

Médialab stories: How to align actor network theory and digital methods

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journals.sagepub.com/home/bds**Dominique Boullier**

Abstract

The history of laboratories may become controversial in social sciences. In this paper, the story of Sciences Po Médialab told by Venturini et al. is discussed and completed by demonstrating the incoherence in the choice of digital methods at the Médialab from the actor network theory perspective. As the Médialab mostly used web topologies as structural analysis of social positions, they were not able to account for the propagation of ideas, considered in actor network theory as non-humans that have their own agency. The main arguments in favour of the ‘more continuous social’ developed at the Médialab (quali-quant, following the actors, zooming) proved to be as misleading as the network metaphor. The distribution of agency that actor network theory so successfully expands was paradoxically reduced to structures and individual preferences, to the detriment of the agency of replications that circulate entities in the form of messages, content or memes, and that should now become the next step for actor network theory-style digital methods.

Keywords

Digital methods, actor network theory, quantification, agency, replications, web studies

The time for reviews has apparently come for Sciences Po Médialab (Venturini et al., 2017). It would be useful for equivalent programmes to take note, after the recent years of exploration where we found ourselves caught up in a dynamic, a conviction that digital technology was changing the way we do social science. ‘Do’ is the operative word here, and this paper will focus on one of those laboratories and institutions that have actually made some use of digital techniques for various empirical purposes, rather than on those that have analysed the digital transformation, even if the two sometimes overlap.

This is a way to emphasise the limitations of the Médialab experiment, since many other labs and projects have tried to address the same issues in their own way.¹ But it will also teach us a great deal about what is at stake, including the place of actor network theory (ANT) in all social science approaches, along with how it has been used and how it could still be used.

The digital programme at the Médialab was supposed to be driven by an ANT conceptual framework, but I will argue that it got twisted in such a way that no coherence could be found anymore. Four points that

have sometimes been used as ‘elements of talk’ when presenting the Médialab will demonstrate these various twists: the quali-quant approach (labelled ‘continuity in data’ in the paper), the ‘follow the actors’ and assemblage requirements (labelled ‘continuity in methods’ in the paper), the zooming effect (labelled ‘continuity in theory’) and finally the ‘network’ misunderstanding.

My claim,² here, is that the Médialab tried to design new digital methods that could be aligned with ANT principles. However, by adopting mainly topology methods (first on the Web and then on textual data sets), it ended up promoting another point of view, that of structural effects, despite all the claims made against them in the ANT literature. The traceability of digital entities nevertheless allows us to develop

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what I call a third generation of social sciences, which would match the initial programme of ANT.

‘Quali-quant’ or ‘computability’?

The inaugural discourse at the birth of the Médialab was entirely based on the concept of ‘quali-quantitative methods’ coined by Venturini et al. (2015). Their more recent paper in this journal (Venturini et al., 2017) advocates the continuity in data allowed by the combination of qualitative and quantitative methods in the digital world. Yet this continuity seems to be challenged by the impossibility of using raw traces and second-hand data such as this recent paper acknowledges. ‘To be exploited in research, digital data need to be detached from their original contexts and refitted for research. Such “repurposing” work (Rogers, 2013) requires significant efforts and specific expertise’ (p. 3). This should be the first step towards the acceptance of discontinuity for the sake of computability. But the conclusion of the section in the paper is still praising the continuity that digital data allows: ‘Digital data are not necessarily more abundant than their predecessors and they are certainly not cleaner or cheaper. They are, however, more evenly distributed across the span of collective existence of which they therefore offer a more continuous appraisal’ (p. 4). This is not adequately demonstrated since the conclusion, albeit quite realistic for anyone digging into this magma, is the following: ‘Exploiting the ENB traces demanded therefore an extensive work of cleaning and refining that ended up occupying most of our project time’. Which means not so many results apart from the design of a clean data set! However, the emphasis was maintained on the continuity between qualitative and quantitative data and not simply a mix of previous methods. A careful examination of projects and papers produced during this period reveals:

1. a very difficult combination of the two methods;
2. an awkward use of digital methods for qualitative purposes more than for quantitative ones, through the use of visual evidence of clusters;
3. more critical, from an Science and Technology Studies (STS) perspective (Callon et al., 1986; Collins and Pinch, 1993), this quali-quantitative motto contributed to an underestimation of the requirements of quantification that are encapsulated in digital methods as well as the absolute discontinuity that they entail when looking for computation as a part of the method.

Let us document each of these issues one by one.

1. The prevalence of ethnographic methods (i.e. qualitative) is well known in ANT publications,

even though network analysis for scientometric purposes was frequently used in the work of Callon et al. (1993). For unspecified reasons, this trend declined at the very time that new digital methods emerged and could have reinforced the methods. At the inception of the Médialab, one of the main activities consisted in training students in controversy mapping, a method designed by M. Callon and B. Latour at the Ecole des Mines long before the Médialab existed. Scholars as well as students of controversy mapping courses (Yaneva, 2012) followed the basic instruction to conduct ethnographic field surveys. Yet while the didactical virtues of these surveys are undeniable, they also pose problems of control, validation and restitution. Efforts have been made to develop relevant visual and narrative formats, and this is certainly an approach that is very consistent with the ANT tradition. In most of the controversies, however, the burden of thorough quantitative work is not worth the investment for students and even scholars: the ‘quali’ part clearly outweighs the ‘quanti’ one.

