

# Open Science, open issues

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Editors



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Edited by  
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# 2

## Ways of science: public, open, and commons

*Antonio Lafuente e Adolfo Estalella*

TO PROCLAIM THE PUBLIC nature of science has become both commonplace and a much discussed topic. The consensus is sometimes overwhelming: the world calls for more science and everywhere more funding is demanded for research, taking it as a given that science is not only economically necessary but morally irreplaceable. The understanding, however, has never been absolute and there have always been those who denounced a democratic deficit associated to how little discussion there is about the kind of science we want or the fact that we keep addressing as externalities the damages inflicted by the use of technology upon the environment or people's health. It is true that in addition to being public, science is also private and the intersections between academia, the government and businesses are long-standing, intense and, sometimes, obscure.

Science is not only semi-public, but cannot exist without the public (NOWOTNY et al., 2005). There is an abundance of papers which insist on the urban, social and collective nature of science. Far from what we would be told by the stalest historiography, science is not a business made for geniuses, nor is it something which happens in the brains of a few. It is obvious that the locus of

science has always been academia and the laboratory, but it is not less true that it has gained space in company headquarters, boards of directors, trade fairs and the stock exchange. However, our list of urgencies would be incomplete if it did not incorporate the garage, the market and the streets. Science has always maintained a complex, dynamic and vibrant relationship with people, amateurs, artisans, witnesses, spectators, activists and consumers. And yes, it is true that citizenship, for better and for worse, owes much to science, in the same way that the thesis that science owes much to citizenship is also correct. There are plenty of anonymous, invisible and tacit contributions to knowledge that are hard to accept and that our history is determined to disregard. Not only is the modest figure of the *travailleur de la preuve* the majority, as said Gaston Bachelard (1986, p. 56), but the figure of the academic leader, or the group leader or the first signatory is also exaggerated. As a consequence, everyone seems to be accomplices in producing an exaggerated and certainly self-interested image of science.

The author, as we know, has never been the key part in the mechanism that moves the scientific machinery. This recent change is associated with the imperatives of the new public management which, on one hand, claim the capacity to regulate the economy of the reputation and, on the other, the freedom to impose the imaginary that contribute to convert knowledge into coded information. The consequences are catastrophic because not only do they encourage different processes of privatization of knowledge, but they also accentuate the production of new asymmetries that explore the environmental justice studies and increase the severity of practices identified as industrial secrecy, academic fraud, social segregation and economic monopoly.

To develop our argument, we have divided the text in three parts. In the first part, we explore the historical origins of the condition of science as a public good. In the second part we show the problems in making analogous the conditions of commons science and open

science, which is equivalent to saying that the demands of the open access and open data movements are necessary but not sufficient. The third section argues that the condition of common good is not reached when the good is for everyone but when it is, among all, that which provides the conditions for the common good, to meet the requirements of the third sector, along with the private and the public. Science understood as a commons would not be public but open science or extramural science yet not merchanted. Neither would it be formal science, as usual, but capable of including the dimension of citizenship in the design and evaluation of projects and their outcomes. It would not be the same science as always but now in a democratic or postmodern version. Science is not a commons as a result of being more functional, open or militant, but for being the fruit of the implementation of contrastive, collective and recursive cognitive practices. The commons would then be a historically differentiated way of producing knowledge, community and commitment. Thus, in the third part, more than science as a commons, we will discuss commons as a science.

## SCIENCE COMMONS AS PUBLIC GOOD

The concept of science as a public good is relatively recent. Philip Mirowski (2011) has devoted many efforts to explain it. In order to understand the concept, one has to accept that the pressure to which scientists have been submitted to by the Church, the Empires and the State has many similarities to what nowadays is practiced by industrial corporations. It is well known that already in the 19<sup>th</sup> Century university laboratories were intensively searched by industrialists who sought to find among test tubes and reels some discovery upon which they could develop new monopolies. Everything seems to indicate that the communitarian nature of science earned credit because somehow the companies which financed industrial laboratories had to be legitimated as



proprietary of the findings. Thus, if the discovery was the result of collective work, nobody except the owner of the space where that knowledge had been produced could claim the patent.

World War II changed that picture drastically. During the second third of the 20<sup>th</sup> Century, the State claimed the right to direct science and also to create the conditions to accelerate innovation. The war economy gave birth to a techno-military complex where public sector would invest in basic science in order to guarantee the free circulation of knowledge among entrepreneurs participating in a game whose rules, laid down by the army, served as the reason of State. The condition of public goods meant the nationalization and militarization of the so-called Big Science. From the 1980's, things changed at full speed, as the Bay-Dole Act (1980) and other judicial decisions in the USA created the conditions for the start of an accelerated process of privatization of knowledge. Discoveries, and not only inventions, could be the object of intellectual property rights and, therefore, could be treated as current assets in the stock market and attract risk capital. If, in the 1960's, knowledge had been treated as an imperfect asset which could not survive in a free market situation without government support, twenty years later the necessary juridical, political and financial instruments had been already developed so that science could flirt with neoliberal economy. In this new *academic capitalism* regime, the frontier between the public and the private tends to dissolve (SLAUGHTER; RHOADES, 2004; SLAUGHTER; LESLIE, 2001).

The transition, however, did not happen without resistance. What is already obvious to everyone was anticipated just by a few. And those arguments are still valid. Paul A. David (2008) explained to us how – since the dawn of modern science, scientists started to be perceived as people out of control due to the sophisticated nature of their knowledge. In court, given that nobody could act as counterweight, the only option was for open knowledge so that it was scientists themselves who ruled over the quality of their

peers' work. This may have been the origin of awards, academies and journals. The autonomy of science led to its organization as a meritocratic, open and cosmopolitan corporation. To distinguish between the wise and the charlatans required the participation of new spaces, different actors and different mediations which, as a whole, lead us to treat the so called Scientific Revolution not as an *epistemic revolution* as it was described by authors like Alexander Koyré or Thomas Khun, but as an *open science revolution*. Michael Polanyi also wanted to join the club of those who denied that knowledge could be treated as information and then subsequently, having uprooted it from its production place, convert it in monetizable resource. The commodification of science was impossible because one could only patent knowledge that was not tacit. Norman Wiener, for his part, defended that innovation was an emerging phenomenon that, as in any other complex system, was associated to the multiplicity and heterogeneity of the interactions between different actors, while patents would operate like bottlenecks which impaired the flow of information. The three positions mentioned above argue that science only thrives when it is held as a collective business whose fruit are not reducible to codifiable information and whose organization goes beyond attempts to confine them within a protected environment (JONES, 2006). The history of ideas, the anthropology of organizations and the economy of innovation coincided in the need to reclaim from the State an active role in the preservation of science as public goods (MIROWSKI; SENT, 2008; SENT, 1999). It is this tradition that Michel Callon inherits and assumes in his provocative way of thinking science.

