The sour grapes of the digital-divided people.
The construction of trust and social capital in
the network society[1]

Anna Fici (annafici@yahoo.it)
Gianna Cappello (gianna.cappello@unipa.it)
Social Sciences Department, University of Palermo – Italy

Abstract

This paper presents the first results of an ongoing research project on the construction of trust and social capital in the "network society".

Contemporary society is characterized by an information overload which makes it crucial to have high skills –both cognitive and technical– of information selection and processing. The new media are co-responsible for a situation where people are daily confronted with (and depend on) a massive amount of information coming from technological "black boxes" upon which they have little or no control. Technologies have come to be part of people's everyday life as an "unproblematic presence" – the Trusted Computing device being an example – whose genealogical history and functioning mechanisms are mostly unknown to common people. In this paper we want to argue that a constructivist perspective could reveal the discursive nature of technology and technology-related notions such as "risk", "trust", "security".

We started our research from a theoretical questioning of the construction of trust between social actors and the new media. Initially we made a preliminary analysis of the notion of trust within the different rational choice theories. Eventually we carried out a first empirical phase where, through the use of qualitative techniques, we profiled six typical social actors with regards to relationship with the new media. These profiles became, in the second empirical phase of our research, the protagonists of a multi-agent computer-assisted simulation in order to verify the role of trust and critical media education both in increasing the agents' willingness to question mainstream notions and practices and adopt a more critical attitudes with regards to new media, but also in reinforcing and radicalizing the exclusion of the excluded (via a "sour grapes" effect).

Keywords: new media; trusted computing; trust; social capital

1. The research context and the theoretical hypotheses

1.1. The advent of Trusted Computing

Information has nowadays acquired a quite wide semantic extension. It includes all that can be digitalized: photography, cinema, literature, software, music, etc. New technologies are therefore becoming today's *history sorters*: the future of our cultures could

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largely depend on the means of data storage and use which are going to be successfully adopted in the next coming years [Fici, 2004]. As a consequence, the political development of this industrial sector as well as the security of these technologies are issues concerning all of us, and yet it is quite difficult to actually interest people in these questions. Security issues concern both the users, who want to protect their data, and digital content producers and providers who want to protect their products from uncopyrighted use. Trusted Computing (TC) seems to be the ultimate solution to security problems. A group of industries (Trusted Computing Group, TCG[2]), since 1996 has installed in every machine (PCs and all sort of digital devices) a Fritz-chip[3] which can monitor, through complex cryptographic systems, all digital data and devices. The TCG will therefore be able to control all software and digital content use licenses, preventing from the top the functioning of all data and software which are not copyrighted and ??certified??as??"trusted"??Currently??this??chip??hasn't??been??activated??yet??because??of??the??intervention??of??the??EU's??Privacy??Authority[4]. In case it will, all trusted technologies will follow certain rules, predetermined by the industry, which will prevent them from being exposed – as they say – to risk. This will occur, however, at the expenses of the freedom and privacy of the users whose status will change from proprietors to licensers of their own technologies [Lessig, 2002; Rifkin, 2000].

In the age of informationalism [Castells 2001, 2001a], the crucial factor is no longer information, but rather the cognitive and technical capacity to select and process information. In this context, the choices social actors make daily in every field are often linked to the *black boxes*[5] of expert knowledges and systems they have no capacity to control. Whenever people lack information/knowledge, they enact trust mechanisms that make daily choices possible. Although that can be accepted unproblematically in certain highly specialized fields, it appears less acceptable with regards to new media: in this field people are not so willing to admit socratically their ignorance precisely because these media are pervasively present in their life. In the collective imagery, the access to computers and digital devices is considered so easily available that the fact of being excluded from it is generally regarded as a symptom of socio-cultural and economic marginalization. New media are perceived as an "unproblematic presence" thanks to the "Trojan horse" of friendly interfaces which make attractive inducing people to show no interest in knowing their inner functioning mechanisms of technology. Many social scientists too have come undervalue the constructed nature of technologies as well as technology-related notions such as "risk", "trust", "security" [Lupton, 1999].

This is the context where our research questions arose, starting from the idea that a scientific approach to these issues has to question what has been constructed as unproblematic. We therefore wondered what could make people, mis-educated by user-

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[2]   https://www.trustedcomputinggroup.org/home
[3]   *Fritz-chip* is the nickname for the hardware component of the software-execution monitoring system now known as the Trusted Platform Module. The name refers to former United States Senator Ernest "Fritz" Hollings, who sponsored several pieces of legislation aimed at protecting copyright holders in digital matters, including one that tries to mandate the inclusion of such a chip in every computer. The term is typically used derisively by those opposed to digital rights management (DRM) in the context of Trusted Computing [http://en.wikipedia.org/wiki/Fritz_chip]
[4]   http://www.privacy.it/grupridoc20040123.html
[5]   *Black boxes* recall the notions of "asymmetric information" and "market for lemons" ("lemons" stands for used cars), introduced in the economic debate by M. Spence, J. Stiglitz e G. A. Akerlof referring to a market where buyers are not given enough information about the value of the good they wish to buy [see Pizzorno, 1999].

friendliness, show some more interest in what the new media in fact do in violating some basic rights, while apparently satisfying their needs. We have tried to answer these questions by creating a computer-assisted multi-agent simulation of the effects of anti-TC propaganda. Since trust is the basic concept for TC, we decided to start from a preliminary excursus on the ways in which sociology has dealt with it discovering that in fact the most interesting insights about trust are to be found in the theories of limited rationality developed in economy and cognitive psychology studies. Eventually we carried out a first empirical phase where, through the use of qualitative techniques (focus groups, semi-structured interviews and participant observation), we profiled six typical social actors with regards to their relationship with new media. These actors, in the second empirical phase, became the agents of our computer simulation by which we wanted to study the role of trust in questioning taken-for-granted ideas and uses of media technologies.

An important contribution to our reflections about trust came from James Coleman [1990], John Elster [1983, 1993] and also from Kahneman e Tversky's *prospect theory* [1979, 1982, 1982a, 2005]. These authors integrate sociological with studies which take into consideration, respectively, the role of emotions in the decision-making process and the deceptions and self-deceptions due to the cognitive structure of social actors. Our simulation, adopting these theoretical suggestions, has showed how critical information and media education do play an important role in changing people's action, but they may also radicalize the exclusion of the excluded, i.e. in certain cases the critical knowledge of the risks derived from TC may determine the position of *intellectual luddism* which Elster [1983] exemplifies with the "sour grapes" mechanism.

After an excursus of the theories of rational choice under conditions of risk and insecurity, we have made a distinction between two forms of trust: an *instrumental* trust which produces self-directed effects and compensates for missing information, and a *non-instrumental* trust which produces hetero-directed effects and recurs to proxy forms of dependence. In making this distinction we have followed Kahneman e Tversky's *prospect theory* in order to reconstruct the generative mechanisms of the conditions which make decisions possible. We have therefore taken into account the effects which systematically contribute to distort both the judgment and the expected utility whenever an actor must take a decision but has not a full understanding of the possible outcomes of it. In other words, we wondered what should be the conditions for an agent to change his/her own attitudes towards the new media, their functions, risks etc. We are not interested however in the role institutions such as the school or the market might play in the process, since we want to work at the socio-psycho-cognitive level. One last remark about the way we use the term *innovation*: we do not refer to some particular technology, but rather to the agents' willingness to question the taken-for-granted knowledge about the new media user friendliness.

1.2. Learning to innovate innovation

In the last decades the discourses of scholars from different backgrounds, politicians, media professionals and in the public opinion in general have increasingly refered to the advent of the "network society", the "age of information and communication", the "knowledge society". These discourses quite often adopt the visionary stance of a techno-utopism which brackets out the historical dimension of technological innovation, *abstractly* identifying it with social change and "modernization", glossing over the conditions, the conjunctures, the specific uses and interests which *concretely* lead to certain technological innovations rather than others. In other words, we are faced with a sort of technological fatalism generated by an «e-

deology» [De Biase, 2003] which, while promising progress and wellbeing for everybody, in fact confines the debate into a self-evident perspective: the genealogy (in Foucault's sense) of innovation remains for most people a mystery to be accepted with trust (or, better, faith) like the benevolent arrival of an alien coming from another galaxy. It is no accident that Margaret Thatcher in 1982, in a speech given during an important conference on Information Technology (IT), defined it as «a friend; it helps us; we should welcome it; we should treat it as an ET rather than IT» [quoted in Robins & Webster, 1999:74].

So de-historicized, technological innovation is endowed with a *telos* of its own, unknown to most people, if not in the experiential terms of the transformations of their daily existences. Therefore they can but trust and adapt themselves to the "advancing progress" in a state of substantial impotence and/or domesticated familiarity, irresponsible apathy, blank proxy. Adaptation is also favored by the *friendliness* of the interfaces so that the relationship with the machines (and the control one can have on them) is perceived as unproblematic, un-mediated while instead is more mediated than ever.

