the action of individuals has been taken over *ex abrupto* by some *sui generis* entity that could be called Los Angeles society. That is precisely the point that Tarde always objected to with Durkheim: We know from firsthand experience that this never happens. It does not mean that there is no society and only individuals (an accusation leveled at Tarde by Durkheim). Rather, it means that the two notions are the two faces of the same coin, and this coin has no more currency any more than a French franc.

To believe in the existence either of individual or of society is simply a way to say that we have been deprived of information on the individuals we started with; that we have little knowledge about their interactions; that we have lost the *precise conduits* through which what we call “the whole” actually circulates. In effect, we have jettisoned the goal of understanding what the collective existence is all about. Is it not strange to imagine a science of society making sure that its main phenomenon will be forever rendered impossible to detect and to document?

Now suppose that we benefit, thanks to digital techniques, from a vast range of information about individuals. Let us be careful here: By individual I don't mean the individual *atoms* deprived of most

of their properties and rendered fully interchangeable before they enter into “interactions.” Instead of those atomic individuals of the past, we now possess individuals for whom we are allowed to assemble *profiles* made of long lists of properties. Nothing is more common on the Web than this explosion of profiles willingly or unwittingly accumulated, stored, treated, and visualized. Until the digital techniques of capture and storage, many fields of social sciences, as you know, had been divided between qualitative and quantitative research (I am myself a qualitativist having done mostly field work). But individual profiles begin to seriously blur the distinction between the two sets of skills. Contrary to common wisdom, and exactly as predicted by Tarde, *the more you individualize, the more you can quantify*—or else we have to find another name than quantification to describe the phenomenon. (Is quali-quantitative a possible term?)

Why is it that the substitution of long and complex individual profiles to that atomic individual generates such a difference in the actor/system conundrum? Because when we begin to gather profiles, the very notion of *interaction* begins to wobble. The reason is that a given individual will be defined by the list of other individuals necessary for its subsistence. This is the reversibility of actor and network mentioned earlier, or that of substance and attributes. Every individual is part of a matrix whose line and columns are made of the others as well. To take the example not of downtown Los Angeles but of the recently rediscovered *Metropolis*, it would be easy to build a database where Freder Fredersen is defined as son of the Joh Fredersen, loves Maria, befriends worker “number 1255”, etc., and then to ask any good social network software to automatically permutate for you the positions so that Joh Fredersen will in turn also be defined as the father of Freder, the enemy of Rotwang and of Maria, etc., etc.

If we pursue this thought experiment, we realize that we have already solved (or rather dissolved) one of the classical problems of social theory: The reason why people said that interactions create phenomena *superior* to the individual social atoms is because they had *first* defined the atoms as self-contained entities *deprived of all the other entities* necessary for their subsistence. (They had failed to see actors as actor-networks.) Then no wonder that, when entering any interaction, those simplified and castrated atoms had produced unintended consequences: Too little was known about them in the first place! Strictly speaking, it is not true that there are *interactions* between individuals. Individual action is much too distributed to be defined in terms of *interaction*. This is one of the first strange consequences of taking seriously the notion of actor-network.

But the second consequence of gathering so much information about individual profiles is even stranger. The very notion of the *whole* begins to be deeply modified. What is a collective phenomenon once you deploy all the information you have about individual associations? It is certainly not something superior to the Web they form by sharing their profiles. What is it then? Probably something inferior, something *smaller than the parts*. This is what Tarde always objected to with Durkheim: The whole is necessarily less complex than the individual who makes it possible, provided, that is, you accept not to reduce individuals to self-contained atomic entities, but let them deploy the full range of their associates—which means, of course, that you need to have a lot of information about their profiles.

This argument seems bizarre only because we are used to the three usual metaphors that have been developed over the course of the centuries to talk about collective phenomena: (a) a society

overarching individuals—the organicist metaphor; (b) an invisible hand producing optimum out of simple-minded atomic calculators—the economic metaphor; or (c) an emerging structure—the auto-organization metaphor. All of those start with atomic individuals and imagine a second level where the collective phenomenon takes over. But it might be the time to imagine other metaphors where there is only one level, where the parts are actually bigger than the whole and where a phenomenon can be said to be collective without being superior to individuals. A better metaphor would be the one that would rely, for instance, on the ways in which standards circulate through the net, or fashion, buzz, epidemics—that is, just the sort of things that are now easy to detect, to follow and to visualize with the new digital tools made available (Figure 7).