Callon's (1994) reasoning begins by demanding from readers the acceptance that knowledge has always been a very worldly enterprise, never isolated from surrounding interests. To say the contrary is to ignore all the work already done in the field of science. To claim the condition of commons for science implies the acceptance of the

erroneous thesis that ideas are easily transported between different sites, be they curricular, cultural or geographic. It is true that for decades, even centuries, we have told the history of science as if it were the global expansion of an oil slick or the spread of an epidemic. There is nothing natural in the transmission of knowledge. It is a mistake to associate the dissemination of science to the propagation of ideas. What the STS have taught us is that verifying any natural law or checking the relevance of a scientific concept requires plenty of machines, technicians or alternatives, as well as time and resources to produce, select, contrast, discuss, standardize and communicate findings. To say that Newton's laws are met in Cuzco means to say that we are able to replicate in the Andes all the paraphernalia needed to verify them. Ultimately, we are saying that ideas exist embedded in things and there is very little which is intangible in the transmission of knowledge. For that reason, it is increasingly more necessary to distinguish between knowing with words and learning with one's hands. To turn science into a commons is a utopian project and makes us ask ourselves if we can truly bear transmission costs which would be extensive (ARVANITIS, 1996).

The *actor-network theory* had questioned for years the notion of scientific community as the basic element and engine of the dynamics of science. If science is a company run in a network, we may demand that more convenient ways are adopted in order to guarantee the diversity and proliferation of actors, questions and processes. Healthy science should promote *Freedom of Association* so that different forms of organization are always in place; Callon also asks for *Freedom of Extension* so that the network prevents the enclosure or the imposition of some form of orthodoxy or canon, and finally invites all the actors involved for a *Fight against Irreversibility*, aimed at preventing monopolies from creating standards that block out innovation. That means that the notion of public goods is explicitly associated with diversity and not to free access. It would be important, then, not to share goods

equally, but to create the conditions to prevent the interruption of production processes and the diversification of knowledge. The goods we want to protect are not knowledge, but the plurality of forms of socialization it promotes. We do not need the State to protect knowledge itself, but the networks where it circulates. This is not about the protection of ideas which are published or merit a Nobel Prize, like the infrastructures which support them and that are frequently both opaque and contrary to public domain.

## SCIENCE COMMONS AS OPEN SCIENCE

To imagine science as a common good demands that we stop to think of it as something that can be separate from the market (HESS; OSTROM, 2007; CORSÍN-JIMÉNEZ, 2013b). We also need to dissociate those complaints from the notion of free access. Elinor Ostrom has argued with memorable forcefulness: nothing could be more contrary to the common good than open access. In fact, the confusion between both concepts is what led Garrett Harding (1968) to proclaim the tragedy of the commons and to demand as a survival strategy the public or private patrimonialization for the goods that really mattered. The commons, repeated Ostrom (1990), are not a *thing*, but a form of management which fails when the community that supports them and is maintained by them is not supplied with efficient rules to, among other threats, protect themselves from *free riders*.

During the last decade, we have witnessed the birth of several movements which have claimed for science the status of open enterprises. Although not all proponents use the same arguments or emphasize the same principles, it seems reasonable to mention two of the main types of reasons. On one side, there are those who question the widespread practice of outsourcing of the communication process. All share the criticism that the current system is both wasteful and paradoxical, since it involves huge

costs in the production of papers, which then must be bought from those to whom they were previously given at zero price (MOULIA et al.,2013). And what was said about articles worsens embarrassingly when we think about the data, as scientists have got used to a regime of competition which is so compelling that they have turned non-cooperation into the password for their professional ecosystem. If the data is the foundation of academic work, it is not surprising that within a similar knowledge regime, laboratories treat findings as a scarce resource which must be protected from piracy. The academic problem is serious, but it is even more worrying when we think about clinical essays or expert opinions which condition the processes of *technology assessment* and, in general, great part of political decisions which affect our community life.

The second reason to claim free access to scientific information has to do with the aspiration of well-informed policies, faith in freedom of choice and the strengthening of democracy. Discussions on energy options, the consumption of genetically modified food, the quality of the air, food labelling or the treatment of chronic diseases, not to mention the role that our society must assign to homeopathy or the many forms of alternative medicine, open processes which must be openly discussed. Nor is it a less important matter the fact that the exaggerated costs of scientific information or of medication exclude their use from institutions, patients or poor countries, making science another contributing factor for the asymmetries of our world.

Waste, careerism and opacity are well-deserved criticism that justify the slow move in favour of open access. The quality of democracy and global justice are not minor objectives and perhaps cannot be postponed. However, it is true that something stinks in this whole debate. Open science policies correct some of the urgent needs of the current system, but it is no less true that open, online and free of charge distribution has a cost whose main beneficiaries are great corporations or, in other words, those who have the

capacity to capitalize on the information. Moreover, it is not obvious that accessibility corrects the role of science in our world in a more decisively manner. The fact that information is available does not mean that we may use it or do something with it, since it will still be material that is extremely linked to technologies and to the values under which it was produced. Ulrich Beck (BECK, 1992, p. 166) was right in sharpening the pencil to write that facts are nothing more than the possible answer to questions that could have been asked in a different way. Alternatively, and more directly, instruments would be of little use if, once accessible, could only function at the service of the same questions, the same protocols and the same forms of knowledge validation. We need to ask ourselves if things could be different. Is making science more functional everything we can aspire to?