Even the education context, by definition in charge of providing cultural and critical competences and knowledge seems to be dominated by a techno-utopist drift which promotes the adoption of mechanisms of non instrumental trust. Particularly over the last years with the advent of digital *personal* media, educa- and policy makers have come to believe that these media, unlike *mass* media, offer new and more empowering possibilities of interactivity and personal choice, new self-made forms of knowledge construction and democratic access to information, etc. In other words, because of a vocational and instrumental vulgate of the concept of digital citizenship (according to which students must be "supplied" with the technical-alphabetical skills to succeed in the job market and access the goods and services offered by the state/market), the "technological sublime" has come to impose itself vigorously. Many educators have therefore come to celebrate digital media as thaumaturgical tools for empowering learning processes and even foresee a future disappearance of all formal education in favor of new forms of self-learning which the market will wisely satisfy and orient. The education context too is glossing over the historical dimension of technological innovation, failing to recognize that the media are not mere tools for communication, or vehicles of information, they are indeed today's "life environment" radically transforming the spatial-temporal organization of social life and conditioning social actions and interactions, as well as the ways in which people relate to reality, to themselves, to other people [Dayan-Katz 1992, Meyrowitz, 1985; Silverstone 2005, 2006; Thompson, 1995].

In our research we want to argue that education – redefined according to a media education and lifelong perspective – should not promote technological innovation as the "tool" for better jobs but more radically as the environment for exercising democracy and constructing social capital. After an excursus of the social capital theories, we made the hypothesis that social capital should be defined not only in terms of trust and reciprocity, but also in terms of "relationships", namely the relationship it has with the capitals traditionally provided by education, i.e. human and cultural capital. At the same time, education comes to acquire a more social orientation which redefines in more critical-cultural terms the educational use of technological innovation teaching people (of all ages) how to interact with it so as to actively contribute to the construction of social capital in their life contexts. In a way, education should promote an innovation of innovation, i.e. it should promote the adoption of a critical stance towards technological innovation and question the user-friendliness ideology of techno-utopism.

Being convinced that the *mission* of sociology – at least of a "public sociology" aiming at being a «moral and political force» [Buroway, 2007:3; see also Santoro 2007] – should be first and foremost that of questioning, deconstructing and operationalizing common sense ("making the familiar strange") with the ultimate end of explaining phenomena, being eventually transformed by them, we think it is morally and politically necessary to fix a priority in the sociological agenda: to re-found education according to a more social and media education perspective so that people's life contexts may also become "learning contexts" where technological innovation is widely socialized and employed for the construction of social capital and the overcoming of all divides, new and old.

Given this theoretical framework, within the anti-TC propaganda simulated in our model, we made the hypothesis that the increase of the agents' change potential, i.e. the adoption of an innovative attitude to-

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6   According to Santoro's definition, public sociology «identifies a kind of sociology, better, a kind of practicing sociology, which is concerned with its being-in-the-world, and to this "world" is therefore primarily devoted. The sociologist is public whenever s/he makes the public – the different publics – which compose contemporary (civil) society, his/her main focus of interest and his/her main interlocutor, dialoguing with it and using this dialogue to adjust his/her own agenda» [2007:7].

wards innovation – indeed, an innovation of innovation – based on instrumental trust, could be facilitated by the insertion, at regular intervals, of education pills (EDU pills).

2. Technological innovation, social capital and education

2.1. Techno-utopism and the question of qualified access

In 1986 Melvin Kranzberg exposed six laws about the history of technology. Two are particularly interesting here:

1st – *Technology is neither good nor bad; nor is it neutral.*

4th – *Although technology might be a prime element in many public issues, nontechnical factors take precedence in technology-policy decisions*[7].

In other words, Kranzberg argues that all technological systems are the result of some historical dynamics. The new media, including the Internet, are no exception. «The culture of the Internet producers has modeled the medium» as Manuel Castells writes [2001a, translated from Italian edition 2004:45], therefore the adoption of a genealogical perspective contributes to understand the particular developments of the new media, first and foremost the pervasive control that private, profit-oriented interests are increasingly gaining on them. «In spite of the ideology about the potential of the new communication technologies for education, health and cultural growth, the prevailing strategy is aiming at developing a gigantic system of electronic entertainment, considered the safest investment from a business point of view […]. therefore, while governments and futurologists talk about cabling all schools, making distance surgery and consulting online the Encyclopaedia Britannica, most of the actual construction of the new system is devoted to video on demand, online gambling and online funfairs [*ibidem*, translated from Italian edition 2004:424]. Besides, this massive interest in offering entertainment does not seem to correspond to the actual possibility of "absorption" of the demand, either because of the stagnation of individual and family incomes, or because of the contraction of leisure time, or else because of the emergence of media uses and interests which escape from «the ideology of what people is in the imagination of marketing experts» [*ibidem*, translated from Italian edition 2004:427].

All the rhetoric on the digital media as neutral tools for the construction of the "knowledge society" should be questioned on the basis of these considerations. As a matter of fact, although knowledge is today undoubtedly crucial in many processes and contexts, that does not necessarily imply that a new post-capitalist phase has come where capitalism is no longer looking for making profit from material goods. On the contrary it could be argued that the affirmation of knowledge as the chief dimension of contemporary society has further extended and consolidated capitalism's asymmetric relationships in wider geographical areas and contexts of daily life. A paradoxical situation therefore arises whereby the more knowledge qualifies social action and interaction in all sorts of life contexts, the more people depend on *expert systems* for developing their life projects [Beck 1999, especially chapter 5]; the more these systems (and the material and symbolical resources they provide) become crucial for people's everyday life, the more the access to them becomes complex, socially stratified, and bound to conditions which escape people's control and understanding. In other words, just when the media seem to allow people to construct and express their identity and social-cultural universes in the utmost personalized and independent way, «a a relationship of stricter dependence ties them up […] to complex systems of production and distribution of mediated symbolic forms on which most of the people have little control» [Thompson 1995, translated from Italian edition 1998:300]. Undoubtedly the bidirectionality of *personal* new media (unknown to *mass* media, typically unidirectional) tends to dismantle the difference between producers and consumers expanding the latter's possibility to create and share their own contents, yet it is reasonable to suspect that the new media may be constrained into unidirectional forms of action/interaction by those private investors who are increasingly "colonizing" the Internet. That's why, as we argue throughout this paper, the question of accessing the "machines" must be connected to the acquisition of the critical/cultural competences to take advantage of their potentialities and also be aware of the limits and constraints which might impede a fully shared development of them.

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[7] The remaining laws state: 2nd - Invention is the mother of necessity; 3rd - Technology comes in packages, big and small; 5th - All history is relevant, but the history of technology is the most relevant; 6th - Technology is a very human activity - and so is the history of technology [Kranzberg, 1986:544].

Rather that asking questions about this dependence and its causes, techno-utopists call for (and offer) information-filtering systems which make dependence even stricter. The typical example comes from the Internet and the information overload: these systems can select the topics which supposedly interest the users sparing them all unwanted (unsecure, risky) information[8]. While we could partly agree on this, the fact is that it will ultimately make people more passive and vulnerable with regards to those (private companies?) who control the information-filtering systems and are, understandably, oriented to satisfy their priorities first. In a way, we run the risk to see the Internet passing from *direct interaction* to *direct intermediation* [De Rosa, 2000]. Therefore, while on the one hand the Internet is the domain where small and large communities as well as single individuals (think about the blog phenomenon, for example) have the chance to self-express and communicate in a totally independent (and interdependent) way, on the other hand the problems of processing the information/relational overload coming with this are such that the intervention of some forms of mediation is highly desirable, if not indispensable. As De Rosa writes, «although they have the chance to do basically anything on the Internet […], people, overwhelmed by information, will tend to delegate their "power" to others: to browers increasingly powerful which will select information according to criteria which might not be so clear; and to brokers who will process and edit it in an increasingly pleasurable way» [*ibidem*, 193].

In other words, these developments may end up promoting a relationship with change and technological innovation either in terms of apathy and non-responsibility, or in terms of technological infatuation, or, on the opposite, of neo-luddism and "adaptive preference" (Elster's *sour grapes* effect). As a consequence, the genealogical reconstruction of technological innovation is strictly connected with the question of qualified access. As a matter of fact, it is not only a question of having a physical access to technology, but first and foremost of having the cultural and social capital (and, of course, the economic capital too) to be able to control the information overload, interact reflexively with technology and actively participate to the «mediated public sphere» [Thompson 1995]. It is therefore necessary to intervene in the education processes and contexts so that people (at all ages) may learn how to acquire, select, process and create information on their own, generating critical knowledge, playing an active and poietic role in the construction of reality and hence triggering a process of social inclusion and cohesion. This is far more necessary if we recognize that the media produce quite relevant effects in the processes of socialization and identity formation representing a privileged interlocutor, offering important (and often contradictory) cognitive, normative and value models which end up redefining people's social practices and identities by unhinging their social situations and "sense of place" [Meyrowitz, 1985][9].

The question of qualified access is therefore crucial. As Jeremy Rifkin noted in 2000, «In the next coming century, with all probability the debate about access is going to be as passionate as the debate about copyright was in the modern era. That is because, potentially, access is an even more general issue: copyright concerns the limited world of mine and yours, whereas access touches the larger cultural question of controlling the experience» [2000, translated from Italian edition 2001:293]. Stefano Rodotà, although more interested in the law aspects of the access question, is equally worried about it, «The full freedom of access to information, and therefore the infinite chance to turn it into knowledge, define today citizenship; all limitations to information are limitations to citizenship. They have cultural, technical, political and social reasons and can only be fought if access is regarded as a right and a universal service [1997:84].

