

Science as Social Construction

An Inter-Epistemological Dialogue between Two Internet Scientists on the Inter-Epistemological Structure of Internet Science, Part 1

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Abstract— This paper is structured as an informal dialogue between two members of the EINS (www.internet-science.eu) Network of Excellence: a sociologist (Laura Sartori) and an engineer (Paolo Dini). The deck is stacked since the engineer also taught physics for a number of years, has been studying social and economic theory for the past 10 years, and is also currently active in mathematical and theoretical computer science research. The purpose of the paper is to provide an overview of the epistemological bases of different disciplinary perspectives as a first step towards developing a methodology of analysis of the Internet as a scientific object of study. To complement well-established areas of Internet Science such as networking and information theory, the paper regards three areas of social science as particularly important: social constructivism, power and knowledge, and domains of value. Of these, we focus on the first and only touch on the other two. The paper builds on previous research which concluded that it is impossible to develop a unified interdisciplinary theoretical framework due to irreconcilable epistemological differences, but that it is possible and very worthwhile for those adhering to various disciplinary perspectives to collaborate towards the achievement of a practical joint endeavour. In our view the Internet exemplifies the ultimate example of such an endeavour.

Keywords: *epistemology; interdisciplinarity; social constructivism; internet science; methodology*

I. INTRODUCTION

Laura Sartori: Good morning, what are we talking about today?

Paolo Dini: I would like to discuss the epistemological structure of the EINS project because I find it extremely interesting and potentially transformative for how we do science.

LS: In Italy ‘epistemology’ carries a connotation of ‘history of science’. However, I think you are probably referring to the more Foucauldian meaning of ‘construction of knowledge’?

PD: Yes, correct. The Greek root of ‘science’ means ‘knowledge’, so we could easily tie ourselves in knots, here, but in today’s English this distinction makes sense. In other words, we can take epistemology to mean construction of knowledge, but with an awareness of a deeper set of issues, as encapsulated in this brief quotation:

The episteme is the ‘apparatus’ which makes possible the separation, not of the true from the false, but of what may from what may not be characterised as scientific. (Foucault 1980: 197)

LS: Very nice, but why are you introducing the ‘apparatus’ so soon?

PD: Well, the cognitive landscape we need to explore is multi-dimensional and very complex, so our dialogical narrative can hardly be expected to be linear. I am afraid we will have to jump around a bit and may need to distribute the explanation of concepts at different places in the paper.

LS: Right, so we are writing a paper, and this paper appears to have a distinctive philosophy of science flavour.

PD: Yes, it seems like a good way of making sense of the EINS project, or of the Internet, for that matter.

LS: Where do we start?

PD: From my point of view, this paper builds on a paper I co-wrote with Mehita Iqani and Robin Mansell (Dini et al. 2011) at the end of the radically interdisciplinary EU-funded Network of Excellence OPAALS,¹ which had some similarities with EINS. OPAALS was concerned with digital ecosystems as a socially constructed ecosystem *metaphor* of socio-technical and economic environments of particular relevance to small and medium-sized enterprises (SMEs), and aiming to maximize sustainable development and/or collaborative knowledge construction.² OPAALS took the existence of the Internet for granted. In addition to aiming to develop a ‘science of digital ecosystems’ and a community of practice in this science, it also had the applied aims of sustainable socio-economic development led by SMEs and catalysed by information and communication technologies (ICTs). EINS, by contrast, seems more fundamental to me: it is focused entirely on scientific objectives, i.e. understanding the Internet as a socio-technical-economic phenomenon, on developing a ‘science of the Internet’, and of course also on the development of an Internet Science community.

LS: Very interesting. So, in EINS we are interested in identifying the concepts and thought processes that enable

¹ Open Philosophies for Associative Autopoietic Digital Ecosystems (2006-10), <http://www.opaals.eu>

² At the same time, digital ecosystems as understood in the OPAALS project and in its precursor DBE (Digital Business Ecosystem, 2003-07, <http://files.opaals.eu/DBE>) were meant to benefit from a certain level of self-organized and autonomic behaviour in the software itself, i.e. as far as the software is concerned the research attempted to develop an ecosystem *model*, in addition to treating the concept of ecosystem as metaphor. This latter, mathematical, work was pursued also in the BIONETS project (Biologically-Inspired Networks and Services, 2006-10, <http://www.bionets.eu>) and is still on-going in the currently active BIOMICS project (Biological and Mathematical Basis of Interaction Computing, 2012-15, <http://www.biomicsproject.eu>).

making sense of the Internet from a social, economic, and technical perspective. Am I right?

PD: Yes, but first we need to define the framework within which we will be working.

LS: In terms of the ontological dimensions and epistemological perspectives for Internet Science?

PD: Precisely. Figure 1 shows the analytical framework I propose we follow. At the top of the figure you can see what I would call the analytical categories that we are going to utilize to orient ourselves in the discussion. The second group of concepts are three themes or dimensions that I consider *necessary* to Internet Science, although clearly not *sufficient*. Since the ground covered by these themes is rather vast, we should focus on social constructivism as a running thread for this paper, touching on the other two dimensions only briefly. We could leave more in-depth discussions of power/knowledge and value domains to future dialogues. The bottom group of terms lists some of the main pairs of opposite perspectives in how we construct our understanding of society. In this and the following papers I would like to show how

- 1- each of these viewpoints relies on its own ontological priorities and epistemological machinery;
- 2- the Internet appears to be bridging several if not all of them, often in surprising ways; and
- 3- attempts to reconcile these binary opposites often lead to the development of interesting theories

LS: OK, this sounds pretty ambitious, but I guess it's worth a try.