Those who study open science have invited us to consider phenomena like SETI or all crowdsourcing projects associated with the pioneer platform BOINC. Voluntary computing has become a powerful mechanism to address problems which call for huge calculation capacity. Distributed computing, be it private, public or citizen, already has many successes to be proud of: *GalaxyZoo* or *Innocentive* have attracted numerous studies seeking to explain how the world of Big Data or open innovation constitute new hybrids with which we will have to learn to deal with. *Wikipedia* and *Fold.it*, two very different projects, show without attenuation the emerging power that can be unleashed by connected crowds (FRANZONI; SAUERMAN, 2014). We are referring to the colossal devices that interconnect millions of human beings; we are also referring to new forms of producing and validating knowledge (NIELSEN, 2011). But it is not only that crowdsourcing, allied to crowdcrafting and crowdfunding, feed the long deferred dream, capable of replacing the illustrated *technology for the people* with the more empowering *technology by the people* (HAND, 2010). There are examples which lead us to imagine a citizenship capable of producing facts that

antagonize with official data, whether we talk about environmental or food crisis, or to the production of new maps, different patterns or institutions. If so, we would be experiencing the dawn of new knowledge regimes which would be organized upon other forms of encoding, filing, communicating and validating knowledge. Laboratory space, formerly reserved for experts, becomes disputed over. Experts have reasons to feel restless. Everything indicates that their consolidated hegemony might be in jeopardy. It is not the first time that some demonstrations of discontent resulted in the widening of knowledge space, including new actors and different questions. Those who accept these propositions treat the influence of *criollismo*, hygienism, feminism, functional diversity or environmentalism as epistemic modernization processes (HESS, 2007; LAFUENTE, 2012). Isabelle Stengers (2005) talks about cosmopolitics to remind us of the forcefulness with which non-professionals have always been expelled from public spaces must be replaced by a more respectful gesture with epistemic pluralism. Peace needs to be settled: we need a lasting agreement that does not insist in the division of the world between those who know and those who do not know, a ceasefire which saves the world from the arrogance of a selected few. To say that we need science to guarantee a prosper future is not enough, given that a number of times there has been a claim for more science which ended in the gassing of troops, bombing of cities or, in general, legitimizing an exclusion policy that, ultimately, guarantees new wars for science (STENGERS, 2006).

Citizen science has shown its ability to secure presence in public spaces (IRWIN, 1995; COLLINS; EVANS, 2002). The Gulf War disease syndrome (BROWN et al., 2011), the struggles of those affected by AIDS (EPSTEIN, 2007), the protest that represents the French Muscular Dystrophy Association (CALLON; RABEHARISOA, 2003; RABEHARISOA; CALLON, 1999), the arguments on breast cancer introduced by feminists (MCCORMICK et al., 2011), or the

visibility gained by electrosensitive patients (CHATEAURAYNAUD; DEBAZ, 2010), have much in common. Here we want to highlight, as taught by John Dewey (DEWEY, 1927; BROWN, 2009), that which is crucial for our democracy: to be no longer invisible and to gain the ability to establish a dialogue with public administration. The important aspect is the way in which this was achieved, as protest turned into proposal, demonstrating the ability to produce, mix and communicate information based on data, concepts and validated scientific objects. The scarcity of their means and the political harassment they were subjected to did not prevent the advancement of their proposals. They have gained, as explained by Jacques Rancière, the right to the city. We have been taught different forms of civility, more inclusive and contrasted. They have demonstrated i.e., proved with arguments and occupied with their bodies, their right to take the floor in public spaces (RANCIÈRE, 2007).

If we were to make an urgent appraisal of the meaning of citizen science, we would have to acknowledge that it is more science, in spite of being conducted outside the walls of academia. In fact, citizen science is independent science, knowledge developed by virtuous communities which, being radical in their political rhetoric, are more conservative than what we would imagine in scientific practice. For example, they share with Robert Merton the values that characterize imaginary scientific communities: communitarianism, universalism, unselfishness, objectivity, scepticism. Thus, citizen science would be the last refuge for the fall of Mertonian science, while the so called *Mode 2 science* would be what we have always had – a hubris variable that joins academic, corporate and governmental interests (NOWOTNY; SCOTT ; GIBBONS, 2001; NOWOTNY, 2003; STRATHERN, 2003). They are very distinct, but share the same epistemic project, even if many times citizen science has adopted counter-hegemonic profiles. In the same way that aeolic energy competes with fossil or nuclear energy, the truth is they can all coexist in an orderly fashion.



## COMMONS AS A SCIENCE

Citizen science is not monolithic and we need to use the plural to refer to them. All citizen sciences share a resistencialist gesture. Some, in addition, have shown that there are alternative forms of relating to the political, economic, scientific and environmental surroundings. At this point hacker culture must be mentioned. We certainly owe much to Pekka Himanen (2001) and his notion of the hacker ethics, as an expression of technological nonconformity which object to the idea that things can only be what they were designed to be. However, the most radical hacker gesture, as taught by McKenzie Wark (2004), implies not only an argument over the functionalities but also a confrontation of the properties. Hacking the world is not only about inventing new possibilities of inhabiting and transforming it, but also to return to the commons all that has been abusively patrimonialized by states and markets. The first hackers, back in the 1960's and beyond, invented the quadrature of the circle: to be an author there was no need to be a proprietor, given that one could only reach the position of creator of something in the very moment when it was donated.

Nothing has been more radical in these approaches than the hacker movement. Nobody did better in translating into sustainable practices and protocols the commitment for an open, experimental, inalienable, horizontal and distributed culture. The texts written to explore each of these words would make up a mountain. We will not raise it in these pages, but neither will lose sight of it. Writing codes is not all the only action from supporters of free software – an ecosystem which only works through the functional assembly of programmers, documentarians, testers and translators. Good care is required and not all succumb without the guidance of the specialist. The success of free software is linked to the fact that it works, or in other words, that programme run, are functional, do their tasks efficiently. Despite the noticeable fulfilment of this

expectation, what makes it an exceptional cultural, political and technological phenomenon are the resulting forms of organization of knowledge. How can that be explained in a few lines?

We will take two of its characteristics: the *fork* (COLEMAN; GOLUB, 2008) and recursiveness (KELTY, 2008). A fork is produced when part of the community involved in the development of a project decides to opt for another alternative, to separate from the dominant criteria. When that happens, dissidents are entitled to take all the codes which they use to share until then. Free software then is always open to all its possibilities, always turns out to be a beta design, a prototype incarnated by a non identitary community, a project which is always “*more than many and less than one*” (CORSÍN JIMÉNEZ, 2013). Projects which learn from their mistakes are recursive, something that children do naturally, sometimes in order to imitate adults. Nevertheless, here we are interested in the notion of recursiveness when it applies to systems not people or simple projects. In such circumstances, we say there is recursiveness when not only is the functionality of the device preserved, but also its moral integrity or, in other words, when the protocols and the code are responsible for preserving the values that sustain the project, i.e. the community.