In some of the Médialab’s work on climate, it has also attempted to apply this method in a much less systematic way, and the result has been a serious loss in the qualitative part, as the authors acknowledge in the 2017 paper:

Despite their accuracy, the Earth Negotiation Bulletins filter out most of the details of the real interaction (which may disappoint the anthropologist, historian or analyst of political discourse for example). This simplification is precisely what makes this document particularly suitable for computer-supported processing. (UNCC report)³

2. In these works, the quantitative part of the method was often delegated to the topology of networks, where decisions of weighing arguments or positions are made but are rarely helpful to generate an interpretation other than in terms of ‘positions’ and ‘communities’ – not really the kind of result one expects from an ANT framework. This was the case of one of our personal studies at the Médialab, on ‘the web of books’ (Le Béhec et al., 2018), where the disconnection was complete between a very long qualitative exploration of reading practices, and the topology of more than 5000 websites related to books. This kind of calculation that is required to tell a story of alliances (of actors) or of semantic proximity (of topics) operates all too often like a black box and does not allow the hypothesis to be tested in a robust way.

Quantification, in the Médialab's early days, was most often seen through the lense of graphs. For instance, in climate change research (EMAPS, MEDEA, UNCCC projects), a thematic space of negotiation was designed using co-occurrence methods, based on blocks of text surrounding key words. But the issue that was addressed was limited to the opposition between mitigation and adaptation strategies for climate change as well as their distribution among the texts and the countries. The use of the graphs (using Gephi, a constant resource at the Médialab) to demonstrate the topology of keywords does not lead to a real ethnographic investigation. It must nevertheless be noted that datasprints managed to involve climate experts to validate the classification work in a kind of reversible process of immersion (in this case, the observed become immersed into the data world of the observers).

3. The quali-quantitative motto may, moreover, become misleading with regard to computability. When one phenomenon either appears in the form of numbers or is converted in quantitative indicators, the continuity disappears since calculation requires discretisation, even though it looks blurred in fuzzy logic algorithms, for instance, or highly granular in Leibniz's infinitesimal calculus. For that reason, classification is as critical in computer science as categorisation is in social science. It introduces discretisation into a living experience, that is, of course, continuous and analogous.

Digitisation does not work without discretisation and discontinuity. Moreover, as Turing (1937) argued, the computability of problems should be assessed by decomposing them into simple operations. And the assessment of the classes of complexity (Church-Turing, Kolmogorov, Vapnik Chervonenkis dimension) of these problems will lead to conclusions about their tractability or untractability. This is a challenge that the social sciences in general, and the Médialab in particular, did not take up. The choice was made at the Médialab to rely first on web topologies that are built upon centrality scores, for a simple reason: Gephi. Gephi delivered powerful visualisations that allowed non-computer scientists to manipulate data directly, thus contributing to the fake sense of continuity from data to interpretation ('a cluster is a community'). And Gephi was the main software used in almost every project because one of Gephi's lead developers, Mathieu Jacomy, was hired quite early on at the Médialab, as part of a collective connection to the University of Technology of Compiègne where many members (including me) were trained by Franck Ghitalla, the pionner of Web topological analysis in France since the year 2000.

The graph method was extended to texts only recently with the help of computer scientists and their dedicated text analysis platforms (CorText developed by Jean-Philippe Cointet, who joined the Médialab in 2017; see Poibeau et al., 2014). These recent methods now offer a large opportunity for quantitative validation of corpora, but this was not previously the case, since no trained statistician was available within the Médialab's team. This should not come as a surprise since ANT as such was not situated within the framework of the digital era of quantification, for the methods adopted were primarily ethnographic, qualitative and casuistic, based on unique and uncomparable case studies. The coupling with computation has been tried several times, for instance, via scientometrics with the Candide software – a very interesting attempt to equip the analysis of the linguistic material of scientific texts (Callon et al., 1993). Its extension in the Réseau-LU software was also promising but unwieldy. The uniqueness of observations and accounts is strongly supported in ANT publications, but it comes at a cost: the impossibility of comparison between quasi-similar cases and therefore the non-computability of all the problems that are investigated. This is something that Venturini acknowledged in his programmatic paper on controversy mapping:

Of course, this will make interpretation more difficult. Of course, this will complicate the work of representation. Of course, this will slow down the construction of a shared cosmos. Still, there is no other way to make such construction a democratic enterprise, no other way to ensure that all actors and networks have a fair possibility to participate.

And citing Latour: 'The burning desire to have new entities detected, welcomed and given shelter is not only legitimate, it's probably the only scientific and political cause worth living for' (Latour, 2005: 259; Venturini, 2010). As we can see, this political motivation for qualitative emphasis on detecting new entities is very difficult to challenge in terms of comparability and computability for more robust accounts. Yet in the same paper (Venturini, 2010), he was able to detect the flaws of this approach when advising scholars about controversies:

Avoid boundless controversies. Controversies are complex and, if they are lively and open, they tend to become more and more complex as they mobilize new actors and issues. When selecting your study case, be realistic and resource-aware. Mapping huge debates, such as global warming or genetically modified organisms, requires huge amounts of time and work. As a general rule, the more a controversy is restricted to a specific subject, the easier will be its analysis.

This should be a kind of late STS enlightenment: your methods will shape your standpoint and you must control them and be sure the problems you are addressing remain tractable. It is exactly the same recommendation as Turing's, about complexity, and it means accepting the need to draw boundaries, in other words, discontinuity.