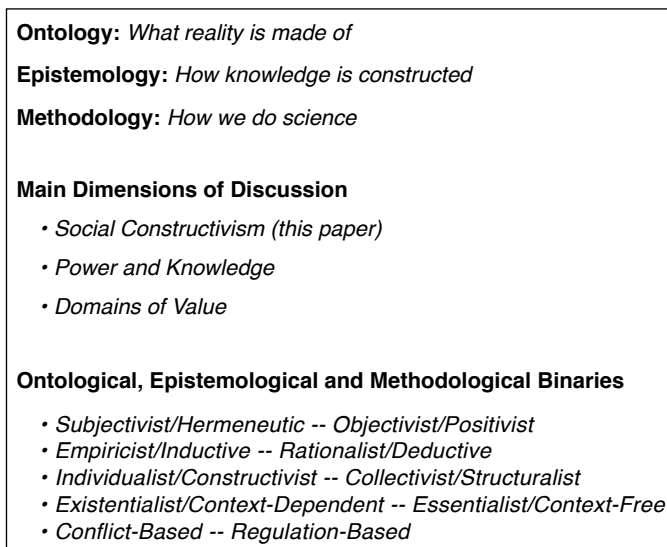


Fig. 1. Analytical framework underpinning the dialogue

II. THE METHODOLOGY OF INTERNET SCIENCE

PD: Right, as we were saying, in EINS we are interested in identifying the concepts and thought processes that enable making sense of the Internet also from a political viewpoint, which relates to governance issues.

LS: Of course. But in describing OPAALS you seemed to be mixing social construction with mathematics. Why, and how, do you do that?

PD: That's a scary question. No, in those projects, and also in EINS, I think we can afford to overlook the socially

constructed aspects of mathematics and simplify our discussion considerably by treating the hard sciences and mathematics as objectivist. The social sciences...

LS: We will talk about the social aspects of mathematics and informatics (as in coding and programming) another time, but, please, just let me cite this quote by Albert Einstein:

As far as the laws of mathematics refer to reality, they are not certain; and as far as they are certain, they do not refer to reality. (quoted in Newman 2003[1956])

PD: Ah, nice one! The social sciences can be both objectivist and subjectivist, of course, but in this paper, again for the sake of simplicity, I would like to emphasize the subjectivist perspective in social science and de-emphasize quantitative methods.^{3,4} Anyway, before we get to that, let me clarify what I mean by 'socially constructed' through the words of Boghossian:

To say of something that it is socially constructed is to emphasize its dependence on contingent aspects of our social selves. It is to say: This thing could not have existed had we not built it; and we need not have built it at all, at least not in its present form. Had we been a different kind of society, had we had different needs, values, or interests, we might well have built a different kind of thing, or built this one differently. The inevitable contrast is with a naturally existing object, something that exists independently of us and which we did not have a hand in shaping. There are certainly many things, and facts about them, that are socially constructed in the sense specified by this core idea: money, citizenship and newspapers, for example. None of these things could have existed without society; and each of them could have been constructed differently had we so chosen. (Boghossian, 2001)

LS: I agree entirely. But you seem to like to add more of a philosophical twist to our conversation than some sociologists would! Social construction is one of the most interesting processes to be studied, also because it operates across all disciplines. Not only the social sciences. There are many aspects of the Internet that could be described as socially constructed. In other words, the Internet has become "real" in people's minds and in people's lives, in spite of their ignorance of the "objective" aspects of the Internet. They don't understand its technical structure, but they "use" it, they talk about it, they incorporate it in their daily routines. Yet, the Internet as a technology does not drive what people do, as a technologically deterministic view might suggest. Technology allows for certain activities, and users and actors domesticate and shape it to fit their own goals. Something analogous has happened in the past as well. Take the refrigerator, for example. In the 1950s refrigerators were used to preserve drugs and women tights, not just food. Also the telephone or electricity – whose technical details were largely unknown at the time – were used very differently from today (Fischer 2000; Marvin 1988). The social construction of technology depends on the socio-technical frame (Flichy 1995), reflecting user practices and collective representations in a given historical period.

PD: Very true. This point connects to another disciplinary perspective on the phenomenon, namely anthropology, which views technology as a cultural artefact and/or as an extension of language. As you just said, the Internet has made it much

³ Social network analysis is an example of an area of social science that has been usefully complemented by mathematical concepts; however, it still leaves most of the questions social scientists are interested in unanswered.

⁴ Qualitative methods include questionnaires, participant observation (ethnography), individual interviews, focus groups, etc.

more obvious to most laypersons (and, of course, some computer scientists!) that technology embodies our cultural values (Feenberg 1999, 2001), for example through the Net Neutrality debate. Deep packet inspection can enable the prioritization of certain content streams over others; whereas this is often proposed as a market-driven evolution of the web, it also has implications for freedom of expression. Backing one or the other side (i.e. supporting or not Net Neutrality) has social, political and economic consequences. Another example is provided by centralized architectures, which make top-down control more feasible, versus distributed P2P architectures, which facilitate individual freedom on the web. Although whether or not control or freedom can be justified in some cases very much depends on the point of view, the point is that architectural or technological features embody our social, economic, political and moral values.

LS: Might we say that our actions, decisions, and behaviours are value-oriented and they result in shaping public opinion (or the dominant perception/opinion, as Habermas would say)?

PD: Sure, but the less obvious point here is that the same values influence what technologies we build and how they work.

LS: Just perfect! A sociologist and an engineer that agree on the social construction of technology seems to be a nice start for our Internet Science. For this purpose, we consider the sociological, anthropological, economic, technical, and political dimensions, even though each of these perspectives relies on sometimes slightly different and sometimes radically different ways of analysing and making sense of the object of study, in other words of constructing knowledge. This is what we mean by different epistemologies?

PD: Yes. The incredible thing about the Internet is that it is forcing together areas of science that had previously maintained a “safe” distance from each other. In many cases, however, this still is not sufficient for mutual understanding to emerge, precisely because the ontological and epistemological building blocks are so different, incompatible, and often incommensurate.