What gives a vibrant character to free software communities is not the purpose of producing for all, but to build them together. The commons for which they work is not guaranteed by free access, but by the determination not to exclude any form of collaboration which improves the outcomes. We are not referring to people only but also to cultures. The result, naturally, is not a product but a way of understanding our relationships with technology and with other human beings, based on the principle that the language used for communication between machines should be open and that communities must be formed by peers in order to dissolve the artificial and imaginary borders that our society creates between nationals and foreigners, experts and amateurs, communicate and share, or between free and free of charge. As already mentioned, we

are talking about cosmopolitan communities, informal and based on the economy of talent (LEACH; NAFUS; KRIEGER, 2009). Nor is non-payment the divide which makes these productions unique. Sharing the code has led to the creation of alternative business models which do not ruin those who opt for free software.

## MAKING THE CITY

The hacker culture is no longer restricted to the *geeks*, nor is it a matter for computer freaks. Nowadays we talk about hacking museums, academia or the city (COHEN; SCHEINFELDT, 2013). There are hundreds of projects which dare look at the arts as if they were companies that we should re-found on less commercial principles, fighting to free the music, painting or architecture activities from the hook of the cultural industries, tourism or real estate speculation. The city itself, our public squares and abandoned building lots may be inhabited otherwise. Not everything should be sacrificed for speed, security and profit. Our needs are not met by transport, the police or trade. Our streets may be a meeting place for neighbours who do not get together to consume or protest. The street is being widened as the space par excellence by a form of sociability which we had never had and that yet it seems we are losing.

Many people are afraid of wandering around, of eating street food, joining spontaneous parties, touching unfamiliar bodies or, worse yet, to have free time (DELGADO, 2011). In short, we no longer live with our neighbours, we just put up with them and our cities are just containers of fleeing humans. There is an increase in the number of cities in whose public squares and building lots there are groups of citizens who, tired of all the submission to the ideals of individualistic consumerism, are recovering the pleasure of sharing dances, food, fairs, bazaars, markets and other forms of popular celebration and interaction. We were nearly convinced that we would better forget these old-fashioned forms of sociability.

Now, however, we see them as a heritage which embodies the best of us, in other words, of all we share and do together.

Many architects, artists and social scientists know and continue to write about the topic. Yet we have not advanced much. The city should be occupied, we need to fight over it against the leisure, insurance and housing corporations (HARVEY, 2012). This is the origin of a whole series of new emerging urbanisms which operate a singular change in a city that represents both the setting for protests and the very object of proposals (VV. AA. 2009; VASUDEVAN, 2014). The new urbanism is emerging in the abandoned lots, urban gardens, bike routes, the nomad streets, neighbourhood associations, neighbourhood parties, the recovery of memory, the local markets and all the many forms of association implied in these forms of collective experience of the city, based on connections at the same time fragile, sporadic, tentative, intermittent and still recognizable, concrete, localized and functional.

We would fall short, however, if we reduced the notion of a proposal to an action plan presented in a document which selects, articulates, schedules and forecasts a packet of specific lines of action. All of that must obviously take place, but the most important thing is how to identify the narrative and the community which supports it. What matters, in fact, are the bits of learning which they had to go through in order to get somewhere together. The important thing is that they learnt to build together. For that reason, the emerging collective urbanisms constitute real citizen laboratories for experimentation with our capacity for learning how to live together while we give form and produce viable proposals to tackle the problems around us. Proposals are made, and above all the urban experience is reconfigured. There is, therefore, a shift in the way of inhabiting the city and making politics: that which goes from discourse to intervention, which takes us from the fleeting word to the problematization of the infrastructure. (CORSÍN JIMÉNEZ, 2014). The global Occupy movement is perhaps a paradigmatic

example of this other urban practice. The protest camps set up in the most diverse geographical locations such as New York, Madrid, Greece or Hong Kong were a sign of reurbanization in the city which put into play their own bodies, threw light on a different kind of relationship and of thinking the city, while giving new material to political action (CORSÍN JIMÉNEZ; ESTALELLA, 2014). Something especially clear when related to the cycle started more than a decade before by the alter-globalization movement. If the alter-globalist proposals intended to seize the foreign city, Occupy attempted to literally occupy their own city (MAECKELBERG, 2012). However, Occupy is only an indicator of a movement with global reach which extends back in time and expands in a global geography through initiatives which claim the right to a different city.

Henry Lefebvre (1969) presented us, several decades ago, the figure of the right to the city. A diffuse expression recently recovered by initiatives intended to make a different city; in reality, the right to the city, perhaps due to its initial ambiguity, has become an emblematic symbol of the new urban mobilizations. We refer to initiatives that are not limited to claiming the right to this or that, but that have different aims. It is not about claiming the streets only, but to build public squares. Public space which suffers material interventions empowers those who live in it with new capabilities and renewed sensitivity, while at the same time equipping the right to the city with new infrastructure (MARRES; LEZAUN, 2012). The urban gardens that dot the abandoned lots, furniture that organize neighbourhoods and the initiatives to occupy empty urban areas are instances where the right to the city is no longer an exercise in complaining but the work to build a different kind of city which dissolves the split between the urban and the rural, turning the street into a hospitable extension of the home and filling with a neighbourhood spirit what before was only a wound, an empty urban space.

In all these projects, people are learning to experiment their city in a different way, and although accredited people are well

received they never act as experts. No knowledge is dismissed in these collective experiments which always go beyond formal and traditional expertise. These are projects in which everyone can experiment, investigate, interpret, contrast, reach an agreement, learn and among them create new knowledge (ESTALELLA; CORSÍN JIMÉNEZ, 2014). Literature exploring other forms of experimenting which are not associated to the idea of contrasting hypothesis is increasingly abundant. There are many experimental cultures, historically open, and not all of them have their development associated to the idea of demonstration. Testing, along with naming, collecting, describing and changing the world are gestures that conform different styles of experimentation (KLEIN, 2003). What we have learned from studies of science is that the task of knowing something has less to do with the task of assembling proposals than with building relationships with the environment: it is not an effort of mental musculature but a relational practice (ROUSE, 2002). No example is clearer than these interventions in the city of a tentative, precarious, vulnerable and hopeful nature, or said in a different way, experimental. No one is surprised by those solutions, unless they are simplistic and discriminatory, therefore more time is dedicated to listening than to planning, to doing not thinking and to saying not writing. In order to pose a good proposition it is necessary to put the logic of caring before that of the evidence, and plural episteme before functional ones. A good proposition assembles actors who are potentially very heterogeneous and makes up an open space ready to the identification of matters to be clarified, the discussion of ready-to-wear ideas, the contrast of personal experience, the criticism of circulating interpretive patterns, the examination of the value to be assigned to data or the analysis of other alternative approaches. Altogether, people, instruments, models and practices form an experimental system that, as happens in the best academic science and as explained by Rheinberger (1997), sets off without the safety of the result and among fuzzy and fluid convictions which are

not described in methodology manuals and the majority of scientific accounts. There is a risk in wanting to try other forms of inhabiting the city and wanting to turn our vulnerabilities in an opportunity to recognize the emergency of new urban textures, or as Despret and Galetic (2007) said, to be affected by this unprecedented vibration, this uncoded throbbing (LATOURE, 2004a; SANCHEZ-CRIADO, 2005). Thus, the city (in) common that we are evoking does not spring from the expertise of urbanists or politicians, but is brought into existence to respond to other propositions to inhabit the city.