The quantitative limitations of the Médialab's research were in fact 'by-design' since the continuity protocol in line with ANT traditions makes computation almost impossible. This raises the issue of comparison within the ANT approach, as a first step towards quantification. As Glaser and Strauss (1967) put it in their recommendation for a 'continuous comparison': 'describe, label and classify the entities under observation so that they become comparable in other social settings'. Comparison is clearly not a basic qualitative requirement in any ANT field work, and this widens the gap with computability issues for the privilege of continuity against discretisation.

When 'carbon copy' means capturing the 'whole' of the social

The methodological preference for an extension of dimensions is advocated in the paper (Venturini et al., 2017) in order to counter the limitations of the quanti and quali division, for the sake of 'navigation', to reconstruct 'continuity in methods'. Yet the way it is expressed signifies, to some extent, a very specific view of 'navigation':

the discontinuity between the two types of methods generated a blind spot in our vision. We can glance at the global picture and examine each piece of interaction, but we cannot observe how the puzzle of collective life is put together. (Venturini and al., 2017: 4)

Looking for the way in which the puzzle of collective life is assembled seems to be the Grail of social science, yet it focusses precisely on what scientific knowledge cannot capture, due to its analytical methods, even though they seem to be as continuous as possible. This 'God's eye view' ('how the puzzle of collective life is put together') sounds rather strange in a supposedly non-modernist approach such as ANT (Latour, 1993). When digital traces were made available in large volumes and high granularity, the Médialab appeared to be the device provider that would help navigate in a seamless world. 'Situation' and 'aggregation' were presented as two contrasting requirements that were generated by the 'traditional research protocols', and digital methods would make it possible to go beyond that opposition. The confusion came from the term 'navigation'. From the opportunity

to explore the different scales of digital networks (not mentioning the zooming problem that we shall discuss later), the protocols moved towards an accumulation of 'the whole set of data' thanks to the granularity of the digital tools, even though the 'whole' has been disqualified as a fictitious entity designed by structuralist social scientists (as we demonstrated in the paper 'The Whole is Always Smaller Than Its Parts', Latour et al., 2012). The unlimited proliferation of websites and then of texts was related not to calculability issues (even though they were encountered most of the time) but to the search for all relevant features that could play a role in the assemblage (the aforementioned entity detection). And this quest (to expand the detection of entities or mediations) became easily transcribed as an infinite expansion of observations that came close to Geertz's 'thick description', despite the preventive disclaimer of ANT's authors against this influence.

In fact, the work carried out along the lines of the topologies that initially constituted the Médialab's core activity, made this artefact of an ideal correspondence between real life and digital traces possible. Gephi's software and topologies encapsulate a description of the social world in terms of positions and nodes immediately qualified as actors, by a daring shortcut. This leads to the theme of the web as a 'carbon copy' that was actually one of the first 'talking points' forged by Tommaso Venturini, and that is still dissiminated in recent papers, despite my early criticism: 'Digital mediation spreads out like a giant roll of carbon paper, offering the social sciences more data than they ever dreamt of' (Venturini and Latour, 2017). It generated a lot of confusion that has been resolved only occasionally by recourse to the vigilant digital methods of Rogers (2013) and Marres (2017), where the formatting power of platforms is taken into account. The interpretations were, however, rapid or even immediate in terms of social proximity or hierarchies between clusters or between nodes, promptly translated into social actors, groups or communities. 'Carbon copying' thus produced a very surprising digital positivism for researchers trained in STS. Later, the Médialab did its own aggiornamento by studying limited corpora such as climate reports (as mentioned in Venturini's paper) yet still reproducing a structural approach to actors' clusters and topics, as we mentioned previously. The empirical shift was wise; the disconnection with the conceptual stakes more problematic.

This twist from 'navigation' to the 'carbon roll of society' should not be all that surprising, even though it can lead to Borges' ideal map on a 1:1 scale. The concern for the reductionist effect of scientific methods in social sciences has always been evident in Bruno Latour's books and became a target of his early manifesto 'Irreductions' (Latour, 1984). The narrative

method that requires one to ‘follow the actors’ was dedicated to this irreductionist strategy in which all intermediaries of any kind may play a role in a given situation and become mediations, albeit only after careful examination. This led to a radical change in the focus of fieldwork and produced wonderful pieces of ethnography. However, the process was converted in many academic works into completing a list of entities that may contribute to unique ‘assemblages’, a term widely used especially in ANT English-speaking communities, even though it is largely dismissed by many scholars. Looking for ‘wholes’ was considered to be an old-fashion illusion in our paper (Latour et al., 2012), especially when it comes to its holistic version that states the agency of these wholes over individuals, as Durkheim (1897) did. However, the systematic emphasis that ANT puts on the mediations, on each of them, on their particularity, on the fact that any of them may play a role in the emergence or the maintenance of any social phenomenon, seemed to authorise many empirical studies to consider the assemblage of mediations as a kind of ‘whole’ of its own, in contradiction with the emergentist approach of networks in ANT. This was amplified by the digital promise of access to all kind of traces without any limitations of storage, granularity and so on, to the point of obtaining a ‘carbon copy’ of the social.

In my opinion, this refusal to accept reductions, to emphasise the access to both aggregation and specific situations, was the source of the misunderstandings that led to the digital programme of Sciences Po’s Médialab. This means no official acceptance of classifications, of reduction of dimensions, or of any analytical approach, which is another way to seek the ‘whole’ – albeit a more dynamic one than that of the classical social sciences – and to ignore the ‘curse of dimensionality’ (Bellman, 1961).