LS: This gives a nudge to our conversation. What is science? What is Internet Science? To begin to answer these questions I need to go back to the philosophy (and history) of science, trying to grab some useful concepts for our inter-epistemological effort. By the way, as you will see, I will try to turn epistemological problems into methodological issues.

PD: Is this actually possible?

LS: I believe science is a social construction, as I expressed earlier. Sociology can, thus, try to solve empirical questions that traditionally pertained to the philosophical realm. In my opinion this is the path we have to follow to make different areas of science talk to each other. I will briefly sketch my personal preference in terms of construction of knowledge. Had I lived in the 19th Century (or before), I would have been an empiricist rather than a rationalist. I would have studied social phenomena through inductive methods, not deductive. I am more a fan of Max Weber than Emile Durkheim since Weber considers social action to be oriented by actors’ motivations and preferences. By contrast, Durkheim, the value of whose work on statistical and quantitative methods is undeniable, regards actors as powerless and believes general laws to be operating in society

exactly as they do in physics. Two threads of research have emerged since the time of this basic dichotomy: Interpretativism and Positivism. Very roughly, we can state that the first (also called Hermeneutics) focused on interpreting social phenomena through the understanding (verstehen) of individual points of view, while the second⁵ tried to explain social phenomena through statistical data. We might call these two positions ‘paradigms’, as Thomas Kuhn would say (1996).

PD: Didn’t Kuhn theorize scientific revolutions?

LS: Yes, Kuhn for the first time asserted that knowledge is not cumulative. At a certain point, the paradigm just changes and all assumptions, hypotheses and results with it. When Copernico (or Galileo) was credited for his theories about the solar system, the previous Earth-centred solar system was simply rejected. The same happened with Netwon or Einstein’s ideas. All of a sudden paradigms change.

PD: The way I like to put it is that a Kuhnian paradigm is a body of theory combined with a community of practice and a set of methodologies. This is to be contrasted with the use of the term in computer science and in common parlance, which tends to be more limited to a ‘model’.

LS: Sure. The very point here is that Kuhn says that different paradigms are incommensurate, because profoundly different in terms of – as Foucault would say – apparatus, as you mentioned earlier. Yet, they can communicate. In other words, they cannot be “measured” by the same unit of measurement, but they can still have a dialogue. And I think this is exactly what you meant in your paper (Dini et al. 2010).

PD: Foucault’s apparatus is also closely concerned with the interplay between power and knowledge, but I see what you mean. In any case, when I call for an integration, not a unification, of different sciences, I mean the following. If ‘unification’ is understood to imply considering two or more apparently unrelated phenomena within the same theory or model, then ‘integration’ is understood to enable different theories to coexist with a degree of compatibility that does not imply that the same theoretical foundation underpins them. An example of the former is electricity and magnetism which were thought to be different physical phenomena until a single set of equations was derived by Maxwell (1873). An example of the latter is the understanding of computers as media of communications, rooted ultimately in Heidegger’s phenomenology, sitting side-by-side the understanding of computers as machines operating on objective data and whose functions can be optimized (Winograd and Flores 1987).

LS: Exactly, we are not looking forward to a new unified single science, but to an integration of different visions of science. Even in the natural (or hard) sciences there are competing views (as well as methods, hypotheses, and values). And, especially in social science, different paradigms and visions co-exist easily, such as qualitative and quantitative methods, post-positivism and interpretativism, etc. The competition between quantum mechanics and general relativity is a perfect example for the hard sciences. They explain two different aspects of behaviour, one at micro-level and the other at macro-level.

⁵ Today we talk more properly of neo-positivism because the search for general laws governing society has shown its weaknesses, leaving an opening to a probabilistic approach through statistics. It is recognized that there are hypotheses to be tested to attain a certain degree of generalization and standardization.

PD: Yes, right, they are incommensurate, although in this specific case there is at least a chance, in principle, of mathematical unification (e.g. string theory). But in general I agree that different paradigms from all the disciplines of the consortium can start dialoguing since there is no competition!

LS: Definitely. One starting assumption we should make and stick to is that coexistence is possible if there are no “imperialistic” tendencies by any one discipline over the others in terms of “superior” techniques or value-production of their own discipline over another.

PD: As Foucault would put it, we should avoid ‘the tyranny of globalizing discourses’ (1980: 83).

LS: Yes. As I was saying above, I think *methodology* is the key for setting up an Internet Science. Given our differences in ontologies, epistemologies and research techniques, I believe that methodology is the key to our conversation. Methodology could work as a bridge across the different epistemologies at play precisely because Internet Science is a *practice* that straddles all the disciplines we have been discussing.

PD: So, what do you mean by methodology?

LS: Methodology refers to the techniques we choose when facing a cognitive problem, which could be either theoretical or applied. Obviously we will differ because we have different cognitive issues and research problems, not to mention skill-sets. The good news is that we can solve that. As Feyerabend stated, there is no one scientific method better or superior to others (1975).

PD: I agree, although it sounds a bit abstract. As we concluded in the article I mentioned above (Dini et al. 2011), it is possible and very worthwhile for those adhering to various disciplinary perspectives to collaborate towards the achievement of a practical joint endeavour. I think the Internet exemplifies the ultimate example of such an endeavour.

LS: What we can borrow from Feyerabend is the fact that change (in paradigm) at the theoretical level is driven by interests, ideology, and cultural beliefs (convictions), not by a specific method – i.e. by a “more scientific” method.

PD: So... your proposal for the foundations of an Internet Science is...?

LS: Well, I would propose to think in terms of a ‘research programme’ (Lakatos, 1976). A research programme is not a closed system of a few, measurable and static theories. It is a living, open system where scientists discuss, compare and contrast different ideas or solve problems as they emerge, prioritize or abandon hypotheses, etc. Thus, they contribute to the progress of science. Take Newton’s theory of gravitation, Einstein’s relativity, Freud’s psychoanalysis, or Marx’s theory of capital. They all have a core (2-3 definitions) exemplified through auxiliary propositions connected to historical facts. In Marx the theory of surplus value occupies the core, while alienation, revolution and failing profit rate are auxiliary theories. Decades later the Marxist tradition maintained the core but adapted to different contexts and auxiliary propositions.