Latour (2004b, 2010) says that we are facing new forms of making up the world which we must mix with those forms which are typically modern and based on contrasted facts or agreed opinion. Politics and science must admit that their allocation of powers over the world are not enough: not everything is a matter of law or fact. Not everything may be managed through laws, agreements, standards and innovation. There is much to be admired in all these entities that science brought to the world and of which we cannot or do not want to dispense with. The world is full of neurons, ozone and neutrinos, not to mention hadrons, transgenics, bits and Cro-Magnons. It is useless to paint the full picture, but it would be unfair not to mention the atmospheric carbon market, the bee crisis, the endocrine disruptors and the desecration of intimacy. Neither have politicians renounced to sowing our lives with a multitude of prodigious objects: rights, infrastructure, standards, labels, taxes, flags and holidays are just a tiny part of this legacy. Politics is not a matter to be taken lightly: our debt with those elected is immense. However, it would be insensitive if we did not evoke the prevarication, the inequality, the secrets, the war, the pillaging and other monstrous productions. All these entities have widened our world, our sky, our bodies, our city, our language and our privacy.

Making a city amongst all, build a common city, calls for something beyond codes and congresses. We repeat it: we do not want, or know, or play at destroying the world of politics and the world of science.

However, it is true that the world of the elected and of the selected no longer represents us completely. We have to, we can and we know how to build a common world. In order to build it we need to bring to existence entities that still do not inhabit it like, for example, a new right to the city, a new urban dweller, new sensitivities, new organs... a series of entities that will help that which is common to rise, in other words, that which is created by all. Making up a city does not imply the production of new consensus or dissensus; neither does it claim for new maps of the reality which may expand our capacity to know or to disdain the environment. The world in common does not claim for more experts, or more mayors, not even more agnostics, more paranoids or atheists. The common world is a world (in) common, made by all, with words, practices, protocols and infrastructure that, as mentioned before, must be open, emerging and recursive. The hardest thing to accept is that we still do not know, as Newton or Montesquieu did not know their creatures, which will be the entities that will make up the common world.

## CREATING A BODY

The city looks like a manageable object by non-accredited actors. But what about the body? Must we also reinvent a body (in) common, a body amongst all? The answer is yes (LAFUENTE; IBANEZ-MARTIN, s/d). The accelerated expansion of chronic ailments, together with the growing number of people with serious mental disorders, eating disorders, addictions or behaviour disorders, added to the existence of many groups of people affected by allergies or intolerance, turn diseases with no cure expectancy into a new and disturbing phenomenon. We have been educated in the conviction that all evil would have a technical or scientific – therefore political – solution. We were not prepared to confront the obvious and to admit that human bodies are not the same and that each one reacts differently to the same therapies or circumstances.



Thus, general solutions always produce affected minorities. In addition, not everyone tolerates equally well the bad quality of our air or the contact with chemical substances whose effects on people's health are ignored. It seemed that all of a sudden we had been attacked by an epidemic of fragility. Many people – we do know if the more lucid or those who have lost all hope – have lost the confidence that institutionalized knowledge may offer them some consolation. There are answers for everything, from those who have fallen captive of some alternative and confusing discourse, to those who talk among themselves to explore what is happening (to us).

The first inexcusable example is Alcoholics Anonymous, AA (KURTZ, 1982). A well-known case which has been shown on the cinema many times. Its cognitive and political relevance are quickly verified, because we are referring to an initiative of those affected, which develops at the margin of public institutions, be they academic or related to assistance, sanitary or police services. In AA meetings, it is assumed that there is no individual cure and that it is the strength of the group (sometimes identified, especially in the beginning, with the presence of some divine or transcendent force) which allows those who succumbed to addiction to be rescued from the hell in which they inhabit, and all the lies told to pretend they had the situation under control. Admitting their own weaknesses becomes the key which leads each one of the participants to feel recognized and comprehended in other people's accounts. Evil, consequently, ceases to be the result of individual failure to become the expression of a culture which causes the hypertrophy of the individual as opposed to the relational. An addict would be someone who has taken too seriously the fiction that they have an inner self perfectly confined in space and time, which is the same as saying that it fits perfectly in their bodies and their memories. An addict would be someone incapable of admitting the systemic nature of that which we call personality. What the participants of the AA

meetings are doing in their meetings, based on their experiences and through the spoken word, is to reunite with themselves around an inner self which is more distributed, open and emerging. Nobody carries a hero inside except the candidates to fall down, and the alcoholics are the wound through which bleeds a world excessively prone to competition and to heroic gestures. The novelty is in the fact that the experiential acquires not only cognitive but therapeutic value; participants state that AA meetings changed their lives, or in other terms, they state their quality of life improved. The cure through the word is an old and disputed issue, but what interests us here is the recognition that the so-called recovery movement has gained – a movement created by many groups of addicts and mentally ill patients who acknowledge in the AA an undoubted source of inspiration (FARRIS; KUTZ, 1990; WHITE, 2005).

There are thousands of AA groups all over the world, but the participants not always live nearby or can easily access the meeting places. Bringing together dispersed individuals has always been difficult and costly. The internet allows that to happen at nearly zero cost (SARASOHN-KAHN, 2008; FERGUSON, 2007). We have many examples of communities that have used the internet to meet and talk about what is going on. We are talking about groups disappointed with the response they have received from academic and public institutions. We refer to groups of diseased who have not found the expected comfort from formal therapies. There are many groups of diseased who have decided to adopt a critical posture in relation to medical practice and their canonical institutions (RODRÍGUEZ-GIRALT, 2010; BROWN, 2004).