This appeared once again when Venturini et al. (2017) expressed their ‘disappointment’ with the data collected on Twitter for the investigation of climate negotiations: ‘They (the tweets) allowed us to extract the general agendas pushed by different countries (and their reception by the media), but not to follow the negotiation dynamics’ (Venturini et al., 2017: 4). When the authors look for the dynamics of negotiations, they look for understanding the ‘whole’ of the process or the very moment when the social makes new forms emerge, that is, an agreement. It seems rather strange to take Twitter as a source of data for this purpose, as if it could work as a ‘carbon copy’, since the issue of climate negotiation cannot be dealt with from this high-frequency source but more from very structured data sets of texts that are very well delimited as a ‘whole’ and highly familiar to people working on negotiations through their proceedings. On the other

hand, other questions and other processes could have been identified on Twitter, and primarily on Twitter, such as the circulation and emergence of categories, terms or ‘issues’ that show the public dynamics of a discussion or a conversation, acted on by these circulating entities.

This would then be a departure from the scientific and political objectives of the planned research on climate, but it would undoubtedly be more interesting for ANT than the overall agreed-upon picture of negotiations stemming from a structural analysis of the official climate talks. This pleads in favour of a clear understanding of the opportunities afforded by digital traces embedded in a specific socio-technical environment. It should make us think about the necessary alignment between concepts, theoretical choices, questions, methods, indicators, data and sources. This entire chain, very familiar thanks to the achievements of STS, has to be scrutinised each time a ‘digital method’ choice is made in order to avoid incoherence in the alignment. Unfortunately, this requirement does not appear in the checking list recently published by experts on digital methods (Venturini et al., 2018).

Another platform was, however, developed at the Médialab, the ‘Law Factory’ cited in the article mentioned above, that demonstrates the lack of alignment in the reverse way. The Médialab was looking at Twitter for the wrong reasons and missed its main added value, but in this other case of the ‘Law Factory’, the platform that was designed offered new opportunities to be more ANT-compliant but its actual use went back to very traditional social science protocols. The ‘Law Factory’ consists of time tracking devices that can be used to monitor changes in amendments and legal texts in the French parliament. This makes total sense in relation to ANT, or even for scientometrics, yet is never presented as a radically non-structural point of view. In fact, the emphasis is put on correlation studies with the properties of the authors of the amendments, for example. When the authors imagined the possibility of tracking down each amendment of a bill within the parliamentary system, they labelled this research qualitative. ‘Both qualitative and quantitative methods seemed unfit for the project. We could have dissected the parliamentary journey of a few bills to examine their transformation, but how to know if findings could be generalized?’ (Venturini et al., 2017: 5). This is a strange concern when most of the fieldwork done in ANT studies generates only single case studies, without any comparison, due to the requirement of ‘following the actors’. However, the system that the Médialab designers and partners built affords enough opportunities to compute the transformations (or replications) of thousands of bills and their power to produce associations among law makers,

for instance – provided the research focus moves towards the agency of these bills and does not get stuck in the traditional agency of law makers. This is why the qualitative/quantitative or situation/aggregation framing of the changes brought in by digital methods is of very limited interest if there is no concern for the agencies that are tracked down. It looked like a very ontological discussion while ANT was more oriented towards a pragmatist approach. The ‘whole’ and ‘parts’ distribution should rely only on the kind of distribution of agency generated by the choice of methods when collecting data (which means not carbon copying the world but introducing reductions that can be accounted for). Not only ‘following the actors’, but accounting for the instruments that help social scientists follow the actors and detect them.

The ‘zooming effect’ as a positivist view of data

Another major purpose of the digital methods used at the Médialab was the extraction from the micro-/macro-division in favour of a ‘flattened world’, a term that Bruno Latour used very often in his own works and is still present in the paper: ‘the “flattening” effect produced by the continuity of digital methods suddenly brings them together and forces them to share the same stage’ (Venturini et al., 2017: 9). The ‘continuity in theory’ is thus supposed to be reached within the practice of the scholar digging into a specific data set and moving continuously from what was called micro- and macro-levels (individual and collective, for instance, or individual and its features in other cases). Along with the ANT principles, the ‘whole’ as a macro aggregate was dissolved in a long continuum of mediations that can be explored using an equivalent of a zoom, especially in graphs for texts or web topologies. Each website can be accessed as an individual grain and ‘immediately’ observed in its topological environment by dataviz techniques such as Gephi that were promoted at the Médialab. The quality of the software is widely recognised but, once again, in this apology of the zoom, no warning was raised on the naïve transfer from data science to social science: one node may become an individual or an institution, one cluster may become a community, and each move back and forth in the parameters of the graph may become an analytical tool to follow individual and collective at the same time. In this version of the zooming effect, scales were not a problem anymore, neither sociological nor technical, and ‘wholes’ were permanently deconstructed as an assemblage of individual features, be they nodes in clusters or features in a profile. As a confirmation of this choice, the 2017 paper refers to a previous paper we wrote as a team: ‘Instead of having to choose and thus

to jump from individuals to wholes, from micro to macro, you occupy all sorts of other positions, constantly rearranging the way profiles are interconnected and overlapping’ (Latour et al., 2012: 595).