PD: So, it sounds like you think that Internet science needs a ‘research programme’, where each discipline maintains its core while adapting to and interacting through auxiliary hypotheses?

LS: Yes. Methodology is the tool, the “practical language” as you would say, to build knowledge. Computer and social science can contribute and interact productively because they both share a scientific method that can solve both applied and philosophical cognitive problems. When you speak of ‘practical joint endeavour’, I hear ‘methodology can translate philosophical problems into practical cognitive problems’. In this sense it can handle both theory and practice. Moreover, our goal is ambitious: we (social scientists) study causal connections between social conditions and knowledge in the information society, in our contemporary society (supporting hypotheses and theories with empirical evidence).

PD: Are you saying that we have to think really “big” in order to understand the causal connections underlying our society? I agree, we have to fly beyond single-discipline boundaries, answering the call for integration that ICTs have implicitly launched.

LS: I really believe that what we need today is new thinkers able to grasp the complexity we are experiencing, as Max Weber did at the dawn of capitalism⁶ when he set up the methodological basis for modern sociology. Again, the Internet is calling us to set up a methodology (a ‘research programme’) for the science of the 21st Century. Each discipline uses different methods because it tries to answer different research questions stemming from alternative cognitive and epistemological problems. Each discipline sheds light on a limited portion of knowledge. Since as we said ICTs serve as a “practical” bridge across disciplines (and across paradigms), we need not only the social sciences to agree and cooperate but also the hard sciences to listen to research questions that have been posed in a different way.

PD: OK, science itself has to be thought of as ‘open’ to critical thinking, as Popper suggested. Critiques grow out of differences in scientists’ certainties and beliefs: as Popper says, this is the only path to knowledge! I see your point: Internet Science has to cross disciplinary fences, exercise critical thinking by encouraging each discipline to borrow from the others and... just build knowledge.

LS: Precisely. Otherwise, we remain stuck in the familiar scenario where computer scientists develop the best-technical-platform-ever for – let’s say – participation (by individuals, associations, governments). Yet, if they do not take into considerations, for example, social actors, material and symbolic resources, social and economic values attributed to that specific social action, privacy concerns... in short, if they do not account for social and institutional actors (their preferences, their values, their social relations), the best platform remains a “perfect”, yet closed, system.

PD: Yes, I know... we tend to design closed systems because it is easier to define *ceteris paribus* conditions and, from this, test hypotheses and infer some conclusions. It is like economics: it relies heavily on mathematics and modelling, but it often fails because its models do not fully reflect the real world.

LS: Of course, I agree with that. I want to sum up and end this part of the discussion with two points. The first relates to methodology, paradigms, and dialogue while the second to the nature of science:

⁶ Weber investigated the conditions upon which the capitalist system grew in his masterpiece *The Protestant Ethic and the Spirit of Capitalism* (Weber, 2012[1905]). More importantly, he also set up the methodological basis for modern sociology.

1. Methodology, thus, is the key to solve epistemological differences that can be still challenged within a single discipline but do not adversely affect Internet Science.
2. By now, it should be clear that science – generally speaking – is a social construction.

PD: True, I acknowledge that even in the hard sciences interests and ideologies can have influences that are more than conceivable or acceptable. Think about the research on stem cells, the battle over IPv6, regulatory standards for Intellectual Property protection, the Net Neutrality debate I mentioned before, SOPA, ACTA,⁷ etc. It is clear: dominant opinions shape science, because it is socially constructed in a mutual process where multiple actors play.

LS: Our mission should be, then

1. To establish the (methodological) basis for a dialogue that teases and provokes points of contact.⁸ By so doing we will have a higher chance to discover what bases are needed by an Internet science.
2. To understand that our research results can orient and influence the form the Internet (and, consequently, Internet Science) will take.

PD: So, even though straight translation between social science and hard science concepts is often not possible, as long as one keeps in mind the ontological assumptions and the epistemological processes involved an interesting dialogue obtains?

LS: Yes. Each discipline has its own paradigm, which is incommensurate with other paradigms. Yet, they can try to talk to each other without worrying about losing their primacy because they respect each other's epistemological bases. The history of science is full of examples to the contrary, for instance Keynes's and Hayek's ideas in economics, Weber's and Durkheim's, or Parsons and The Frankfurt School in sociology, etc. But in Internet Science we should make an effort to avoid such polarizations.

PD: Not that one should expect communication to be easy, but at least there is a better chance of getting across to each other – and to *learn* from each other.

LS: Yes, if there is no “imperialist” vision (e.g. computer science over social science) I believe that the Internet – as a technical and a social product – can facilitate dialogue and collaborative knowledge construction. Would you bet that in the long run computer scientists will design really usable technologies, for example (how often they realize that outside of the laboratory the ‘average user’ is not able to use what they invented)? And that social scientists will elaborate hypotheses and narratives that are down-to-earth (that is, that consider technical aspects, actors, and contexts all at the same time)?

⁷ SOPA = Stop Online Piracy Act; ACTA = Anti-Counterfeiting Trade Agreement.

⁸ For example, for economists consumer decisions are the product of independent evaluations deriving from high-level information and budget constraints (for example, ‘I have E30k, I like red cars, so I can afford a red BMW since the latest model costs E29.9k’), whereas for sociologists consumption has a strong relational character (it depends on others' preferences) and on the symbolic value of goods, which can be more important than its use value (for example, ‘I want to buy a new car for my second house in the countryside, I like red or blue cars and I like Toyotas, but many friends told me that they don't have reliable 4-wheel drive; my best friend suggested a Range Rover to me, it costs just E2000 more than my budget, I think I'll go for it'). So this would mean making economists look at preferences more closely and making (some) sociologists utilize a higher degree of formalization.