There are two cases which we will examine in order to explore the breadth of these counter-hegemonic movements. The first are the electrosensitive (CHATEAURAYNAUD & DEBAZ, 2010), a condition which affects 3% to 5% of Europeans, with varying degrees of severity. The electrosensitive are patients who had to fight for their diagnosis, because without the acknowledgement

of the disease they might lose their jobs or be treated as people without courage or will by their family circle. In practice, we know that a percentage of those affected could suffer the extreme fatigue syndrome and were too depleted to perform ordinarily in life. Without energy and proper diagnosis, their life was an ordeal full of incomprehension and misunderstandings, because frequently they were told in medical consultations that they suffered from some kind of post-traumatic shock originated from their lack of ability to adapt to the technological changes of our time. It was not waves that were killing them, but their resistance to adapt to the modern world. So they decided to get together to discuss what happened to them, with a view to elaborating a document that could represent them, which gave form to the diseased they were suffering from. They managed to convince authorities in Scandinavian countries. So much so that electrosensitivity was accepted as a new illness, which returned to patients the condition of full citizenship and the benefits that the sick enjoy in the so-called welfare societies.

The second case we would like to recount consists of a gigantic online group which brings together mentally sick patients tired of taking anxiolytics and antidepressants. Not only do they discuss whether the solution to problems they experience are the pills, but they are also committed to giving higher cognitive value to their own personal experience. They have decided to use chats to try to understand each other, and to check if there is anything in what they feel that respond to some shared pattern. What happens when people with mental disorders of the Brain Talk Communities (HOCH; FERGUSON, 2005) start to talk, in the same way that it happened with the electrosensitive, is that there are no words to refer to their condition. As the diagnosis or the treatment they are given is not satisfactory, they are forced to identify features which may be recognized as symptoms, which makes them create a shared and contrasted language. Shared because communication does not get interrupted and contrasted because they need to be sure that

homemade, local or bizarre medicine which circulate on the chat are effective and not mere placebos. Not only do they contrast potions, but also ideas, sometimes heard in their consultations with their respective doctors, sometimes read in some free access academic repository. What we are saying is that those concerned, based both in their own experience (the proprioception as proposed by Merleau-Ponty) and in the experience they had access to (reading papers or listening to physicians), were capable of organizing a kind of gigantic critical essay in real time, where the diseased took control of their own bodies. Nobody would be more interested in finding good responses than those who are using their own lives while they look for those answers. They know they can only aspire to an improvement in their quality of life: at least for them, the healing paradigm was left behind.

The experiment is confirmed when they agree that they are better, although this improvement is a sustained commitment among all and not an individual solution, like with addicts. If the participants are being taken seriously by formal scientific institutions (the electrosensitive and those affected by the Gulf War syndrome, for example, fought to get a diagnosis) or experience some improvement (like those with mental disorders), there is no alternative but to admit that we are talking about knowledge produced by all. The community that sustains it is recognized insofar as the knowledge produced is validated for being functional. Finally, the affected community exists in/by this cognitive activity. It is a learning community which was able to give consistency to a collective of intergeneration nature and culturally heterogeneous, which means that they have acted as social brokers. Their role as social innovation vectors does not eclipse their importance as knowledge producers and as creators of other forms of sociability.

Let us recap the nature of your network activity: experimental, open, relational, distributed, horizontal, collaborative, inalienable and recursive. What talkers are doing is to reinvent a relational

body based on experimentation; that is, in all that a scientist tends to qualify as collateral, irrelevant or useless. It is the same experience that we described before in relation to urbanism. From the abandoned lots and in view of social practices ignored for being characteristic of the poor, uneducated or marginal, we are reinventing the city. In the same way, we are creating a common body from the excess, from what is ignored for being irrelevant (LAFUENTE; IBANEZ-MARTIN, s/d). It is not that the scientists disdain what they do not know, but rather that their protocols and practices preclude them from considering the experiential as material from which to build contrasted knowledge.

## COMMON SCIENCE

We already have everything we need to conclude. We call common science a form of producing knowledge that must happen amongst all. The condition of “amongst all” is different from the “for all” that is characteristic of public goods. Common science is not better or worse than public or private science, but different. It is built from other practices and different materials, and the way in which knowledge is validated is also different.

If it needs to be made amongst all, it is necessary that it does not require previous accredited knowledge. No titles are requested, nor previous experience. The entry rituals do not discriminate between those who know and those who do not know, or between those who are capable and those who are not. There are no exams, no competition. Nobody seeks the best or the better prepared. Common science is not conceived from the imaginary of the experts. They may be represented, it is expected that in the collectives referred there are people with some qualification or with more reading, or why not, with more dedication. Not all participants have the same degree of knowledge, or know it in the same way. It is exactly the opposite. Each one has arrived at

the collective by their own means without any filtering process in order to produce a more connected group. So that it happens amongst all, so that nobody is left out and nobody dominates the situation, knowledge must be constructed from material which is both abundant and ordinary: experience. Something we all have. Moreover, something in which we are all experts, because we all know nuances, even if not verbalized, about that which happens around us and about what we can discuss with flexibility and our own criteria. We all know a lot about what happens to us and we can all participate in a process whose destination is the knowledge of what we have in common, or in other terms, to find the words with which to describe our shared experiences. The cases we have described, both in terms of the human body and the city, show that common science is part of a response that the communities of the diseased have found to give visibility to their own way of inhabiting the world, or their way of feeling it, of narrating and sharing it.

The search about which we talked is experimental in its shared, contrasted and public nature. The process is always open to the arrival of new interlocutors and other points of view. The process, being open, is not infinite, because it ends when the participants – as it happened at the AA – realize they are feeling better, when the signs of improvement in quality of life are undeniable. The truth about the experiment is contained in the goodness of its consequences for participants. It is the community of those concerned which certifies the credibility of the procedures. The community not only is constituted while experimenting and its members learn to live together solving the problems that affect them, but it is exemplary and sustainable, which is equivalent to saying it is replicable and hospitable.

Common science which is configured around the recovery of the experience of something that we were about to forget, the experience of a body and a common city, is not an alternative to

academic science. Both need each other, although sometimes we will see them competing for public space and also for the public.

## REFERENCES

RVANITIS, Rigas . La science pour le développement est-elle une science publique?. In: WAAST, R. (Ed.). *Les sciences au sud. Etat des lieux*. Paris: Editions de l'ORSTOM, 1996. p. 175-185.

BACHELARD, Gaston. *Le rationalisme appliqué*. Paris : PUF, 1986.

BECK, Ulrich. *Risk society: towards a new modernity*. London: Sage, 1992.

BROWN, Mark B. *Science in democracy. expertise, institutions, and representation*. New York: The MIT Press, 2009.

BROWN, Phil; ZAVESTOSKI, S.; MCCORMICK, S.; MAYER, B.; MORELLO-FROSCH, R.; GASIOR ALTMAN, R. Embodied health movements: new approaches to social movements in health. *Sociology of Health and Illness*, v.26, n.1, p. 50–80, 2004.