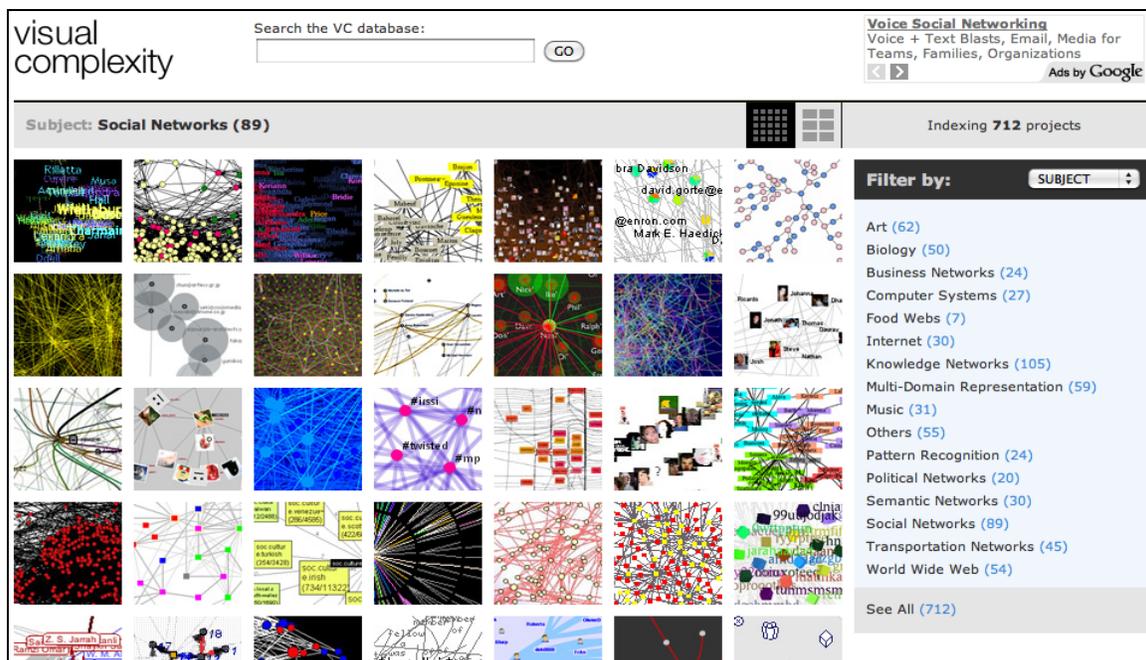


Figure 7. Network Datascape Illustrating Phenomena In Which Both the Collective and the Individuals Are Dissolved. From <http://www.visualcomplexity.com/vc>

You are going to tell me that this kind of information on the building of downtown Los Angeles that I took as my example is totally inaccessible so that my thought experiment is just that—a thought, not an experiment. Maybe, but it is not the same thing to say that because of a lack of information we speak *as if* there was a whole superior to the parts, or to say that the great problem of social theory is to “reconcile the actor and the system.” What is shut close with the second formulation is wide open with the first. And I could add that there exist many sites where we *do* have this information, for instance, in the artificial worlds of SimCity, or, even more tellingly, in the many efforts of interesting radical architects,

planners, and builders to devise digital platforms to resolve the question of collective or participatory design.

There is something always fishy, and I believe deeply wrong, in the idea of a whole superior to its parts. I always have the feeling that we have not moved much from Menenius Agrippa's famous simile of "The Members and the Belly." Remember Shakespeare's *Coriolanus*. If you accept the notion of organism as something different or superior or even emerging, you lose what an organization is (and, I would add, you ruin the possibility of doing politics). A phenomenon may be collective without being social.

The reason I insist on this farfetched argument is that it opens a much more interesting collaboration between sociologists and, for instance, biologists fighting against the equally misleading notion of an organism (organizations and organisms share the same paralyzing social and political theory), or between sociologists and neuroscientists. Since there is no conductor, nor homunculus, nor *sui generis* society anywhere, we might be able to collaborate more effectively by following the right conduits through that which appeared before as a whole *above* parts but is actually a part, *primus inter pares*, so to speak, that traverses *through* the parts. The problem is the same in a brain, in a body, in a city. Yes, networks are everywhere, but not quite in Barabasi's generalization of a world made of links. Rather in the neo-Leibnizian meaning of the word that Tarde had resurrected under the name "monads."

There is something actually very bizarre in the attempts to apply models borrowed from natural sciences to social phenomena. Too often, physicists or biologists try to make individual human atoms just as simple-minded as atoms in physics or ants in entomology. Now, I have nothing against models (in our médialab we are actually trying to model Tarde's idea of a whole *smaller* than the part society). But is it not strange to claim to imitate the natural sciences while doing just the opposite? What is so striking in human societies is how much information is available on *individual* profiles, so it is a bit silly to say nonetheless that we should start with *interchangeable* atoms. A reasonable and apparently fully scientific way would be to seize the opportunity offered by the mass of information now available. And yet, what is done instead? The humans (on which masses of information are available) are treated as atomic morons on which as little as possible is known, by endowing them with as few rules of behavior as possible, so that they generate through their "interaction" (a loaded term, as we just saw) as complex a structure as possible.