PD: Yes! Nicely put.

III. A SYSTEM OF EPISTEMOLOGICAL BINARIES FOR INTERNET SCIENCE

PD: Now that we have a better understanding of how to work together, i.e. through a joint applied endeavour and/or by focusing on methodology, we can continue discussing the ontological and methodological, but mainly epistemological, binaries of Figure 1. Paraphrasing Anthony Giddens, the difficult aspect of social science is that, unlike what happens in physics, the object of research has *opinions* about what is being said about them. How many opinions? As many as there are individuals. Clearly it may become too difficult to account for or work with that many, so that is why we engage in dialogue and various kinds of interactions (political, social, economic) to work towards some level of consensus, thereby reducing the number of opinions out there.

LS: I would put it differently. I would say that the social sciences deal with multi-faceted social, economic and political phenomena where actors and institutions play complex and intertwined roles. Since economics and sociology were born, pundits debated about these disciplines' ability to grasp social reality. Far from 19th Century positivist positions,⁹ I believe that it is possible to study social, economic and political phenomena by means of Max Weber's Ideal Types. Ideal types are analytical tools for representing the main traits of historically-grounded phenomena. For example, what we generally know as power, (or capitalism or state) has various declinations: charismatic, traditional-bureaucratic or legal-rational. Think of different types of power you encounter in daily life. You recognize somebody as powerful because he is gifted (Julius Ceasar, Napoleon, Hitler had charisma), or you acknowledge beliefs and behaviours as powerful because they are strictly linked to traditions (i.e. religion), or because they originated from a legal framework (i.e. a constitution and democratic structures). It is clear that these ideal types can be encountered in different contexts at different historical moments. Yet, they will help reconcile particular traits within a more general analytical framework.

PD: Trigilia explains ideal types as follows:

The formulation of generalizations – which Weber called ‘ideal types’ – has specific spatial and temporal limitations and essentially aims to improve historical knowledge. (Trigilia 1998: 6)

So perhaps what you mean is that power is an ideal type, but it takes the different forms you list above in the different contexts?

LS: Sure, that's fair.

PD: Since you mention power, let me cite Foucault again:

It is not possible for power to be exercised without knowledge, it is impossible for knowledge not to engender power. ‘Liberate scientific research from the demands of monopoly capitalism’: maybe it's a good slogan, but it will never be more than a slogan. (Foucault 1980: 52)

Foucault also addressed the “imperialism” of science that you mentioned earlier, which seems particularly relevant to Internet Science:

⁹ The central assumption of positivism in the 19th Century was that the social and natural sciences share a common nomological framework in explaining how single phenomena stem from general laws and in making use of organicist analogies.

What types of knowledge do you want to disqualify in the very instant of your demand: 'It is a science'? ... Which theoretical-political avant garde do you want to enthrone in order to isolate it from all the discontinuous forms of knowledge that circulate about it? ... in contrast to the various projects which aim to inscribe knowledges in the hierarchical order of power associated with science, a genealogy should be seen as a kind of attempt to emancipate historical knowledges from that subjection, to render them, that is, capable of opposition and of struggle against the coercion of a theoretical, unitary, formal and scientific discourse. (1980: 85)

What I find interesting about Foucault is that to him power is not just 'oppressive', 'coercive', or 'hegemonic'. Power can also be "horizontal", it can be 'productive' not just destructive. This means that power can sustain and transmit complex relationships among the component parts of society. He captures these ideas through the concept of the apparatus, which I mentioned at the beginning and which seems particularly fitting for how we can think about the Internet:

...a thoroughly heterogeneous ensemble consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral and philanthropic propositions – in short, the said as much as the unsaid. Such are the elements of the apparatus. The apparatus itself is the system of relations that can be established between these elements. ... The apparatus is thus always inscribed in a play of power, but it is also always linked to certain coordinates of knowledge which issue from it but, to an equal degree, condition it. This is what the apparatus consists in: strategies of relations of forces supporting, and supported by, types of knowledge. (1980: 195, 196)

LS: I see, this is interesting. And I agree, it can be useful for us. Anyway, I can see political and social interactions potentially leading to consensus, but how do economic interactions lead to consensus?

PD: This point is tricky to argue. I believe that the degree to which economic interactions can afford to approach the "free market" is proportional to the democratic maturity of the society within which those economic interactions are embedded.¹⁰

LS: That's an outrageous statement.

PD: Sorry. Probably impossible to prove. But as an Italian that has lived in different democracies (IT, US, IE, UK) it feels right. Of course there is no such thing as a free market. The fact that we may feel more or less free to buy and sell whatever we want does not mean that the market itself is "free".

LS: That's for sure!!!

PD: In order to function properly, in addition to contracts markets need accountability rules, laws, institutions of various kinds and sizes, physical infrastructure, standards, and so forth. So mine is a superficial perception which, however, I believe is echoed by the current Euro/sovereign debt crisis. I wrote a paper on community currencies that discusses this point in more depth (Dini 2012). We can look at the Swiss WIR parallel currency, for example, which has been going strong since 1936. It balances solidarity with trade, entrepreneurship with accountability and banking law, and

¹⁰ See Granovetter (1985) for the concept of embeddedness of economic action in social structure.

explicitly protects SMEs from credit fluctuations caused by global market and economic forces. Their example is now being emulated by other parallel currencies, such as the Sardex.¹¹ I think that when Neoclassical economists were talking about the self-regulating market they had this idyllic picture in mind, but took a huge amount of political, democratic, and institutional infrastructure for granted, which could be argued to have been present in Britain in the second half of the 19th Century to a greater degree than in many other countries at that time. The uncritical application of the 'self-regulating market' in countries that were farther behind in their democratic development – as well as in Britain itself – then led to famine, world wars, etc, as variously argued by Polanyi (2001[1944]) and others.