BROWN, Phil; ZAVESTOSKI, Stephen; CORDNER, Alissa; MCCORMICK, Sabrina; MANDELBAUM, Joshua; LUEBKE, Theo; MEADOW, Linder. A narrowing gulf of difference?: disputes and discoveries. In the study of gulf war–related illnesses. In: BROWN, P.; MORELLO-FROSCH, R.; ZAVESTOSKI, S. (Ed.). *Contested illnesses: citizens, science, and health social movements*. Berkeley: University of California Press, 2011. p. 79-107.

CALLON, Michel. Is science a public good? Fifth Mullins Lecture, Virginia Polytechnic Institute, 23 March 1993. *Science, Technology & Human Values*, v.19, n.4, p. 395-424, 1994.

CALLON, Michel; RABEHRSISOA, Valolona . Research 'in the wild' and the shaping of new social identities. *Technology & Society*, v.25, p.93-204, 2003.

CHATEAURAYNAUD, F ; DEBAZ, J. Le partage de l'hypersensible : le surgissement des électro-hypersensibles dans l'espace public. *Sciences Sociales et Santé*, v.28 , n.3, p. 5-33, 2010.

COHEN, Daniel J.; SCHEINFELDT, Tom ( Ed.). *Hacking the academy: new approaches to scholarship and teaching from digital humanities*. Ann Arbor: University of Michigan Press, 2013.

- COLEMAN, Gabriella; GOLUB, Alex. Hacker practice. Moral genres and the cultural articulation of liberalism. *Anthropological Theory*, v.8, n.3, p. 255–277, 2008.
- COLLINS, Harry; EVANS, R. Evans. The third wave of science studies: studies of expertise and experience. *Social Studies of Science*, v.32, n.2, p. 235–296, 2002.
- CORSÍN JIMÉNEZ, Alberto. *An anthropological trompe l'oeil for a common world*. Oxford; New York: Berghahn, 2013b.
- CORSÍN JIMÉNEZ, Alberto. The prototype: more than many and less than one. *Journal of Cultural Economy*, v.7, n.4, p.381-398, 2013.
- CORSÍN JIMENEZ, Alberto. The right to infrastructure: a prototype for open source urbanism. *Environment and Planning D: Society and Space Advance Online*, v.32, p. 342-362, 2014.
- CORSÍN JIMENEZ, Alberto; ESTALELLA, Adolfo. Assembling neighbors: the city as hardware, method and a 'very messy kind of archive'. *Common Knowledge*, v.20, n.1, p. 150-171, 2014.
- DAVID, Paul A. The historical origins of 'Open Science'. An essay on patronage, reputation and common agency contracting in the scientific revolution. *Capitalism and Society*, v.3, n.2, 2008.
- DELGADO, Manuel. *El espacio público como ideología*. Madrid: Catarata, 2011.
- DESPRET, Viciene; GALETIC, S. Faire de James un "lecteur anachronique" de Von Uexküll: esquisse d'un perpectivisme radical. In : DEBAISE, D. (Ed.). *Vie et expérimentation: Peirce, James, Dewey*. Paris: Vrin, 2011. p. 45–76.
- DEWEY, John . The public and its problems. In: ROGERS, Melvin L. (Ed.). *An essay in political inquiry*. Penn: Penn State University Press, 2012.
- EPSTEIN, Steven. The construction of lay expertise: AIDS activism and the forging of credibility in the reform of clinical trials. *Science, Technology, & Human Values*, v. 29, p. 408-437, 1995.
- ESTALELLA, Adolfo; CORSÍN JIMÉNEZ, Alberto. Atmósferas de la escucha: órgano de un urbanismo experimental en Madrid. In: MATERIA A DEBATE, 4. Madrid: Club de Debates Urbanos, 2014. p. 253-263.
- FARRIS, Linda; KURTZ, E. The self-help movement. *Social Work With Groups*, v. 13, p.101-115, 1990.



FERGUSON, Tom. *E-patients: how they can help us heal health care*. San Francisco [s.n.] 2007. Disponível em: [http://www.inra.cgt.fr/actions/revendications/Main\\_basse\\_sur\\_la\\_Science.pdf](http://www.inra.cgt.fr/actions/revendications/Main_basse_sur_la_Science.pdf). Acesso em: 5 mar. 2015.

FRANZONI, Chiara; SAUERMAN, Henry. Crowd science: the organization of scientific research in open collaborative projects. *Research Policy*, v.43, p. 1-20, 2014.

HAND, Eric. Citizen science: people power. *Nature*, v.466, p. 685-687, 2010.

HARDING, Garret. The tragedy of the commons. *Science*, v.162, p. 1243 – 1248, 1968.

HARVEY, David. *Rebel cities. From the right to the city to the urban revolution*. London; New York: Verso, 2012.

HESS, Charlotte; OSTROM, Elinor (Ed.). *Understanding knowledge as a commons. From theory to practice*. Cambridge: The MIT Press, 2007.

HESS, David J. *Alternative pathways in science and industry. Activism, innovation, and the environment in a era of globalization*. Cambridge: The MIT Press, 2007.

HIMANEN, Peka. *The hacker ethic and the spirit of the information age*. New York: Random House, 2001.

HOCH, D.; FERGUSON, T. What I've learned from e-patients. *Plos Med*, v.2 , n.8, p. e206, 2005.

IRWIN, A. *Citizen science: a study of people, expertise and sustainable development*. London: Routledge, 1995.

JONES, Adrian. Intellectual property and the nature of science. *Cultural Studies*, v.20, p. 145-64, 2006.

KELTY, Christopher. *Two bits. The cultural significance of free software*. Durham: Duke University Press, 2008.

KLEIN, Ursula. Styles of experimentation. In: GALAVOTTI, M. C. (Ed.). *Observation and experiment in the natural and social sciences*. Dordrecht: Kluwer, 2003. p. 159-185.

KURTZ, E. Why A.A. works: the intellectual significance of Alcoholics Anonymous. *Journal of Studies on Alcohol*, v.43, p. 38-80, 1982.