Qualified access and education are the two interrelated pre-conditions for allowing people to make «reasoned choices» in Amartya Sen's terms [2006, 154] and achieve the so-called *eudaimonia*, a term used by Aristotle which the Indian Nobel prize does not translate with *happiness*, as many do, but rather with *fulfillment*, i.e. with the full accomplishment of the self, with the «blossoming life» of a person who is totally aware of his/her own «functionings» and «capabilities», of his/her own rights of free choice and self-

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[8]   In 1995 Nicholas Negroponte had somehow predicted that with his *Daily me*, an online newspaper tailored on its readers which would «offer front-page news mixed with "less important" stories concerning your friends, the people you're going to meet tomorrow, the places you're going to or coming from» [1995, translated from Italian edition 1995:159-160].

[9]   This is the thesis maintained by Joshua Meyrowitz in a famous book where he combines Goffman's "situationism" with McLuhan's "theory of the medium". «By gathering so many different persons in the same "place" – he says – electronic media have favored the confusion of many social roles, once well distinct. Therefore the electronic media condition us not much through their content, they rather modify the situational geography of social life […]. The electronic media tend to redefine the notions of "social" position and social "place" [1985, translated from Italian edition 1995:10]

determination, informed participation and active citizenship[10]. In other words, «a person's fulfillment does not merely come from the provision of resources or from some utility deriving from them, it comes instead from the fact that this person does (or is) precisely what s/he would have wanted to, even if eventually s/he decides not to do it anyway» [Lo Verde, 2006:29]

Although from different perspectives, these authors stress the importance of qualified access and education: it is not a question of providing a mere access to "machines" and "resources" (a condition which is anyway far from being developed universally, as a simple statistic on the digital divide might prove), but more importantly, it is a question of accompanying this access with the "functionings" and "capabilities" necessary to make it relevant in people's life. «If the new media were only consumption goods, growing inequalities could be in a way accepted. Being instead indispensable tools for cultural, social, political and economic participation, the new inequalities are quite risky for democracy. If these problems do not become a basic issue for policy makers, who prefer to insist on the abstract capacity of the market to solve them, we seriously run the risk that the information highways will end being just another "dead end" in the search for equality» [Rodotà 1997:91-92].

The access to new media is therefore a universal public good which everybody should get and use in competent and qualified way. To put it in simple terms, one could say that the first basic (passive) right to access the new media must necessarily go along with the more complex (active) right to intervene competently in the mediated public sphere they create. This combination requires the implementation of a whole series of solid policies, «It is not sufficient – as Rodotà suggests – to abstractly foresee the universality of the service and the access to it. We also need to implement *active public policies of education* aiming at eliminating the factors which produce increasing and widespread inequalities, if we want to prevent those mass exclusion phenomena which directly condition the democratic status of a system. […]. Such policies, however, must not reduced to the mere use of the machines (a risk getting worse if we aim at the simple material access to some technical means) […]. *Education must also mean having the possibility to understand the social meaning and value of new technologies in order to have critical competences and avoid to identify superficially technological innovation and social progress*» [*ibidem*, italics added].

Rodotà's call for «active public policies of education» should not however be referred to public institutions only. Other social actors too – the whole non-profit sector, for example – should contribute according to the synergic logic of an "educating community" where competences and knowledges are socialized in all sorts of manners, throughout the different life contexts of the community, hence generating social capital.

The notion of qualified access must be critically distinguished by that of accessibility – another term celebrated by techno-utopists – i.e. the fact that a technological device/service/resource can be used in an easy and intuitive way. Indeed, the more *friendly* a technological device looks, the more benefit the user can get from it, even if s/he is not so "expert" (in fact s/he must not be an expert). Friendliness is in a way democratizing since it allows a simpler and more intuitive interaction with the machine. However it is often identified and reduced to a mere exaltation of speed and technical-aesthetic aspects consolidating the idea that the relationship with technology (and the control you can have on it) is a-problematic, *im*-mediate, when it is instead more mediated than ever, and that education is simply a matter of learning the features of the latest release rather than a «*critical learning* of the global organizing mechanisms of technology whose friendly interfaces are just the iceberg's tip. The socio-technical nature of the systems requires a socio-technical intelligence which does not exist yet» [Ortoleva 1998:97].

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[10]   In Sen's terms the *functionings* are «valuable states of being and doing» which may be reasonably chosen because they qualify wellbeing. Being well fed, in good health, or participate actively to social life are examples of functionings. Capabilities indicate the possibility given to a person to achieve relevant functionings, to choose among a series of life options through different combinations of functionings. That is why Sen questions those theories which define freedom as something merely instrumental quantifiable in "primary goods" or "resources". He thinks that freedom and social justice depend on how a society succeeds in granting to everybody the maximum of capabilities and functionings, so as to attain a state of fulfillment defined in general (and not merely instrumental or economic) terms. Sen exemplifies this by saying that although in a democratic country all citizens have a hypothetical "right" (the "capability") to vote, not all of them have the same "functionings" to do that, ranging from the very broad availability of education and pluralist information to the very specific transportation to the polls. Only when such barriers are removed can the citizen truly be said to act out of personal choice.

In order to build the socio-technical intelligence necessary to understand that technologies are not mere *delivery mechanisms* that enhance, in and of themselves, people's life, education must re-state its crucial role in helping people to know critically about the potentialities and also the constraints of technologies in terms of democracy and active citizenship. Therefore, the more techno-utopists tend to "dump" it in favor of an empowering self-instruction made possible by *friendly* technologies, the more we need to re-affirm its value as a collective endeavor for the construction of the human, cultural and social capital of a community and hence its poietic function of mediation between social actors, reality, power, institutions.

2.2. Trust and social capital within a relational perspective

Although not directly involved in the construction of a general theory of trust, studies and researches about social capital[11] have provided some interesting insights about the nature and conditions which make trust possible (or difficult) today.

Quite synthetically, within the debate about social capital three main theoretical paradigms have been identified [Bagnasco et al. 2001; Di Nicola, 2006]. The first one is due to Robert Putnam's and Francis Fukuyama's idea that social capital is a moral collective resource originating from the norms of reciprocity and trust as well as from the civic commitment people share and develop as a benefit for the entire community. Albeit immaterial, social capital does produce material effects (i.e. economic growth) since it "lubrificates" – through trust and reciprocity – the actions and interactions of social actors (olistic vision). A second paradigm, supported for example by Pierre Bourdieu [1986], defines social capital as the set of resources (both material and immaterial) a social actor may use to "bridge" the different social networks s/he lives in and get personal benefits. According to this more individualistic vision, social capital is therefore the set of "personal acquaintances" a social actor may develop as a consequence of his/her occupying a certain social position and having a certain amount of other forms of capital (human, cultural, economic)[12]. There is finally a series of authors who, drawing from James Coleman's theories, stress the relational dimension of social capital, focusing on the *quality* of the particular configurations it may assume in contemporary society.

This relational perspective has grown parallel to the crisis of the modernist idea of society as a system hierarchically and functionally organized in subsystems, roles and institutions strictly interconnected, where trust relationships are possible simple because they are taken for granted and all power conflicts arising from inequalities are simply glossed over. This idea has been replaced by the post-modern metaphor of society as a network where roles are no longer consolidated by traditions and legitimated by the social system, but instead by the relational nodes within which they are discursively defined and redefined; similarly the institutional structures (and the norms they embody) are no longer effective and relevant for people in themselves but rather for the social networks they create. Consequently, the notion of "conformity to the role" as an indicator of social cohesion and integration is replaced by that of "network strategy" that is the capacity of contextual adaptation that social actors may develop in order to make sense of a reality which is no longer supported by the reassurances coming from tradition and from the grand meta-narratives of modernity. As long as the identities of contemporary individuals are (trans)formed in the intersecting points of the multiple social networks they get in touch with, social relationships become the main (if not the only) resource for the construction of social capital within specific contexts that somehow over-determine its nature, value, duration, conditions of possibilities, etc.

One author particularly interested in the relational dimensions of social capital is David Halpern. He has identified three main "cross-cutting dimensions" of the concept which in turn give rise to three sets of relationships at the level of *components*, *analysis* and *functions*. As for the first, Halpern distinguishes networks (the interconnecting relationships among people), norms (the rules, values and expectations which

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[11] Even if the term "social capital" was used since the early decades of the XX century [Hanifan 1920, Jacobs 1961, Loury 1977], the debate about its conceptual definition and empirical assessment has fully developed since the '80s.

[12] Donati points out that «these two notions of social capital could not be more different: the first one […] tending to grasp stability and conformity in social contexts; the second […] tending to the understanding of social change processes» [2006a:11]

govern those relationships) and sanctions (the punishments and rewards which enforce the norms). These three components interact, influence and reinforce each other so that, for example, networks are shaped by norms and enforced by sanctions which are expressed through networks.

Also at the level of analysis, Halpern identifies a three-fold structure of relationships – the micro, the meso and the macro level (whereas many social capital theorists refer mostly to the meso-level). At the micro-level social capital consists of close family and friends ties; at the meso-level it refers to communities, associations, organizations, etc.; at the macro-level it includes state and national connections (language, customs, traditions, etc.). Again, as with the components, social capital can be best understood only if these three levels of analysis are somehow combined: for example if people in a society begin to have looser family ties (i.e. a declining social capital at the micro level), this loss could be compensated by an increase in participation in community organizations (meso levelo) and/or in nationalistic feelings (macrolevel).