We demonstrated, however, at our own expense (Boullier et al., 2016), the wrong assumptions embedded in this zooming metaphor. There is no continuity in theory because there are different standpoints when discussing macro (equivalent to structures) and micro (equivalent to individual preferences or influences). For sure, it should not be considered as a problem of scale, but the illusion of scales is akin to the illusion of continuity that becomes clear when one decides to follow the actors, the scholars doing their exploration and using the supposed ‘zooming’ tools. From a traditional STS standpoint, it is quite easy to keep track of all the manipulations required to change of scale, irrespective of the device and the data set one uses, and to notice that there is no continuity at all but a full reconstruction of the data set for each move. This is what we did in our article on zooming (Boullier et al., 2016): we deliberately reconstructed a graph of 5500 book-related websites displayed as ‘a ready-made network’, whereas it was entirely built by a multitude of choices, some of which were highly debatable. We have thus shown how zooming remains an artefact, since any recalculation of the graph requires a modification of the parameters of spatial and clustering algorithms to produce totally different results. And exploring a segment of the graph sometimes requires changing the algorithm or the feature previously considered. The rhetoric of zooming conveyed the hope of subordinating the technique to the ANT model, making it possible to multiply associations and their continuous revelation. A supreme advantage was often put forward: the aggregates that are clusters on graphs do not block access to the granularity of the elements that make them up. This dream of having the best of both worlds, aggregates and grain, macro and micro, was in fact a way of making a real calculation impossible, since it requires some reduction of dimensions while the number of observations can be extended only to the limits of the computing power.

This ‘back and forth’ vision is plagued by a flaw in its form, one that all STSs have worked on to clarify. The methods of access to these whole/parts are not neutral intermediaries, outside the arena; they constitute the very entities (whole/parts) that can be observed. Therefore, there is no pre-existing statistical universe for the calculation (Desrosières, 1998): statistical work constitutes it and, in so doing, organises a possible access to parts, limits, and so on, of the calculation operation. Zooming cannot unfold something like a previously folded universe. It changes the method, the algorithm, to make other dimensions appear, which actually constitutes another universe.

That there is a link between what becomes scales is probable but would be especially misleading if we wanted to take mediations seriously, without crushing them a priori on macro- or micro-factors, structures or individual choices. The constant desire of ANT to restore a seamless fabric by following the actors, leads us in the Médialab – and this is quite a paradox in the context of digital methods – to ignore the digital mediations that make it possible to weave the links between these actors, and above all the digital mediations of the observer.

How the digital version of ‘network’ produced a fallacy

Finally, these assumptions that were not discussed enough and that I shared with my colleagues until I faced their fallacy were based on the misleading concept of network that was used by the ANT founding fathers. In its basic definition, the network was emergent and always tested; it could be designed in a different way depending on the entry point one adopted. But the analogy with the classical understanding of ‘network’, in scientometrics first, and then in web topologies, created that emphasis on positions, clusters and distances in both the demonstrations and the concepts. This can be witnessed in a large number of papers produced by the Médialab and is clearly apparent in the one cited in the BD&S 2017 paper (p. 7) that makes a secondary use of Boltanski’s works about Sciences Po faculty members. As the data set was designed in a Bourdieusian approach, it focussed only on individuals and their institutions of origin, aggregated and labelled along with Bourdieu’s (1988) theory of fields. There is no way to discover anything other than the structural effects of positions and, possibly, their historical change in time. What could be tracked was the ideas and their spreadability that may have helped to build the structure. This Tardian approach would be something like tracking pheromones in ants’ activity in order to discard a supposedly intelligent design at a higher level, as mentioned in the paper. But when the Médialab used the same data set, deliberately designed for that purpose by Boltanski, the dynamics of other relevant features could no longer be traced, even though some juxtaposition of images of the network over time was supposed to reconstruct a simulation of change. It always goes back to a description of positions in a topological space supposedly analogous to a social space. That is what the social sciences based on the agency of structures have taught every sociologist to do for decades. Understanding ‘network’ as a set of positions can be useful, but many structural social network analysts have been processing data for a long time to give increasingly formalised accounts of their

data using a very well-designed set of concepts (Burt, 1992; Granovetter, 1995; Lazega et al., 2008). This would in any case not be an ANT style of digital methods because it misses the entry points of circulating entities – in this case, ideas and concepts for instance – that are not available in the data set because it was designed on the basis of another theoretical framework.

During the first years of the Médialab, the emphasis was put on the digital links between websites as the most innovative and operational method available, especially when accounting for controversies. Website administrators declare preferences by attaching themselves to other sites through hyperlinks. By a striking reduction of dimensions, this account of a web topology provides no insight on what is being circulated or even on what the ‘significance’ of the link is. This means that the Médialab was adopting a digital method that was by-design focussing on structural effects or in a secondary use, on the roles of nodes in influencing others, for instance (Katz and Lazarsfeld, 1955). In France, Franck Ghitalla (2002) was the first to develop and test these approaches in the social sciences, but his background and intentions were quite different from ANT. As a structuralist, his research orientations led him to use topology methods to detect latent structures in affinity groupings by visualising calculated clusters. From these hypertext links, nothing was said about the dynamics of specific entities (except to reconstruct trends using snapshots of graph images) or about preferences as such, which Google exploited to produce a ranking (not clusters). Despite these very different purposes, Ghitalla’s approach was adopted at the Sciences Po Médialab, taking into account the reputation of the Gephi graph visualisation software. This choice was therefore opportunistic and yet perfectly justified, given the market for available technology. However, by 2009, the Facebook and Twitter platforms had already been created with a whole battery of new metrics. The question of the dynamics of social networks was nevertheless absent from the Médialab’s work programme, since it actually focussed on hyperlinks, be they related to websites or textual corpora. The Médialab was paradoxically in charge of developing massively structure-centred methods for exploring the web, through images of aggregates derived from links, whereas ANT had always advocated dynamically following the emergence of actor networks. Methods should have been aligned with the programme expressed by Ruppert et al. (2013: 35) who delineated quite clearly the purpose and target of what I call a sociology of ‘replications’, akin to ANT principles:

Here, the focus of inquiry is not on the individual factors that affect behaviour, but on the spatial flows of

behaviours and contacts: contagion, pollution, influence, etc. Similarly, data generated by digital devices allows non-individualist and non-humanist accounts of the social, where the play of fluid and dynamic transactions is the focus of attention.

Instead, the topology methods collected positions, although scholars were looking for emergence. With the methods of network topology (even adapted to controlled data sets such as climate reports), we did not follow the actors, and we oversaw them as dataviz techniques allowed us to do, with spectacular effects in presentations but less evident ones in terms of substantial sociological results.

Digital methods may align with other standpoints than ANT

For those who were trained in STS traditions, the focus on the devices and methods that frame a scientific programme should not be a surprise by any means. Therefore, when studying what the Médialab accomplished, we must discuss the digital methodologies not only in terms of technical innovations or creativity but also in terms of the conceptual frameworks encapsulated in each of them. ‘Our tools make our sciences’ could be the motto, somehow translated from the idea that any knowledge device is an ‘engine and not a camera’, as McKenzie (2006) put it, even though it would be more accurate to state that ‘Tools that are not ours make us do sciences that must become ours’, since the division of labor is much more complicated than a simplistic influence. We tried to document the fact that the programme of ‘continuity of the social’ at the Médialab, derived from ANT, either did not work or prevented scholars from accounting for what they were actually doing. The technical choices that were made framed the issues under scrutiny in a structural way so that it was the positions, relationships, network topologies and community detection that were supported, and not other standpoints on the social, especially not ones consistent with ANT principles. The limitations of these methods are not that they overlook social change, the dynamics of the social, because some efforts were made to take pictures of the graphs at different times in order to account for the changes in allies, communities and so on. The limitations come from the standpoint of a structure, observed from above, unwittingly creating the effect of a ‘whole’ while it was supposed to track down the emergence of new entities that manage to make us act. These mediations are a key point in ANT methodology.

This does not exclude a structural standpoint from the use of digital methods, since the social sciences have been relying on this point of view for more than a

century, since the days when the modern construction of quantification made its large-scale and systematic start. Desrosières (1998) documented all the processes and mediations required to make the statistical apparatus work at the time of censuses (1890 and Hollerith machines). At the very same time, Durkheim produced his holistic concept of ‘society’, considered as an actant, an agency that influences individual behaviours. Social sciences of what I have called the first generation (Boullier, 2017) were designed and were closely connected to the needs of nation states ‘to prove and to govern’ through statistics. The distribution of agency was clearly in favour of society as a structure, and it is still the common understanding of ‘society’ (that makes, that thinks, that is responsible for, and so on, including in everyday conversations).

Another historical landmark in statistical thinking was the invention of sampling (Didier, 2002) and its spectacular implementation by Gallup (1939) for predicting the results of 1936 US presidential election. This ‘second generation of social sciences’ was based on representativeness and was supported by mass media (for audience purposes) and brands (for advertising). The new entity that emerged in this process was no longer ‘society’ but ‘opinion’ (as an aggregated expression of individual preferences) that became a reality of its own (even though it took decades to be standardised) and that required a long chain of translation of individual expressions into an aggregated ‘whole’ called opinion (Osborne and Rose, 1999). Individual preferences became powerful agents either in the form of opinion or as individual choices and decision-making processes that economists could model in a frictionless world. Despite the criticism levelled at these methods and their effect on public life, as Bruno Latour (2010) says of fetishes, when they were well designed, they became powerful and they acted on their own. This is also true of ‘society’ or of ‘opinion’ and of the conceptual standpoints based on a powerful structure or on powerful individual preferences. However, ANT and Latour did not consider the role of structure or of individual preferences to be of any interest because the only standpoint that is able to account for all aspects of social life is that of ANT, made of mediations, translation and small differences (Akrich et al., 2006). As de Vries (2016) puts it, this creates a strange asymmetry of treatment between indigenous traditions and scientific visions, where the status of believers is shifted onto the social scientists of the structure or individual preferences!

Latour’s posture in regard to sociology is strikingly different from his attitude towards other scientific practices. While he has followed a wide variety of scientists and engineers to learn as an anthropologist from their

practices, and has approached lawyers, ecologists and an ethno-psychiatrist in a similar vein, when it comes to sociologists, he draws a firm line. He does not follow their activity but advises them to radically change course and to revise their conceptual apparatus and methodology. (De Vries, 2016: 83)

This attitude is all the more striking when observation of the digital methods used at the Médialab reveals that they were largely influenced by a structural vision of society that was embedded in the tools of the scholars – who were not really conscious of them, myself included. We need to propose a more coherent alignment for social sciences that enact the ANT research programme in their digital methods. But first of all, what would we emphasise in the set of concepts that were developed under the ANT umbrella? We shall retain only two of them that generate a powerful ‘theory of agency distribution’, even though it has not been expressed this way: non-humans and agency distribution.