And all of that in the name of imitating, for instance, the study of ants (I mean the real ones, not ANT!). But when entomologists made the startling discovery that they could explain the building of elaborate structures such as the anthill *without* relying on any notion of superorganism, this is exactly what should be done with human societies. With this important difference: that humans dispose of billions of neurons and not tens or hundreds of thousands like social insects. So, what does it mean to really *imitate* the natural sciences? Is it to start from humans with billions of neurons about which we possess elaborate profiles in huge databases and then strip them bare so that they end up looking like ants? Or is it to do exactly as has been done with ants, that is, get entirely rid of the notion of superorganism and even of that of two levels, and to try to see how those monads manage to build elaborate structures without ever relying on a whole superior to the parts?

The true digital revolution in social theory is to open a way whereby it is possible to study the individuals and their aggregates without relying at any point on two levels, without accepting any discontinuity where the individual action disappears mysteriously into a *sui generis* structure. I really believe, that if we succeed in doing this, we will achieve for human societies discoveries just as revolutionary as what has been done with insect societies—and without in the least looking reductionist, since we will not have to commit the rather silly mistake of discarding all the available information to limit humans to ants or atoms just because physicists and biologists like to have masses of interchangeable elements for their models. Why not try to move from complexity—the parts—to simplicity—the whole—instead of doing the opposite? Since the information is here, why not use it?

Actually, there are good reasons for *not* using it, and I will end this lecture with two of those, just in case you find yourself too excited about the prospect I am offering you . . .

The first is the one I alluded to earlier: The mass of data available is accessible through an incredibly poor visual datascape. Actually, the word *datascape* is somewhat of a misnomer. It is not a pleasant landscape, but rather like watching lines and lines of barbed wire. How tiring it is to ponder click after clicks all those nodes and all those edges and all those potato-shaped lines. When Tarde predicted, a century ago, that when statistics would be really good, social phenomena would be as pretty and easy to look at as “the flight of a swallow”, how disappointed he would be to look at the anemic spaces of the Web. It is called “visual complexity,” but it is actually not complex at all, nothing at least like the sight of a flying swallow... Poor and boring and, even when agitated by flashy and sexy moving gadgets, it is just as informative as the reading of tea leaves. I don't want to sound too impolite, ladies and gentlemen, but I think you could do much better! The whole world is expecting from you visual instruments which are at the level of the extraordinary transformations brought about by the traceability of collective phenomena and compatible with our very efficient visual skills. It took about 80 years for statistics to become a vocabulary for doing social sciences. We should be able to speed up the time necessary to transform the mass of quali-quantitative data into agreed-upon and comfortable-looking datascares. Which, of course, means that we should be able to solve the question of compounding masses of individual profiles in a fully reversible way, which is exactly what traditional statistics have not been able to do.

Now, the difficulties of realizing those major transformations in visualization and computing are compounded by another even more formidable challenge. We should be able to navigate through datascares which are not only visually coherent, but which are also able to follow controversies. This is what I call solving the Lippmannian problem (that problem that Walter Lippmann addressed so well in his masterpiece *The Phantom Public*). The social theory question of bypassing the individual versus society is exactly paralleled by the *epistemological* question of obtaining authority while bypassing the distinction between rational and irrational voices. It is actually twice the same problems and this is why their connection is at the core of ANT. The recent climategate fracas is a good case in point: How do you map the controversy around the evolution of climate without resorting either to conspiracy theories or to the positivist narrative that Earth's climate speaks *directly* to the GIEC's scientists, much like Eywa speaks to the Na'vis? Two types of fundamentalisms which are fiercely opposed because they resemble themselves so much: a self-contained authority that would need no network of attributes to be sustained? So much talk about sustainable development and so little attention given to what makes argument sustainable!

I have been directly engaged in this last question through the 15-year development of a course called "Cartography of Scientific Controversies," and a now-finished European project call MACOSPOL to try to develop a platform for making comfortable for scientists and users of scientific data the navigation through controversial datascares. If I wanted to dramatize somewhat the general problem we all face, I would say that what we have to do is to reinvent the newspaper in a completely new form. (This is why Lippmann's wisdom is so important.) If it is true, as many historians have shown, that there is a direct link between the invention of the newspaper and the possibility for citizens to *articulate* political opinions, and if it is true that the old newspaper appears retrospectively as a *platform* connecting heterogeneous data, then it is extremely urgent to reinvent a platform no longer on paper but in the newly rematerialized world of digital datascares. Digital democracy has generated a lot of hype, but I believe, as many of you here, that its true development is still to come and that it will be necessary to invest also, in no small part, in the theoretical import of the notion of network, as this conference proposes to do. When Lippmann said the public is a phantom, this was not a way to say it does not exist, but, on the contrary, a plea—and a somewhat desperate plea—to make it *appear* through the invention of the right tools.

It is only because of the importance of the task at hand and of the seriousness of the challenge that I have taken the liberty tonight of submitting to you these remarks on the theory of network, fully conscious that you know infinitely more than me on those various challenges, but equally conscious that not one of them can be met without a collaboration between many various fields, including philosophy. Thank you very much, ladies and gentlemen, for your patience.