Finally, as for the functions of social capital, Halpern – borrowing again from the literature – distinguishes three functions: bonding, bridging and linking. Bonding social capital refers to networks that are «inward looking and tend to reinforce exclusive identities and homogeneous groups»; bridging social capital refers to networks that are «outward looking and encompass people across diverse social cleavages»; linking social capital links people across asymmetric power relations and «may be provisionally viewed as a special form of bridging social capital that specifically concern power – it is a vertical bridge across asymmetrical power and resources» [2005:19-25]. For example, a black church may bond black people together, bridge sexual divisions and link with powerful politicians.

These three-fold sets of relationships interact internally and externally supplementing each other in a way that Halpern describes using the "vitamin metaphor": just like a human being needs a diversified mix of vitamins, a community, in order to be "healthy", needs a diversified mix of social capital at the level of basic components, analysis and functions. If one takes too much of a kind of vitamin not only does s/he not get any benefit from it, but his/her health can be damaged, the same thing can happen if analyses and social policies privileges unidimensional approaches. As Halpern writes, «We should be wary about making snap global judgments about whether a society or community is high or low in social capital, because it might be high in one type but low in another» (2005:26). Due to its multi-dimensional nature, it should not be a surprise that there is no single cause for changes in social capital. Consequently, analysts and policy makers should adopt more dynamic and qualitative approaches: to "measure" the endowment of goods (both material and immaterial) of a single individual and eventually sum it up with that of other individuals, is highly problematic because it does not take into account the relational quality social capital acquires in specific contexts. Therefore, the true interesting questions are those addressing not only the *quantity* of social capital but also the *quality* of it: what are the relationships interacting in a specific context between the basic components of social capital (i. e. networks, norms and sanctions, in Halpern's terms), its functions and the levels of analysis? That is, how social capital is affected by causal factors operating at the micro-level (personality type, age, family, class, education, work, religion, and consumption habits), meso-level (civil society, school, community, ethnic and social heterogeneity, mobility, transportation habits/infrastructure, and urban design) and macro-level (history and culture, social structure and hierarchy, labor-market trends and the size and nature of the welfare state, etc.). What is the relationship between bonding, bridging and linking social capital? And how social capital relates to other capitals (human, economic, cultural)?

As for the very last question, Halpern's vitamin model contributes significantly to the redefinition of human capital in more social terms, i.e. as the whole of the resources - capacities, competences, qualifications – a person can acquire throughout his/her life *within different formal, non-formal, in-formal educational contexts*. It can no longer be defined in purely individualistic terms since it stems from the internal and external relationships among different socializing/educational systems, more or less formal and legitimated (family, school, peer-groups and sub-cultures, associations, leisure time, and of course the media). It is no longer a question to satisfy the individual needs of the person, but also activate a whole series of social/educative networks *around* the person, i.e. enrich the social capital of the community s/he lives in. As empirical research has shown [Donati 2006, 2006a], the development of human capital – in and of itself – does not generate social capital, but remains an isolated fact with no benefit for the community. Therefore the challenge facing today analysts, policy makers and educators is how to generate and maintain "healthy" relationships between the different forms of capital social actors have (or should have): physical, human, cultural, social. How do these connect (or should be connected) in a given community, in a given historical moment? What kinds of human capital can better contribute to the creation of networks promoting social

inclusion and participation? And conversely, what kind of initiatives at the social level can promote the growth of human and cultural capital?

According to the relational perspective, trust's role in building virtuous relationships within a community acquires a dynamic and contextualized nature: it does not produce relationships which are due to some pre-determined orders of necessity, but rather originate from a set of mutual expectations and obligations which are dynamically built on the basis of particular historical-social configurations and particular balances between the cognitive and emotive dimensions intervening in the process of trust construction. As Antonio Mutti puts it, «from a cognitive point of view trust is situated in the middle area standing between total ignorance and full knowledge; from an emotive point of view, it occupies the space between a total absence of emotive reassurances and blind faith» [Mutti 2003, 516]. At the extremes of this double cognitive-emotive continuum there is no room for trust: neither total ignorance or full knowledge, nor total lack of emotive reassurances or blind faith produce a need for trust. What counts here from a relational perspective is to point out that: 1) trust is the result of a complex combination of cognitive elements based on rational choices and emotive elements which somehow limit and re-orient those choices; 2) such combination is always-already context-bound. In other words, while trust does contributes in producing social capital in terms of *social* ties, it does not produce necessarily *capital*, namely economic capital (as Putnam tends to think): for example, a community may be strongly bonded and yet economically under-developed. That is why trust must be seen as a dynamic relationship which must not be given a priori and out of a context.

This is particularly the case today since it is increasingly difficult to assume that people *a priori* share values, aims, norms and mutual bonds. However, although contemporary social change makes trust quite unstable, at the same time (some form of) trust is far more necessary in the processes of decision making and relationships building as an orienteering strategy – indeed a survival need – within a context which appears more and more "risky", contradictory, unsecure, multidimensional [Beck 1992, 1999; Bauman 2000; Luhmann 1991]. The real question become then: on what bases – albeit unstable and temporary – can we keep on thinking about social capital and trust relationships today? This is a question which problematizes many of Putnam's assumptions about interpersonal and institutional trust as central components of social capital[13]. Using standard questions on trust in a series of comparative longitudinal surveys many authors have shown that there are weak correlations between individualized and generalized interpersonal trust, as well as between interpersonal trust and institutional trust; they have also shown that there are weak correlations between trust (in whatever form) and participation in voluntary associations. Finally, and more interestingly, they have shown that there are «sub-groups of people who have proved to be more willing than others to give interpersonal and generalized trust, associated with individualized interpersonal trust as well as institutional trust» [Mutti 2003, 517-518][14].

The relational perspective questions also another aspect of Putnam's thinking about social capital and trust, i.e. the fact that they are directly connected with political participation: the more people trust each other and mutually bond together, the more they are willing to participate in public life and commit themselves in civil society, as a vulgate of Alexis de Tocquiville's *Democracy in America* [1835] argues. According to James DeFilippis [2001] this is a very flawed concept because it does not take into account issues of power and social stratification in the production of communities. The American civil society de Tocqueville talks about «arose precisely because the interests of the people involved were shared… Putnam's view is possible only if you erase the very real material interests that divides us (and even then, it is still questionable) and create a vision of civil society as solely constituted by people and groups with mutual interests. […]. [F]or social capital to have any meaning, it must remain connected to the production and reproduction of capital in society» [2001:791]

In other words, trust and reciprocity are always already over determined by the context, a context Putnam apparently imagines as a neatly defined space (both physically and symbolically) where differences are minimal or unimportant and people share harmoniously and functionally interests, motivations, aspirations. Putnam is obviously aware of the fact that the process of industrialization and the emergence of the postmodern society have questioned this naïf vision of civil society, in fact he mentions the need to operate at the level of *bridging* social capital too, but «"bridges" do not, of themselves, make the people in any place rich or poor. The important question is: Who control the terms of any relationships or connections (or lack of connections)?» [2001:790]. Why should people in the upper side of the social scale would want to bridge with those standing in the lower side? «What needs to change are those power relations, not the level

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13   For a summary of these criticisms see Mutti 2003.
14   An example of these sub-groups could be the Everyday Maker, see par. #2.3.

of connections?» [*ibidem*]. Indeed, Putnam seems to ignore distributional issues in relation to social capital: different people are endowed with different levels of social capital and can exploit relationships to a greater or lesser degree to obtain other goods in society.

It is important to conclude, however, stressing the fact that the relational perspective on social capital does not rule out trust from its definition, it simply redefines its contribution – as Coleman had rightly perceived – within a dynamic context where trust deploys its benefits and finds a discursive stability through the context-bound articulation of certain relationships which can never be taken for granted once and for all.

2.3. Everyday life, active citizenship and social capital

One of Putnam's most successful assumptions about social capital is the idea that civic participation through certain institutionalized networks (political parties, voluntary associations, religious movements, etc.) is crucial for a healthy democracy where social capital may grow stronger and stronger, that is social ties are reinforced and a sense of generalized trust is promoted. As he writes in *Making Democracy Work*, «virtuous circles result in social equilibria with high levels of cooperation, trust, reciprocity, civic engagement, and collective well-being». But the reverse is also true: «the absence of these traits in *un*civic community is also self-reinforcing. Defection, distrust, shirking, exploitation, isolation, disorder, and stagnation intensify one another in a suffocating miasma of vicious circles» [1993:177].

This assumption has been highly criticized, as mentioned in the previous paragraph, because it fails to recognize the structuring power of the context and the fact that (the possibility of) participation is unequally distributed among social actors. The question is: why do certain social groups systematically evade civic participation (at least as Putnam describes it) appearing "passive", "indifferent", "apathetic"? What can be said about those forms of collective mobilization which not only do not generate generalized and institutional trust, but may indeed exacerbate conflicts and paralyse collective action (think about a local community refusing the installation of a nuclear plant or the passage of a highway in its territory)? What can be said about those forms of "grass-root" movements which programmatically evade any connection with the traditional and conventional «virtuous circles» of cooperation between civil society and public institutions? In other words, is it possible that Putnam's pessimism about social capital today derives from his incapacity/difficulty to understand the non conventional forms of collective action and trust people produce in their daily life?