LS: I like the Polanyi reference, but you are sounding a bit too Euro/Western-centric for my taste.

PD: You are right. My "meta-point" is that it is possible to make sense of rather different positions (e.g. the modern vs. the post-modern), depending on which difficult issues one overlooks. For example, overlooking the power of the IMF (International Monetary Fund) relative to many governments, and the interests of the main private-sector players in the West/North, who have long influenced the WTO (World Trade Organisation), WIPO (World Intellectual Property Organisation), etc, makes it easier to accept a modernist interpretation of recent history. On the other hand, overlooking the unbelievably expensive (in terms of human lives) process through which over the past 300-400 years Western Europe has attempted to develop an understanding – and an acceptable implementation – of democracy makes it easier to embrace the fiercely critical post-modern perspective.

LS: Fine – kind of – but what do we gain from such intellectual exercises?

PD: The ability to see the other person's point of view and to engage in a constructive debate.

LS: I see. Anyway, leaving economics and politics aside for the moment, you mean that there is a middle ground between subjective perception and objective certainty?

PD: Yes, Karl Popper called it 'inter-subjective', which in my mind is more or less the same as 'socially constructed'.

LS: Speaking of Popper, he also proposed a way to resolve the empiricist/inductive vs. rationalist/deductive dichotomy. He said that one could not generalize from a given set of empirical observations to a general law because we never know when an exception to the rule might arise. Similarly, we can't be certain that our starting axioms are always going to be right. So he found a compromise in saying that for a theory to be valid it must be 'falsifiable'.

PD: Very nice. It sounds like a workable position for EINS. It enables us to make some claims, which could be inspired by empirical observations or by leaps of theoretical imagination, as long as we can design tests that could prove them to be false.

LS: Yes, although it's a bit of a trick, because in practical terms we still tend to generalize from experience.

PD: True. And sometimes we make decisions based on axioms as if they were religious dogma.

¹¹ <http://www.sardex.net/>

LS: I am glad we are on the same page: the system view that engineers default to is generalizing and objectifying.

PD: Generalizing because the totality and plurality of, for example, a part of a social system are assumed to apply to the whole system; by objectifying I think you mean that we treat the social system as if it were a physical object, that we lose track of the fact that it is made of individual human beings.

LS: We need to go back to individuals, otherwise we can't really talk about social construction. We can refer to social construction as a good compromise between relativism (tendency to acknowledge the co-existence of multiple realities, each of which deserves to be studied depending on the definition of the situation the actor gives) and objectivism (for which reality is like a physical object, a system made of sub-units working together harmoniously, where the paths of individuals are determined by existing structures).

PD: Thankfully we have language, then, which makes it possible to reach some level of consensus over things like money, newspapers, and citizenship, as we were saying above.

LS: I would push it a bit further. The first position holds that social actions refer to multiple realities and specific situations where actors give their own interpretations. The second supports the idea of an objective reality constraining social action within specific paths. Giving credit both to individual interpretations and constraining structures for action, we have ground for backing the idea that from subjective perceptions and definitions of reality individuals engage in social processes within shared norms and values.

PD: And these social constructions are "real", even if invisible, and help build institutions.

LS: Yes. However, more than just language (as a tool) I would use Goffman's frame analysis (1974). It avoids extreme relativism (each actor has its own definition of the situation) while rejecting determinism. Instead, actors use and define multiple situations according to other existing frames (that is to say, institutions). But now let's move the discussion back to politics and economics. So, in political theory we have Habermas (1964) who says that if a group of citizens engage in public and democratic debate in the 'public sphere' they will eventually reach consensus, i.e. a dominant view, on specific issues.

PD: Whereas Chantal Mouffe (2000), on the other hand, says that we might as well accept that some of us will never agree with each other and, therefore, that we should accept a dynamic exchange of positions as part of a healthy political process. She calls it 'agonistic pluralism', which we could regard as some middle ground between Habermasian consensus and the perennial and sterile polarisation we see in some political systems, for example in Italy since the Second War. This reminds me of Siedentop (2000) and the path towards Modernity.

LS: What do you mean?

PD: A central aspect of the modernity discourse is the issue of individual freedom versus allegiance to the group (be it family, tribe, city, or nation). For example, countries like Italy can be seen to be in the middle of a transition from a 'pre-individualist society' (Siedentop 2000: 166–7), where the individual owes allegiance to his/her family before him/herself, to a society where the individual asserts his/her right to individual freedom. Of course the Western discourse

of modernity has been amply criticised, for example, by postmodernist philosophers (Lyotard 1979) as being deaf to other paths of cultural evolution and self-discovery.

LS: In other words, the possibility of a 'big narrative' of history for the evolution of different cultures or countries towards Modernity has been discredited.

PD: Exactly. However, the point here is that, with respect to individualism and collectivism, the modernity debate has been appropriated by political currents that are concerned mainly with questions of socio-economic action. This has contributed to further polarisation. For example, individual freedom has been applied to economic action, becoming the cornerstone of neo-liberalism. By contrast, collectivism can be taken as the starting point for new value systems based on social capital, collaboration, and public goods theory. For historical reasons that we cannot consider here, collectivism is also associated with socialism, communism and fascism. These connotations can create significant tension within our fledgling EINS community, so we should probably try to set some boundaries.

LS: Indeed! I see you have started to talk about economics again. Where are we going with that?