The major shift brought in by ANT: The agency of non-humans

As de Vries (2016) noted, ‘the term ‘non-humans’ is introduced to allow agency for anything non-human’, as a contrast with other standpoints that ‘miss the masses’, i.e. objects, messages and nature. Non-humans have their own agency and their own power of action. Barbier and Trepos summarised this new proposal as follows:

The agency, as a contribution to the course of action, can be carried out by different entities, human and non-human, in parallel or successively, in a cooperative or conflicting manner; (...) only tests can be used to judge the relative strength of the entities when they have different orientations. (2007: 37–38)

Michel Callon’s (1986) article on scallops demonstrated the most outrageous example of this for the traditional social sciences, which raged against this thesis of the power to act attributed to objects, things, and in this particular case animals, the scallops. The symmetrical description of the processes of delegation between fishermen and scallops was the prime target of detractors, and more than 30 years later, some still have scallops stuck in their throats. At the time, a whole series of articles on objects as actants were published: the Berlin key (Latour, 1993), the electric vehicle (Callon, 1979), Aramis, a public/individual transportation system (Latour, 1996), the bicycle (Pinch and Bijker, 1984), the air pump (Shapin and Shaffer, 1985), the stock ticker (Preda, 2006), the Black-Scholes model (McKenzie, 2006), etc. This shift towards accounting

seriously for the roles of artefacts and living things other than human beings has become increasingly widely shared and from an early stage was already taking up concerns from Foucault (1982) on ‘dispositifs’, from Simondon (1969) on the ‘modes of existence of technical objects’, from McLuhan (1964) on the media and so on. This was what Latour (2005) was looking for in *Reassembling the Social*: ‘Can we anticipate a social science that takes seriously the beings who make people act?’.

The agency’s move is based on a well-known but seldom mentioned loan from Greimas’s (1966) semiotics. The concept of ‘actant’ allowed the potential arrangement of any entity that populated the narratives to be aligned beyond Propp’s tradition. While Greimas’ formalism was certainly not preserved, the principle allowed for more open stories to be told and the concept of ‘allies’ to be formalised, in particular, which extended the idea of ‘adjuvants’ and ‘opponents’ (without this being done from a strategic perspective, contrary to some interpretations). One of the most striking misunderstandings of ANT has been precisely the use of the term ‘network’ to characterise what is above all a narrative. ‘All the literary resources that can be mustered to render an account lively, interesting, perceptive, suggestive and so on, have to be present’ (Latour, 1988: 170). As we can see, this narrative strategy is far from any requirement of computability, as I mentioned before, whereas it makes connections emerge in a way that neither strategic nor structural social network analysis treats. And this was another cause for impossible connections between this tradition and ANT. From an ANT approach, neither the network structures nor the nodes should be the focus of the investigation but rather the entities that are circulating and generating the connections.

It seems to me that if ANT were to accept this emergentist position, it should refuse to substitute itself for the other total explanations and should stress what they lack, namely, a distribution of agency to non-human entities, in particular signs and objects, which circulate and are in the process of being set up, so ‘in the making’ (Latour, 1987). According to Latour, the ‘sociology of associations’ (another definition of ANT) should be a ‘take-over’ of the ‘sociology of the social’ (2005: 375). Unfortunately, in the methods adopted by the Médialab, even ‘associations’ are understood as ‘ready-made associations’ and not as a process in the making, which requires specific methods and entities to be tracked down.

How to align digital methods and ANT

From these elements that put aside the concepts of ‘networks’ or ‘assemblages’, we can design a

third-generation social science that will benefit from a new quantification era brought in by digital platforms, Big Data and Machine Learning. ‘Traceability’ is the new quality that is available for social sciences, provided that they ‘repurpose’ (Rogers, 2013) the traces collected for commercial purposes on these platforms.

This move was anticipated by Tarde (1895), who predicted the era of newspapers made up primarily of curves, especially those of his ‘glorymeter’, the forgotten ancestor of reputation indicators (Boullier and Lohard, 2012). He would have been delighted to see all-news financial TV channels (e.g., Bloomberg) or managers’ dashboards, or the proliferation of polls during elections, or data graphs in economic supplements. These graphic forms, these cognitive technologies, are actually used in social listening agencies on the dashboards for brands, much more often than are the graphs images. It is therefore not surprising that Kleinberg (2002), the one who founded, we could say, the study of the Web’s topology, was directly interested in the ‘bursts and cascades’ as early as 2002. Then, in 2009, with Leskovec, he developed a meme tracker based on curves and propagation (Leskovec et al., 2009), which can be used in studies of Twitter (Boullier, 2018). This makes it possible to account for these processes of replication, sometimes called buzz, which constitute one and only one aspect of the social – even if, in my opinion, it would be the one that Tarde would have favoured and that ANT had envisioned even before digital networks emerged. However, how can we follow these entities that make the social, but only when it works as high-frequency propagation processes (events and not long duration or cycles as Braudel (1958) would have said, that are as valid standpoints as are replications)? We must no longer focus our attention on social structures or individual preferences but on what makes other actants act and what circulates easily: what Tarde called ‘ideas’ and what is often called ‘memes’ on internet (Shifman, 2014) and in a general theory of cultural evolution (Dawkins, 1976; Dennett, 2017). The timelines can account for the propagation of memes and their contrasted ability to make other users replicate, but these differences in propagation patterns must be scrutinised and tested, starting from the features of the entities that circulate (be they semiotic when dealing with messages or functional when dealing with objects for instance – a point that will become critical with the internet of things). The agency of these entities becomes the purpose of the investigation, and it must be demonstrated comparatively, possibly using Machine Learning methods based on the huge amounts of digital traces now available. The non-human agency that ANT demonstrated is reinforced and twisted at the same time: objects and devices are not the only ones to gain some agency; the