These questions can be answered only if one recognizes the fact that the political may reside *also* in the dispersed, fragmented, unstructured practices of the personal and the social, and not only in some institutionalized and conventional structure of civil society and/or the state. Therefore, although Putnam may be partly right when he argues that contemporary society is facing an exasperated individualism which is "thinning" the social and political community [Barber, 1984] and the trust norms regulating it, he is totally wrong when he thinks that such "thinning" necessarily implies «distrust, shirking, exploitation, isolation, disorder, and stagnation […] in a suffocating miasma of vicious circles» [1993:177]. More properly, one should not talk about de-politicization *tout court* but rather about a repositioning of political and social agency into multiple forms of «solidaristic individualism» [Rothstein 2005], «networked individualism» [Wellman et al. 2003] or «network sociality» [Wittel 2001]. People's identity is today shaped today by forms of collective action (often media-bound) that have to do with the experiential and personal dimensions of daily life rather than with some abstract norm of ideological belonging, civic reciprocity or generalized trust. They are a form of "life politics", as Anthony Giddens would put it [1992, 1998], which does not simply amount to a politicization of the personal but aspires to "remoralize" it as a reflection on the value of negotiation within and beyond difference. People connect as usual, but they do so in a discursive and conjunctural way, on the basis of a solidarity constructed a posteriori and not assumed a priori.

To argue for the "active" political dimension of contemporary subjectivity does not imply that it is socially and contextually un-conditioned. It's just like with chess (to use Thompson's metaphor): even though players may have infinite combinations of moves, «the dominant system will set the conditions of possibility for moves to be done or not, with the non banal difference that, unlike chess, social life is not a game you can choose not to play» [1996, translated from Italian edition, 1998:292]. In other words, the resources to act out this "activism" are not equally accessible and distributed among social actors who therefore, as

we shall see, tend to adapt their expectations, judgments and choices to what it appears to them as *reasonably* achievable, given the context they live in.

In line with these developments, some analysts (especially in Northern Western Europe) have argued that a new political identity is being created – the Everyday Maker [Bang & Sørensen, 2001] – that demonstrates how the political may be found also in the smallest interstices of everyday life's social practices. Everyday Makers offer a practical/pragmatic alternative to Putnam's assumption that social capital resides in the cooperation between strong *government* and thick communities (i.e., voluntary formalized associations), generating a form of *governance* from below, at least at the local level. Although they do vote and keep themselves informed with "high politics", they do not orient their civic engagements towards the state but towards the personal networks they get in touch with in the everyday run of things. By the same token, local institutions are not regarded as an external/coercive state apparatus they somehow have to resist, but rather as a feature of their everyday life to live and cooperate with, a center of political decision and action that both conditions and empowers. «Everyday Makers are much more interested in enhancing their personal and common capacities for self- and co-governance, right where they are, than in submitting themselves to an abstract social norm or mode of state citizenship. They prefer a 'thin' form of democratic political community that allows for the reciprocal acceptance and recognition of difference. […]. They react against the norms of 'thick' solidarity pursued by the 'old' left in the 1960s and the 'new' social movements in the 1970s. They insist on the irreducibility of their own modes of coordinating lay-involvement in relation to 'day-to-day life'» [*ibidem*: 156][15]. In a few words, Everyday makers show that: 1) people can agree on the solution to a certain problem and share a certain sense of trust and reciprocity without having the same a priori, universalistic interests; 2) disengagement from conventional and legitimated forms of political participation does not imply necessarily a political disengagement *tout court* but rather a discursive, context-bound and difference-laden repositioning of it.

In order for this "small politics" to be performed by everybody in the community, the intrinsic "virtue" of its solutions, methods and supporters would not suffice. Like all politics it must be systematically and diffusedly cultivated, negotiated, learned and socialized, otherwise it runs the risk to either reduce itself into a micro-dimension with no critical connection to the macro-dimension, or be isolated from those social groups who regard politics (in whatever form it comes) with an "adaptive preference" of apathy [Elster 1983]. There are in fact many people (women, old people and minors, minorities, etc.) who live in a condition of marginalization and somehow perceive they have little or no chance to play any significant role in the public sphere (at least the conventional one). They therefore stubbornly manifest little or no interest at all (at times even a form of overt aversion) in participation, exactly like Aesop's fox renounces to the tempting yet inaccessible grapes deceiving herself into believing that in fact they are "sour". A vicious circle therefore arises, a form of self-fulfilling prophecy: the excluded from participation will tend to keep on self-excluding (activating forms of "adaptive preference") determining the incompetence/ignorance/disinterest for which they had been excluded in the first place. As a consequence, their exclusion could last forever.

However, it is not a question of actual renunciation or self-deception. The fox's preference is temporary and unstable, as Elster rightly comments. Should the conditions change, i.e. should the grapes become accessible, the fox would certainly jump on them. In other words, Elster – criticizing the economicistic reductionism of rational choice theory – underlies that the complex process which brings an individual to choose X in order to achieve Y is not necessarily the result a rational individual "preference" since it is also over-determined by a whole series of factors due to common sense, to certain structural conditions, to certain psychological personal predisposition and past experiences. If one or more of these factors change, presumably the preference changes too in unpredictable modes and directions.

Here is where education comes as a catalyst for change, and that is the sense we gave to it in our simulation model. Education can be the key to break the vicious circle and change "adaptive preferences" creating the conditions for people to develop a will to know and participate more actively. In the light of this educational perspective, relationality – a basic component in all forms of social capital, as we have argued – acquires a strong morphogenetic power: relationships are not simply a resource people "possess" and "use" (and ultimately "consume") as single individuals, but more importantly they are collectively built,

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[15]   Bang & Sørensen sum up the Everyday Maker's "small politics" in the following slogan-like terms: «*Do it yourself; Do it where you are; Do it for fun but also because you find it necessary; Do it ad hoc or part time; Do it concretely instead of ideologically; Do it self-confidently and show trust in yourself; Do it with the system if need be*» [2001: 156].

produced, negotiated and fed within the different social/educational contexts people get in touch with (more or less formally) throughout their entire life. As such, education must be addressed as a goal and a good destined to the entire community and hence, like any other economic and social infrastructure, be pursued with systematic and rigorous policies.

3. Simulation: between explanation and prevision

Simulation studies represent a crosscutting reality among social sciences and therefore offer the possibility to achieve interdisciplinarity not only at the theoretical level but also at a more practical one [Trobia 2001]. Parisi [2001] has argued that the translation of theories into computational models gives them life. As far as sociology is concerned, that is quite an advantage since this discipline has long suffered from the paradoxical condition of being a historical-social science that has in fact grasped and metabolized the movement of reality only in bits and pieces, so to speak, through tons of researches that are often quite different from an epistemological, theoretical, methodological and technical point of view. Such discontinuity has been usually ascribed to its lack paradigmatic unity. In the debate about the scientific statute of sociology, some have seen this as a weakness, some others as richness. With this regard, computer-assisted simulations on the one hand offer the possibility to adopt a unitary and rigorous language, and on the other, they may be used for all sorts of aims starting from all sorts of data[16]. Since the late '50s, among these aims we find prevision (from the neoposivistic approach of Carnap and Neurath), exploration (from a Grounded Theory approach), and finally explanation (from Hedström's analytical sociology). If the feedback coming from the simulation falsifies the theory, you may proceed with further corrective experiments. Experimentation may be useful for explorative research too [Phelan 1997]: you may in fact modulate the presence of the variables that hypothetically determine reality in order to better verify changes in the phenomenon under study. Simulation may also be quite useful for *policy* issues. Through it one can see theory in action, even in its most interdisciplinary form. The concepts used in a simulation acquire a generative capacity (i.e. a capacity to produce effects) which is no longer simply hypothetical but becomes observable. Once generated, a simulation lives a life of its own. It offers us a historical perspective *sui generis*; it is not a *reconstruction* but indeed a *generation*. This is possible because the researchers set a priori only the initial conditions, but when the simulation world starts living, all possible emergences, resulting from computational relationships unnoticeable and unpredictable in a static picture of reality, will open themselves up for interpretation, with the relevant difference that, unlike other interpretative analyses, in this case it will necessarily derive from the elements (i.e. variables and variable-relations) inserted in the simulation program.

Some [Gilbert & Conte, 1995; Nowak & Vallacher, 1998] have even argued that, thanks to simulation models, the traditional break between the micro level of interaction and the macro level of collective dynamics can be overcome in a continuum line of observation. Such method would therefore offer the best solution in a connectionist perspective [Trobia 2001, 2005][17]. Some have defined this approach *utopist* and have opposed a more *realistic* approach being skeptical about the usefulness of simulation models in explaining real phenomena. A third approach is the *experimentalist* one that adopts simulation if only it employs empirical data [Deffuant, Moss, Jager, 2006]. One of the most frequent criticisms made to simulation models is that you cannot infer laws or regularities that can predict/explicate reality. However, this is a problem with *all* scientific knowledge [Cuin 2005:41]. Science does not offer answers about the world, if not indirectly, it rather offers questions about the world and in order to do that it modelizes reality. As many scholars have acknowledged, simulation models show how science works.