- LAFUENTE, Antonio. Modernización epistémica y sociedad expandida. In: DIAZ, Rubén (Ed.). *Educación expandida*. Sevilla: Zemos98, 2012. p. 131-150.
- LAFUENTE, Antonio; IBÁÑEZ-MARTÍN, Rebeca. *Cuerpo común, y cuerpos colaterales*. En prensa, manuscrito.
- LATOURETTE, Bruno. An attempt at a "Compositionist Manifesto". *New Literary History*, v.41, p. 471-490, 2010.
- LATOURETTE, Bruno. How to talk about the body? The normative dimension of science studies. *Body and Society*, v.10, p. 205-229, 2004a.
- LATOURETTE, Bruno. Whose cosmos, which cosmopolitics? Comments on the peace terms of Ulrich Beck. *Common Knowledge*, v.10, n.3, p. 450-462, 2004b.
- LEACH, James; NAFUS, Dawn; KRIEGER, Bernhard. Freedom imagined: morality and aesthetics in open source software design. *Ethnos*, v.74, n.1, p.51-71, 2009.
- LEFEBVRE, H. *El derecho a la ciudad*. Barcelona: Península, 1969.
- MCCORMICK, Sabrina; BROWN, Phil; ZAVESTOSKI, Stephen; CORDNER, Alissa. The personal is scientific, the scientific is political: the public paradigm of the environmental breast cancer movement. In: BROWN, P.; MORELLO-FROSCH, R.; ZAVESTOSKI, S. (Ed.). *Contested Illnesses: citizens, science, and health social movements*. Berkeley: University of California, 2011. p. 147-168.
- MAECKELBERGH, M. Horizontal democracy now: from alterglobalization to occupation. *Interface: a Journal for and about Social Movements*, v.4, n.1, p. 207-234, 2012.
- MARRES, N.; LEZAUN, J. Materials and devices of the public: an introduction. *Economy and Society*, v.40, n.4, p. 489-509, 2011.
- MIGNOLO, Walter D. The many faces of cosmo-polis: border thinking and critical cosmopolitanism. *Public Culture*, v.12, n.3, p. 721-748, 2000.
- MIROWSKI, Philip. *Science-mart. Privatizing american science*. Cambridge: MA:Harvard University Press, 2011.
- MIROWSKI, Philip; SENT, Esther-Mirjam. The commercialization of science and the response of STS. In: HACKETT, Edward J.; AMSTERDAMSKA, Olga; LYNCH, Michael; WACJMAN, Judy (Eds.). *The Handbook of science and technology studies*. Cambridge, MA: MIT Press, 2008. p.635-89.

MOULIA, Bruno et alli. *Main basse sur la science publique* : le «coût de génie» de l'édition scientifique privée. Paris: INRA, 2013. Disponível em: [http://www.inra.cgt.fr/actions/revendications/Main\\_basse\\_sur\\_la\\_Science.pdf](http://www.inra.cgt.fr/actions/revendications/Main_basse_sur_la_Science.pdf). Acesso em : 5 mar.2015.

NIELSEN, Michael. *Reinventing discovery: the new era of networked science*. Princeton: Princeton University Press, 2011.

NOWOTNY, Helga; PESTRE, Dominique; SCHIMIDT-ABMANN, Eberhard; SCHULZE-FIELITZ, Helmuth; TRUTE, Hans-Heinrich (Ed.). *The public nature of sveince under assault. Politics, markets, science and law*. Berlin: Springer, 2005.

NOWOTNY, Helga et al. Mode 2 Revisited. *Minerva*, v.41, p. 175–94, 2003.

NOWOTNY, Helga; SCOTT, Peter; GIBBONS, Michael. *Re-thinking science: knowledge and the public in an age of uncertainty*. Oxford: Polity, 2001.

OSTROM, Elinor. *Governing the Commons: the evolution of institutions for collective action*. Cambridge: Cambridge University Press, 1990.

RABEHARISOA, Vololona; CALLON, Michel. La gestion de la recherche par les malades: le cas d l? In: SÉMINAIRE RESSOURCES TECHNOLOGIQUES, 1999. Paris: Association Française ciontre les Myopathies, 1999.

RANCIÈRE, Jacques. *En los bordes de lo político*. Buenos Aires: La cebra, 2007.

RHEINBERGER, Hans-Jörg. *Toward a history of epistemic things: synthesizing proteins in the test tube*. Stanford, CA: Stanford Univ. Press, 1977.

RILES, Annelise. *The network inside out*. Ann Arbor, MI: University of Michigan Press, 2001.

RODRÍGUEZ-GIRALT, Israel. El activismo encarnado. Barcelona Metrópolis. *Revista de Información y Pensamiento Urbanos*, v.79, p.11-15, 2010.

ROUSE, Joseph. *How scientific practices matter: reclaiming philosophical naturalism*. Chicago: University of Chicago Press, 2002.

SÁNCHEZ-CRIADO, Tomás. *El cultivo de las emociones en diferentes tradiciones: antropología de la ciencia*. William James y Etnopsicología en la obra de Vinciane Despret. [S.l.] Asociación Ibero Americana en Red, AIBR, jul./ago. 2005.

SARASOHN-KAHN, Jane. *The wisdom of patients: health care meets online social media*. Oakland: California HealthCare Foundation, 2008.

- SENT, Esther-Mirjam. Economics of science: Survey and suggestions. *Journal of Economic Methodology*, v. 6, p.95-124, 1999.
- SLAUGHTER, Sheila; LESLIE, Larry L. Expanding and elaborating the concept of academic capitalism. *Organization*, v.8, n.2, p. 154-161, 2001.
- SLAUGHTER, Sheila; RHOADES, Gary L. *Academic capitalism: politics, policies, & the entrepreneurial university*. Markets, state, and higher education. Baltimore: The Johns Hopkins University Press, 2004.
- STENGERS, Isabelle. The cosmopolitical proposal. In: LATOUR, Bruno; WEIBEL, Peter (Ed.). *Making things public: atmospheres of democracy*. Cambridge, MA: MIT Press, 2005. p. 994-1004.
- STENGERS, Isabelle. *La Vierge et le neutrino. Les scientifiques dans la tourmente*. Paris: Les empêcheurs de penseur en rond, 2006.
- STRATHERN, Marilyn. Redescribing society. *Minerva*, v.41, n.3, p. 263-276, 2003.
- VV. AA. *Post-it city: ciudades ocasionales*, Barcelona: Turner, 2009.
- VASUDEVAN, A. The makeshift city: Towards a global geography of squatting. *Prog Hum Geogr*, 2014.
- WARK, Mckenzie. *A hacker manifesto*. Cambridge: Harvard University Press, 2004.
- WHITE, William L. Recovery: its history and renaissance as an organizing construct concerning alcohol and other drug problems. *Alcoholism Treatment Quarterly*, v.23, n.1, p. 3-15, 2005.