PD: Let's see, I happen to be sympathetic to some branches of heterodox economics, in particular Geoffrey Hodgson's institutional economics (1988, 1993) and Stephen Gudeman's economic anthropology (2001). Hodgson defines an institution

...as a social organization which, through the operation of tradition, custom or legal constraint, tends to create durable and routinized patterns of behaviour. (Hodgson 1993)

So an institution can be seen as a social construction. It is interesting that in Southern European countries the term 'institution' can carry a significant *negative* connotation, whereas in Northern European countries this term is much more neutral, and in some cases it carries *positive* connotations. An example of this can be seen in the difference between the definition of institution by Hodgson's, who is English, and Trigilia's, who is Italian:

One can define institutions as a set of social norms which orient and regulate behavior and which are based on sanctions which seek to guarantee compliance on the part of individuals. (Trigilia 1998: 4)

In Trigilia's definition you can definitely sense the coercive power element, whereas Hodgson's is much more neutral and even benign.¹²

LS: Interesting, I see your point, although I am not totally convinced. It can be understood in terms of frame, which I mentioned above. Different frames arise from different individual perceptions and contexts. Contexts are rich historical milieux where the perception of institution is related to the democratic process and to the form modernization took in different countries. We can make a parallel with the Internet. The way the Internet is governed (at a technical, economic, and social level) is a political process, and has to do with how power is exercised at the different scales of the

¹² This comparison between Hodgson and Trigilia is not meant to be "scientific", it is only an informal observation. In fact, in Trigilia's original text in Italian the corresponding quotation places less emphasis on sanctions. Nonetheless, the point remains worth investigating further, perhaps through a comparative study of how institutions are defined by sociologists from many different European and non-European countries.

individual and the institution. It takes us back to the first part of the discussion: decisions (especially policies) are produced through a collective process imbued with images of society, economy, and technology. Therefore, they reflect the positions of the dominant class (or country, like the US in the case of the Internet) on specific issues. Talking about the Internet (or more generally ICTs) it is clear that dominant telcos want to influence regulatory decisions in a way that is opposite to user/citizen preferences. The control of the Internet governance process, which can be heavily influenced by the prevalent view on specific issues by different players, is at stake (the Net Neutrality debate exemplifies this well).

PD: Yes, speaking of scale, we are clearly approaching questions of socio-economic action, in particular juxtaposing structuralism and individualism. I think it may be helpful to refer to Figure 2 at this point. Differing epistemologies are most evident when comparing natural science and social science, but they are also evident within the social sciences. A ‘map of social science’ proposed by Hollis (1994) can be used to begin making sense of the large number of concepts we are throwing together here. Hollis’s map summarises the main analytical traditions in the social sciences divided along two axes: the first a commitment to objectivism or subjectivism, the second a commitment to structure or agency.

As shown in Figure 2, the blue boxes indicate some of the social science epistemologies that we are discussing. A few indicative names are shown to make the table easier to interpret. The left-hand column is generally associated with the rationalist, deterministic tradition. In Western thought it is the older of the two, and grew out of naturalistic philosophy. The right-hand column is more recent, reflecting a greater emphasis on the social world in defining reality (ontology) and construction of knowledge (epistemology). Although interpreting the two columns as an objective-subjective dichotomy risks gross oversimplification, those in the left-hand column can be grouped loosely as sharing a belief in some form of ‘objective’ reality, whereas a more ‘subjective’ perspective permeates the ideas of those named in the right column. The column on the left is generally acknowledged to have a much greater constituency (and to attract more funding) within social science than the traditions on the right that are inspired in part by a hermeneutic (i.e. interpretative) philosophy. The table can also be understood in terms of different accounts of social systems and human action. The top row favours a view of society and the economy that is biased toward the importance of structures and systems over individuals, whereas the bottom row represents the opposite emphasis. This distinction is reflected in methodology in the sense that theories in the top row tend to be deductive, deriving behaviour from general principles, whereas the bottom row is associated with the tradition of empiricism and positivism, where general principles are derived from experience through an inductive process.

LS: I don’t agree on putting Weber in the upper-right quadrant, because he focuses more on individuals and on action rather than on society and structure.

PD: Well, kind of. As explained by Hollis (1994: 147-151), Weber’s starting point is individualist. However, his extension of ‘*homo economicus*’ into ‘*homo sociologicus*’ as rule-following individuals leads to, for example, organizations as ‘Weberian machines’ whose rational and bureaucratic traits are self-evident. So I think both views of Weber are possible.

LS: I see. We said earlier that Popper provides a plausible way to reconcile the subjectivist-objectivist tension. Can something similar be done with the structure-agency tension?

PD: Indeed! Giddens’s theory of Structuration does that very well, in my opinion. Giddens says that institutions provide a structure within which we live our lives. So to some extent they determine many of our actions. However, institutions themselves are the result of social constructivist processes in a specific time- and space-frame. To this I would add also progressive memory-dependent “crystallization”, i.e. the same process through which many flexible social norms eventually become rigid laws.¹³ In any case, the point is that through language our social interactions provide an upwell of transformative pressure from within institutions, which over longer time-scales are thereby able to renew themselves and evolve.

LS: I understand that you think about language as an explaining category (as power could be). But, please, do not reduce everything to language!

PD: All right, but don’t worry: language for me has a more important epistemological function than ontological role. In other words, I do not believe that social systems are made of communications, like – oversimplifying – Niklas Luhmann does. In any case, to me structuration provides a nice balance between top-down structuralism and bottom-up social constructivism. It represents a theoretical approach that tries to solve the macro/micro incommensurability. Again, the important thing to our discussion is that it highlights the dynamic and context-dependent nature of the process we are observing.

LS: You sound like an sociologist! In other words, is Giddens saying that micro- (actors) and macro- (structures) levels influence each other in a long-term process?

PD: Not exactly. Macro-structures influence individuals on *short* time-scales, whereas individuals, through social interactions, generally can influence institutions only over *long* time-scales. Anyway, we have a couple of binaries left to address: essentialist vs. existentialist and context-free vs. context-dependent binaries, which are similar, and the conflict vs. regulation binary.

LS: We have kind of covered the latter.