In 2004, at the University of Koblenz, Germany, there was a quite interesting workshop on simulation models whose proceedings have been published on JASSS [Journal of Artificial Societies and Social Simulation, 2005, 8(4)]. The most frequent question asked by skeptical sociologists and by those more tied to "in field" studies and comprehensive sociology was *How does a simulation model relate to reality?* From their point of view, since simulation requires a preliminary mathematization of reality and eventually a translation of it into computer language, it is the quintessence of reductionism. As simulation supporters have acknowledged too, the most important problem is that of testing the validity of the models and software

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[16]   For a review of simulation models, see Trobia 2001, 219-224.
[17]   A sort of connectionist manifesto was proposed by Trobia in 2001, whose points of developments are apparently substantiated by the simulation method.

employed. A central (if not unique) criterion to keep in mind with this regard is that truth must be meant as «the precision with which the model represents the empirical reality or the theory which is being studied» [Trobia 2001:231; see also, Schmid 2005 and JASSS 2005, 8(4)]. Precision and realism are not the same thing. Within comprehensive sociology, for example, it is common to adopt the heuristic practice of creating ideal-types, but as we all know ideal-types' precision does not lie in their imitation of reality. Of course, the representativeness of simulation is quite different from the statistical one [Marradi, 1997], although the outcomes of quantitative research may provide good insights in the simulation initial phase of data input. What is the relationship then between qualitative representativeness (expressed through ideal-types) and the construction of artificial social worlds? Artificial social worlds may be satisfied with the plausibility originating either from the dynamic projection of statistical data and the quantitative relationships among them, or from the dynamic projection of ideal-types referring to social actors, interactive processes and rules of action. While ideal-types may be derived only a posteriori (*inductive typicality*), simulation allows to recur to plausibility, i.e. a sort of *deductive typicality*. But what kind of validity could the output of a simulation, partially or totally based on a deductive typicality, have? With this regards, Trobia underscores the difficulty to carry out this validity testing when the object of the simulation is a phenomenon latently present in the social system. In these cases, he proposes to make a confrontation among different and competitive models, which for example implement different versions of a theory (experimentation and explorative experimentation). The alternative would be that of verifying the validity of the model from its predictive capacity. In this case, however, the model could have been built validly, although its hypotheses may not eventually be verified by real data. In other words, the output validity of a model based on a deductive typicality may depend from the validity with which the simulation model has been built (process validity). In this field, the most solid validity test is a test on the sensitivity to variation.

The plausibility judgment given by the scientific community with regard to the construction of the simulation is also very important. Moreover, it is possible to have validity tests on middle-term results. From all said so far, one can conclude that computer-assisted simulation is the closest thing to the concept of sociological imagination. Also the doubts about the simulation capacity to emphasize sociological laws and regularities are somehow referable to the general debate about the nomological capacity of sociology. In other words, if you think sociology has the capacity to get to some laws, albeit *sui generis*, you must accordingly recognize that computer simulation has the capacity to identify them. In fact, even the traditional approach is not a simple comment on reality but rather a model of it. The laws and regularities found through research do not concern reality but the model that theory has created to represent it. If one adopts a critical position towards the *nomological illusion* – as Passeron did in the early '90s [1991] – simulation may offer some interesting insights. In criticizing the nomological illusion, Passeron lists a series of reasons: the impossibility to take into account all the variables which are present in the phenomenological context being studied; the impossibility to make the same comparisons scientists do in experimental analyses (if you do them you would basically wipe out their historical dimension); the implantation of the popperian criteria of falsifiability through the testing, at least logically, of its theoretical assumptions [Cuin, 2005:37]. It is easy to argue that computer-assisted simulation solves the first and third problem thanks to its computational capacity and its experimental vocation. The second problem opens up the question of historicity. Sociology's historicity is not that of the historical detail, but rather that of the minimal or necessary conditions. Although we agree with Raymond Boudon's warning about a too drastic removal of disorder from reality, we also agree with Charles Henry Cuin's conclusion that in sociology you can only have conditional or probabilistic laws, a conclusion you can apply to other fields of study. It has been in fact accepted also by the so-called *hard* sciences that, however, keep on considering nomological statements a crucial element in the explanation of phenomena.

3.1. Aim and description of the simulation model

With regards to the empirical part of our research we have used Netlogo, version 4.0.2, a free software available at http://ccl.northwestern.edu.netlogo [Wilensky 1999]. We have simulated the effects of anti-TC propaganda in stimulating a transition from a merely instrumental conception of digital media to a more reflexive one that brings the agents to recognize digital media as fundamental parts in the construction of reality and be ready to learn their language *ex novo*.

3.2. The agents

As said, our simulation deals with the diffusion of anti-TC information and aims at observing how such diffusion proceeds; how TC information is metabolized by different kinds of agents; how the agents perceive differently the risks connected to the use of both TC and non-TC systems (risk propension); how the different agents are willing to question and change their conventional knowledge about digital media (change potential).

The model originates from the reflections developed in *Mondo Hacker* [Fici 2004]. For the construction of the agents, we have drawn data from several sources, from the three-fold classification of hackers presented in Fici 2004, from some secondary sources and from some focus groups and interviews that have helped us in adding three more agent profiles.

Why did we start from the hacker world?

TC is not a commonly known reality and those who know and exchange views about it are basically the same people Fici contacted between 2002 and 2004[18]. We have therefore made the hypothesis that it from here that critical information about TC could come from. We initially wondered if and how this kind of information could be widespread, both among the hackers and a general population more similar to Italian society, where a large number of people still have a poor media diet [Censis Reports 2001-2006]. Drawing from previous research [Fici, 2004], we have identified three profiles –scientific hackers, activist hackers and psychedelic hackers – wondering how they could contribute to the generalized diffusion of anti-TC information. Scientific hackers (SHs) have a scientific, communitarian knowledge of digital media. They believe in pure research. Their idea of science is a popperian one, i.e. deductive, open, and always falsifiable. For SHs, individualism is a fundamental value and autonomy is a necessary pre-condition for all forms of creativity. Community, however, is also important since it represents the first stage to build knowledge and research, and share critical intersubjectivity. Sharing is never a mechanical activity but always implies hacking (literally meaning to pull apart an object to see how it works), that is rational, critical reasoning. In Coleman's sense [1990], they are the *advisers*: you listen to everybody, confront with everybody, but ultimately make up your mind autonomously; they repudiate all sorts of tie, as declared in many of their manifestos [Raymond 1997; Himanem 2001] and do not want to be conditioned in their research by the interests neither of the industry nor of common users. In a way, they are against education and divulgation, unless they are meant in radical terms: teach everybody the basic programming language and prevent the dependence from mainstream *friendly* technologies. In other words, they have no other aim than that of enhancing their own knowledge without worrying about its "spendibility".

The activist hackers (AHs) are not so much interested in the production of free software but rather in the effects it produces. Being somehow in the middle between the creators of free software and commons users, they fight for digital rights and for their extension to everybody. They promote the civic uses of digital media i.e. the use of computers and the internet to increase social and political participation and access to crucial information. They are not as competent as SHs, they are instead a sort of translators. Like SHs, they believe in community-building and sharing and yet, while for SHs community is a tool for knowledge, for AHs it is a value in and of itself. To them, the fight for free software originates from ethical reasons and not by instrumental ones, as for SHs: it is indeed a form of social capital in Coleman's sense [1990] and hence it must be regarded as a public good. Despite these differences, SHs and AHs have many points of contact. They often participate to the same discussion lists, AHs often work in social centers teaching basic digital literacy courses or writing articles on blogs and online magazines such as IndyMedia [http://italy/indymedia.org].

The third profile is that of the psychedelic hackers (PHs), the fans of a cyberpunk culture situated somewhere in the middle between the countercultures of the '60s and the current cyborg literature portraying the hybridization human-machine. They are in a sense marginal groups characterized by an addictive relationship with technologies whose function is similar to that of LSD in the '60s [Fici 2002, especially chapter #5; Balestra 2004]. In the micro-world of our multi-agent simulation, SHs, and partially also AHs and PHs, have the knowledge necessary to fully understand all the implications of TC. In particular, SHs understand the technical implications, AHs the social, political and economic ones; PHs, being less interested in the collective benefits of technologies, are more worried by the implications of TC in terms of individual uses of technological innovation. All of them, however, have a fairly high knowledge of digital media issues.

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[18] During this period, Fici made a prolonged participant observation of the Italian Linux Users Groups (LUG) and interviewed many of the young physicists who have created Palermo's LUG [http://palermo.linux.it/].

To these three types of agents, we have added three more profiles that somehow represent the ideal-types of *common users*. In line with a certain trend in simulation studies [Trobia 2005:140], we have chosen to identify them by combining secondary sources and empirical research. As for the secondary sources, we have looked at the Reports issued by CENSIS since 2001, while for the empirical research we decided to carry out some focus groups and interviews preceded by a pre-test for the selection of the participants. In line with the description done in the CENSIS Reports, we thought that abstractly the population could be divided into three portions:

1. A good portion of people who do not use neither the computer nor other technological devices relating to *new media*, except the cellular phone which has a fairly cross-cutting penetration (in the model we called them neutral agents, NAs).
2. Another good portion of people who have with computers and the internet a routine relationship, mostly spent in their workplace (we called them conservative agents, CAs). Presumably, they are not so curious about digital media and they use them only for strictly professional reasons.
3. Finally, there is a third, smaller section of people who do not have any specific digital expertise and yet show quite an interest in digital technologies, they use them in their workplace, but also in their leisure time (we called them innovative agents, IAs). They keep themselves informed with the latest news about technologies and try to solve autonomously technology-related problems, like for example looking for the best software purchase for a particular use.