messages that circulate between them and humans become the targets of the investigation because they also acquire their own agency. This balance between objects and messages can be dated back to Hutchins (1995) when he argued for attention to be paid not only to ‘representational media’ but also to ‘representational states’. In his fieldwork, the US navy’s aircraft carriers were plotted by navy operators, during the fix cycle, by means of elementary devices requiring no calculation and only controlled movements, translations and propagations. As Hutchins says, ‘the fix cycle is accomplished by the propagation of representational states across a series of representational media’ (1995: 117). This prompts us to emphasise the two-fold approach in the theory of replications: devices (material, representational media) AND representations (mental, representational states).

This research is just emerging as a field and even in Twitter studies, the three types of distribution of agency can be found (Boullier, 2018). The agency of the network structures and that of individual preferences through the focus on influencers are still prevalent, but an increasing number of papers focuses on the agencies of the content, of tweets, of stories, of titles, of novelty (such as in the study of fake news, the novelty score (Vosoughi et al., 2018), beyond the general description of the propagation. In this regard, Twitter and memes websites (9gag, Reddit, knowyourmeme.com) should be considered as the sandbox to build the methods that are required for a third generation of social sciences, because these platforms and messages were designed for that purpose, for nudging people (Thaler and Susstein, 2009) to replicate the content. Of course, this feature makes neither Twitter nor memes an analogon of ‘society’ – fortunately, since from this standpoint we don’t believe in ‘society’, only in replications. We should, on the contrary, consider Twitter and memes as the *drosophila* of our social sciences, which will help decode the elementary processes of replications. At the outset, this will of course not pertain to the main political and social concerns and will serve only for the purpose of testing the human ability to be affected by elements of culture. This ‘natural experiment’ requires us to repurpose the traces collected on Twitter and to strictly limit the validity of the results for social diagnosis on structure or on individual preferences purposes. Other fields of research on different platforms would help to compare and validate the processes of replication that may appear on Twitter and on meme websites.

If continuity were to make sense, it would be found in these rhythms and waves of propagation. However, the concept of continuity is highly deceptive and should be excluded from digital methods in general because it brings back an analogical representation of the world,

whereas any use of digital techniques requires discretisation and a break in all continuous phenomena. Discontinuity, which means analysis, is moreover a prerequisite for computability and was already set up by Leibniz in his differential calculus. That these differences are smaller and smaller does not mean that the concepts of ‘continuity’, a ‘seamless world’ and even the ‘flatness of the world’ are useful in a scientific investigation. It is necessary to take on the analytical formatting of our own standpoints through our tools and concepts, and instead of advocating any continuity illusion, to ensure that each methodological choice we make (which means discretisation of some kind) is consistent with others, and that there is an ‘alignment of the mediations’, as Antoine Hennion (1993) proposed.

In this context, it is quite conceivable to have digital methods to highlight not only the structural effects or the role of the influencers but also the power of action of the replications of these entities that circulate and that overtake us. This makes three distinct approaches, all equally legitimate but technically different, and impossible to combine except to keep the nostalgia of Borges’ map. To mourn the excessive promises of digital technology, which basically only take up old idealistic promises, does not mean that we abandon the vision of the ANT pioneers, those who, before any real availability of digital methods, were able to redistribute agency in a new and profoundly non-modern way. It is in this respect that the choices of digital methods that we make are also political, or even critical, while remaining pluralistic and historically reflective because this is the condition for a scientific debate to take place.

Conclusion

Designing digital methods and digital protocols always encapsulates a choice of standpoint among the three that we identified: the methods allow either for the description of structures (and the specific weight of their agency can be assessed independently of individual cases) or for the exploration of individual preferences and decision-making processes of individuals (and the specific weight of their agency can be assessed independently of structural effects). These two standpoints are not supposed to be shared by the pragmatist approach that is at the core of ANT. This is why another standpoint should be developed, the one based on the agency of non-humans, be they objects, gifts, signals or messages, and on their power to make us act that is evidenced in the propagation of elements of culture. The digital methods that can account for it differ radically from the previous ones, even in terms of data collected. The Médialab did not manage to build a coherent alignment with an ANT framework, but it did

thereby reveal some possible limits of ANT itself. In any case, ANT cannot use digital methods without clarifying the basic assumptions that are supporting its powerful attractiveness. Computability and comparison, as much as non-humans’ agency, mediations, are concepts that must find their place in a new ‘digital ANT’ framework, one that is more analytical and less omnipotent, because more aware of the limitations of any methodology.

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Notes

1. See Ruppert et al. (2013) for an extensive review of these labs.
2. Disclaimer: I was scientific coordinator of the Médialab with Bruno Latour from its inception until 2015, and the choices made were also my responsibility. But the lessons to be learned from this first phase of existence of the Médialab require a thorough examination and a debate. It should not be reduced to ‘a family affair’, just as the first paper in this journal should not either, even though it was written only from an insiders’ point of view as much as from my own.
3. Accessible at: <http://medea.medialab.sciences-po.fr/#/unfccc/introduction>, §3.

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