PD: Yes, but we can say a bit more. Burrell and Morgan (1979) provide a map of sociology that is similar in spirit to Hollis’s. It overlaps Hollis’s map on the subjective-objective axis, but instead of the structure-agency axis it relies on a conflict-regulation dichotomy. They argue that many works in sociology rely on an assumption that some level or “harmony” is attainable, for example Talcott Parsons’s functionalism.

Others, for example Marx, believe that conflict is unavoidable and is intrinsic to human nature. Since I have an engineer’s mind, I saw an opportunity for a 3-D diagram, see Figures 3 and 4. Note that in Figure 4 the cube face the stickperson is looking at corresponds to Figure 2. Going onwards, my exposure to physics and my ever-stronger attraction towards mathematics provides a good balance for the social constructivist thinking. I was always partial to

¹³ For example, most academics are familiar with the process whereby administrative procedures are communicated and actioned informally, but become progressively more formalized over time, eventually involving many steps, many people, and many written rules, forms, and signatures, which are perceived as exogenous to the community.

structure, and now I can see that this may be nothing more than how our minds are sensitive, to different degrees, to algebraic structure.

LS: You lost me.

PD: Algebraic structure is closely related to Platonic essentialism, which in my mind is related to context-free concepts and theories.

Fig. 2. Map of social science (after Hollis 1994; and Dini et al. 2011)

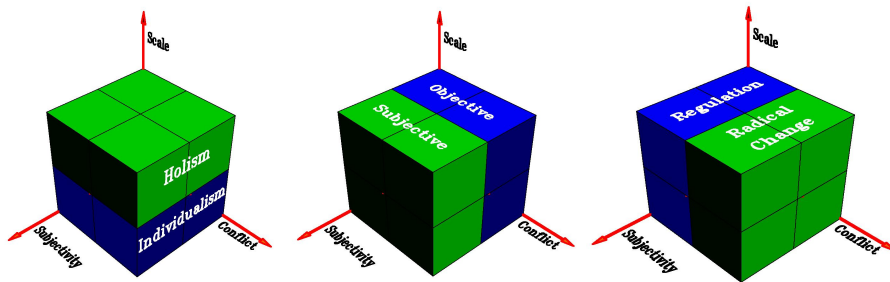


Fig. 3. 3-D view of social science (after Hollis 1994; and Burrell & Morgan 1979)

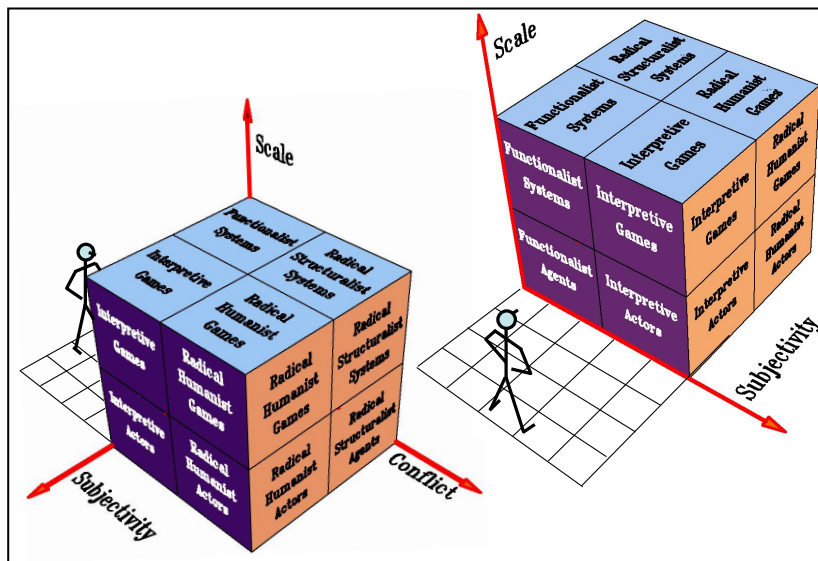


Fig. 4. Social science in a box (after Hollis 1994; and Burrell & Morgan 1979)

LS: Whatever you say! Anyway, where is the context dependence then?

PD: In evolutionary dynamics. The DNA blueprint (genotype) of an individual organism can lead to slightly

different phenotypes depending on the environment the organism develops in, and over many generations a species will adapt to its environment. So the core “design” – a common example is the eye – is fairly stable, but the finer details will change and adapt as the environment changes. An analogous perspective in the social sciences is provided by post-modernism.

LS: You are making big leaps again, but OK. Where do we go from here? Where is the Internet in all this? And can you please provide an example of the parallel between organism and post-modernism. In my understanding, post-modernism opens up multiple paths to knowledge through relativism. Where is the link to the evolutionary dynamic of organisms and phenotypes?

PD: Relativism is the basis of evolution. Natural selection is meaningful only relative to a given environment. In other words, a successful organism is only successful relative to a given environment, not in absolute terms.

IV. CONCLUSION

PD: If we combine the ideas we have talked about we should be able to start seeing how different disciplines and different individuals approach and relate to the Internet.

LS: I suppose, but we haven’t yet arrived at an understanding of what the *structure* of Internet Science might be.

PD: You are right, we have only started to sketch an outline. I believe that, whatever Internet Science might end up being composed of, it will depend to a significant extent on the dimensions I mentioned at the beginning: social constructivism, the interaction between power and knowledge, and some system of value that goes beyond current mainstream understandings of market and exchange economy, without negating either. But in this dialogue we have only touched on the second and we have not discussed the third at all. In any case, the idea is not so much to develop a single and unique view of what the Internet is or what Internet Science should be composed of. The idea we have been developing in our conversation is to set down some principles of interaction and communication for internet scientists, so that they can understand each other better as they work towards a common methodology for *doing* Internet Science, which might eventually lead to some shared understanding of what Internet Science *may become*.

LS: That sounds good to me. ‘Til next time then!

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