Through a pre-test, we selected a number of persons somehow corresponding to these portions. After the selection, we carried out three focus groups according to the following criteria: the first one included four CAs and four IAs; the second one included four NAs and four CAs; and finally the third one included three NAs, three CAs and three IAs. During the focus groups, after showing an anti-TC video, we first of all asked people about their perception of the risks and advantages relating to TC. Eventually we tried to make them discuss and confront each other with the following topics: interpersonal trust and its sources; the construction of trust in the media technologies purchases; the socialization to technological knowledge; the perception of the social phenomena relating to computer use and Internet navigation. Another objective was that of verifying the validity of the characteristics we had imagined for each type of agent. As it often occurs in empirical research, we had to face a problem we had not predicted: the difficulty in finding NAs willing to participate in a research project like ours. Actually, the NA portion was formed by people who – by age, socio-professional status, or literacy level – either tended to suspect that with the focus group we wanted to "measure" somehow their competence or had no intention to confront themselves with more "expert" people. For this reason we could not carry out the third focus group, an inconvenient we tried to partially overcome by making some individual interviews to NAs in their homes about the same topics discussed during the focus groups.

As for the numeric distribution of the agents in the simulation world, we have imagined the following situation at the initial setup:

1. Scientific Hackers (SHs): 10 groups comprising 7 agents each;
2. Activist Hacker (AHs): 10 groups comprising 10 agents each;
3. Psychedelic Hackers (PH): 50 isolated agents;
4. Innovative Agents (IAs): 180 isolated agents;
5. Conservative Agents (CAs): 250 isolated agents;
6. Neutral Agents (NAs): 350 isolated agents.

The total population amounts to 1000 agents, although it is possible, for exploratory and experimental reasons, to change the number of the agents using some sliders. At every single setup their distribution in the space of the simulation is totally randomized. Adopting Rogers' definitions [1962, 2002], the SHs are the *innovators*; the AHs and the IAs are the *early adopters* who, together with the SHs represent the *early majority*, while the CAs are the *late majority*. The role of the PHs and NAs is less clear and in fact it is on these agents that we focused experimentally in order to explore their action in the exchange of critical anti-TC information.

3.3. The variables

The characteristics of the agents have been operationalized in nine variables, each one comprised within a 0-1 variance range. In the field of simulation studies, this operation requires a correct *metrics* [Epstein 2000; Punzo 2008] that justifies the choices of numbers, their interrelations, and all the parameters adopted during the research. In our metrics, as for the construction of the agents, we have drawn from previous re-

search and from the focus groups that allowed us to grasp the personal point of view of the persons contacted. Through the focus groups, we also wanted to identify the differences between the three agents who, in our hypothesis, represent *common users* in terms of competences, interests and attitudes towards technological innovation. They were therefore quite useful in the calibration of the variance range. The variance ranges have been further tested following an experimental mode that confirmed their plausibility. Following an elsterian perspective, in the construction of the agents we also took into consideration their socio-cognitive, psychological and emotional characteristics. Emotions, according to Elster, have often a relevant role in determining the sense of social interaction and rational choices. However, we cannot ultimately predict their effects on either single individuals or particular contexts. In line with this approach, we have inserted in our simulation some psycho-emotive variables that appeared to us pertinent to the limited rationality theory we had started with. Trust, knowledge, risk perception and limit are the four factors that, according to the experiments done by cognitive psychologists and researchers in the field of innovation adoption, mostly condition the diffusion of new ideas and of the social practices deriving from them. Given that the diffusion of new ideas always implies a certain degree of uncertainty and that their process of diffusion depends also from the capacity of the social system[19] to absorb that uncertainty which otherwise would paralyze social action, we have inserted two variables regarding two different forms of anxiety: an *innate anxiety* distributed randomly to the entire population of agents like a sort of individual bio-genetic trait, and an *acquired anxiety* derived from the contact with anti-TC information. The latter is a quite complex information made of different elements which are difficult to evaluate for the non-specialists. Drawing from the limited effects theory of mass communication [Wolf 1985], we inserted the variable *closure* (i.e. closure to anti-TC information) to indicate the complex interaction between psycho-social dynamics and communication processes: the interest to acquire anti-TC information [Hyaman & Sheatsley 1947]; the selective exposition to it [Klapper 1963]; the selective perception of the different elements composing it [Kendall & Wolf, 1949] and the selective memorization of those elements [Barlett 1932; Hovland, Lumsdaine & Sheffield 1949]. These are the four implicit sub-variables that define the variable *closure*. As we will show, closure operates differently in the agents according to the concepts of risk aversion, loss aversion and endowment effect, taken from Prospect Theory. As a consequence, we have given a higher acquired anxiety to those agents who, by definition, are less interested in anti-TC information and in technologies as a whole, less capable of perceiving the general meaning of it and memorize the most important aspects (ANs and CAs).

The variable *resistance to pass anti-TC information* refers to the degree of openness agents have towards other people. It is linked with two implicit sub-variables: the full understanding of the general relevance of anti-TC information; the different capacity and willingness to communicate with others. When we talk about openness we do not refer to some sense of generic altruism but to the willingness and capacity to share with non-experts one's own critical knowledge about TC. Accordingly, we have imagined that AHs (vocationally oriented to divulgation) have a quite low resistance to pass anti-TC information, certainly lower than SHs who can perfectly understand all the negative implications of TC but have neither interest nor capacity to translate and transmit their knowledge beyond their restricted groups. The agents less rigidly defined have a higher level of variance probably due to the fact that we had no empirical data to make more precise hypotheses about this aspect.

In line with the theory of limited rationality, the variable *horizon* indicates the limits of the agents' capacity to grasp reality. It is not a generic horizon but rather the space within which it is possible to access information about technological innovation (i.e., info patches and EDU pills). Two types of limits determine the horizon: context-bound limits and reflexive, self-imposed limits (in Elster's words *accidental* and *essential* limits). Technological knowledge too limits indirectly the size of horizon: the more a person knows, the more s/he is willing to expose herself/himself to specific information, the larger her/his own horizon.

The variable *mainstream knowledge* indicates the dominant information about TC. In our simulation it is represented by the knowledge about the dominant computer operating systems as well as the software installed in all digital devices. In the common sense understanding, these systems are one thing with the hardware and their diffusion is so pervasive that there seem to be no other possible alternative. In our hypothesis, mainstream knowledge is average or low (0.3-0.5) in CAs (it is the only knowledge they have). In the case of IAs, we have imagined a larger range of mainstream knowledge since they are more curious

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[19]   Following Rogers [1962], the *social system* is the whole of networks within which the early adopters of an innovation are inserted and circulate information about it.

about technologies. NAs, having generally a knowledge highly mediated by technologies, do not have high level of mainstream knowledge since the simple information they have does not amount to knowledge. As for the three kinds of hackers, mainstream knowledge is quite limited since their interests are more oriented to non-mainstream, *unfriendly* uses of technologies.

The variable *instrumental trust* indicates, in Coleman's terms, the trust derived from *advisors*. It does not imply the renunciation to self-determination because advices, albeit requested, are *weighed up* according to one's own competences and interests. As a consequence, instrumental trust is larger in those agents who are more competent and scarce or null in those who are less competent or totally incompetent.

The variable *non-instrumental trust* indicates, in Coleman's terms, the trust derived from *guarantors*. It produces hetero-directed choices since the guarantors supply all possible alternatives. As a consequence, this kind of trust is more frequent in those agents who have less competence to weigh up autonomously the possible options and hence need assistance and reassurance from the guarantors or from general common sense. The choices derived from non-instrumental trust are more inclined to conformism [Elster 1983]. These two kinds of trust are then differently distributed among the agents. Even SHs and AHs have a certain degree of non-instrumental trust since for them the communitarian dimension is quite important, albeit for different reasons. At the other extreme, the NAs have the highest levels of non-instrumental trust since they have no competence at all to adopt the other kind of trust.

3.4. The info patches and the EDU pills

Besides the agents, we inserted in the simulation world three different kinds of info patches, each one with a different nature and life span. The agents therefore may either meet each other or with some info patches.

Main patches (mainstream patches) represent the very frequent meetings with dominant information about computers and digital devices. They are quite numerous (400 at the initial setup) and their life span lasts for one entire simulation cycle (301 ticks).

Div patches (divulgation patches) represent the meetings with critical anti-TC information (such as articles, forum messages, blogs, etc.). They are expressed in a quite simple language that can be easily understood by non-specialists too. They are 40 at the initial setup.

Spe patches (specialized patches), like div patches, represent the meetings with critical anti-TC information, but are expressed in a very specialized language which is not easily understood by non-expert agents. At the initial setup of our simulation world they are 30.

Div patches have a life span of 150 ticks (half cycle) while *spe patches* last for only 48 ticks, the hypothesis being that a highly specialized information is more quickly replaced by similar information, while divulgation, tending to consolidate information in non-expert agents, lasts longer. In line with the divulgative vocation of AHs we have made the hypothesis that whenever a *spe patch* meets an AH, it dies and splits into two *div patches*.

Finally, we have created another kind of patches, the so-called *EDU pills*, i.e. the meeting with an occasion of critical media education. They are in fact a more structured and systematic intervention. In the simulation world EDU pills are launched in groups of 20 at the 105th, 150th and 225th tick of the cycle and will last for the entire cycle. The numbers of both info patches and EDU pills can be experimentally changed using the sliders provided by the program.

3.5. The rules of interaction

The main objective of the interaction agents-agents and agents-info patches/EDU pills is to verify at first the increase of anti-TC information per capita and eventually: 1) the increase of the propension to risk perception; 2) the willingness to question one's own knowledge and common sense certainties; 3) the modes through which this change happens.

Within *prospect theory*, the theme of risk perception has been widely dealt with. On the basis of some experimental studies it has been verified that risk aversion is not to be meant in terms of aversion to one particular risk but rather as an aversion to change from a particular status of stability into a new one whose outcomes are totally unpredictable. In risk perception an important role is played by loss aversion and the endowment effect. This is in line with the theory of limited rationality according to which in presence of certain contextual or subjective limits it is not possible to predict the negative consequences or risks that may derive from a particular choice, especially in the long run [March, 1978]. In Kahneman and Tversky's

definition, loss aversion consists in the tendency to over-estimate the loss and under-estimate the gains while the endowment effect represents the aversion to give up what one already has. Several studies have demonstrated that loss aversion and endowment effects have less to do with a long-term evaluation of the effects of a particular choice than with the stress caused by the transition from one status to another. We have therefore drawn from the concepts of loss aversion and endowment effect to imagine some similar dynamics of resistance to the change required by anti-TC information, that is a passage from a relatively secure set of certainties about technological innovation to less commonsensical opinions and actions. Drawing from the "uses and gratifications" approach developed within the communication research field in the late '60s and '70s of the XX century, we have also made the hypothesis that the attribution to the new media of some sort of gratification (cognitive, affective, integrative, instrumental) may reinforce the endowment effect so that they acquire a power that goes well beyond their instrumental use or market value.

These are some of the reflections which led us to identify in our simulation model certain rules of interaction agents-agents and agents-info patches/EDU pills. The movement of the agents as well as info patches and EDU pills have been randomly determined. In particular, the interaction among the agents – i.e. the exchange of anti-TC information – has been described through a *communicating vessels effect* according to which, in line with a basic assumption in information theory, when A meets B, the agent who has more information tends to "transmit" the difference to the agent who has less information. The process of information transmission is however conditioned by other concurrent processes such as the presence of *anxiety* (both innate and acquired), the *resistance* to pass anti-TC information, the *closure* of the receiving agents. In other words, we expect that the effects of the interaction among the agents will be on the one hand amplified by anxiety and on the other hand reduced by the sender's resistance to pass anti-TC information and the receiver's closure to innovation. The interaction between the agents and info patches/EDU pills follows the same logic. More specifically, when an agent meets a main patch, the latter's value increases being multiplied by the agent's horizon which is supposedly saturated with dominant, mainstream information. Therefore, the larger the horizon, the larger the value of the main patch. The interaction between the agents and spe patches is conditioned by the receiver's anxiety and closure but has also a further coefficient (0.7) which represents the difficulty to understand and metabolize that information. The same happens with the interaction between the agents and div patches, but in this case the coefficient expressing the information absorption difficulty is 0.4 since information is more divulgative. Of course, EDU pills make possible an even larger information absorption.

The interaction agents-agents and agents-info patches/EDU pills produces in each agent a certain propension to risk perception (PRP) which is supposedly directly proportional to the increase of anti-TC information. Actually, knowledge produces new, destabilizing questions. Risk perception arises precisely when, because of some new knowledge, one starts making hypotheses concerning the probability that certain events may actually occur[20].

Finally, we have predicted that the agents have a change potential (CP), i.e. a willingness to question their own assumptions about technological innovation, resulting from the discount that trust and mainstream information determine with regard to the propension to risk perception[21]. CP is described in the simulation with a yellow curve that may have both negative and positive values.

4. Some draft conclusions

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[20]   The formula expressing the propension to risk perception (PRP) is:
$$PRP = MainTC *(Anxiety1 + Anxiety2), \text{ where}$$
PRP = propension to risk perception; MainTC= mainstream information about TC; Anxiety1= Innate anxiety; Anxiety2=Acquired anxiety.

[21]   The formula expressing the change potential (CP) is:
$$CP = \frac{PRP}{NiT(MainTC) - IT}, \text{ where}$$
CP= change potential; PRP= propension to risk perception; NiT= Non instrumental Trust; Main TC = mainstream information about TC; IT = Instrumental Trust.

In this paper, we have just presented the very first results of a research project still in progress. The most interesting characteristics of computer-assisted simulation models is that of giving new experimental opportunities on which we are still working. Therefore what we discuss here are just some initial results we have reached after running one hundred simulation cycles of the simulation[22].

4.1. The first experimental outcomes

As said, these draft conclusions derives from running one hundred simulation cycles: any change in the size of the population, in the variance ranges or in the interaction rules, would require the same number of cycles. As for the agents' change potential, the initial setup (as described in the previous paragraphs) is very determining. In fact, the whole simulation is highly dependent on either the random distribution of the values included in the variance ranges or the characteristics we attributed to the agents (somehow confirming the hypotheses we had made about their action) . The agents who had been defined in more rigid terms (i.e. SHs and IAs) because of their vocation, appear more willing to change using instrumental trust. One peculiar element shared by these two agents is the specularity of the curves describing their propension to risk perception (black curve) and their change potential (yellow curve): if one changes, the other one changes too in a directly proportional way. In particular, this specularity occurs whenever the yellow curve (indicating the CP) is negative while the black one (indicating the PRP) is positive. Both curves follow the same trend. If the yellow one were positive, the propension the risk perception and the change potential would run parallel above the x-axis.

As far as the other agents are concerned, the change potential does not stabilize into a predictable trend but instead fluctuates, both qualitatively and quantitatively, in a peak-like manner. In particular NAs are highly dependent from others people since they show a fluctuating behavior as a result of casual encounters. Having no technological competence at all, they are the most subjected to a peak-like trend determined by a sort of panic effect caused by the anti-TC information they have somehow got in touch with. Since they have no capacity to elaborate autonomously this information, they end up selecting the effects through some form of mediation developing fear and sensationalism rather than a real understanding of the phenomenon. With regards to the little increase of the red curve (i.e. the growth of anti-TC info), we have tentatively concluded that in the hackers' case this is due to the *communicating vessels effect* (SHs, AHs and PHs are already quite "anti-TC literate" and therefore do not need to know more), while in the other cases (NAs, IAs and CAs) it is due to the variance of the variables *closure* and *resistance* to pass/receive anti-TC information. The trend of the yellow curve (i.e. the change potential) is entirely coherent with the theoretical premises in the case of AHs: they play somehow a "bridge" function and then it is plausible that their willingness to change is averagely high, sometimes mediated by other people's choices, some other times more open to develop autonomous understanding of technological innovation. The presence of peaks among all kinds of agents indicates that anti-TC information, if passed only through a word of mouth, without more structured interventions, does not produce any stable and significant effects. Surprisingly, CAs, that is the agents who, by definition, tend to show an inertial agency, are the most willing to change, albeit weakly, and to act more autonomously.

The formula about the change potential (CP) [see footnote #21] describes the way in which the propension to risk perception (PRP) is reduced, via a division, by the difference between non instrumental trust (NiT) and instrumental trust (IT); however, the NiT value, before the subtraction of the IT value, is multiplied with the value of the Main TC (i.e. the mainstream information about TC) value which, in our hypothesis, has the capacity to increase in the agents the tendency to trecur to NiT, determining a stronger social control on them. A further hypothesis states that the higher the Main TC value an agent have, the higher his/her NiT. Therefore, the PRP will be high, average or low and have negative values if IT is prevailing and positive values if NiT is prevailing. In a further development of the basic model, we have adopted a different formula $CP = \dfrac{PRP}{(NiT + MainTC) - IT}$ where the NiT value and the Main TC value are no longer multiplied but instead added one another. The formula in this case produces a much weaker so-

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[22]   A more detailed exemplification on the simulation cycles will be presented on a website we are currently working on. In the meantime, to give an idea on how the simulation interfaces look like, we offer some examples at the very end of this paper.

cial control than in the basic version, leading to much higher fluctuations in the change potential, a fact that we tend to interpret through a re-elaboration of the *sour grapes effect*.

4.2. Education, the *sour grapes effect* and self-discipline

Following Elster, we have defined the *sour grapes effect* as the process of "adaptive preference" through which individuals, being unable to make a certain choice, simply renounce to it and deceive themselves into believing that in fact they "prefer" some other thing. However, it is neither a real renunciation nor a real self-deception. Should their initial conditions of possibility change, presumably their "adaptive preference" would change too. Our first hypothesis was that the agents (or at least a particular type of them), if confronted with anti-TC information, in order to avoid the *dis*-integrative consequences (psychologists would call it *cognitive dissonance*) which would derive from adopting it, tend to: 1) develop an "adaptive preference" for mainstream TC information; 2) become less inclined to change; 3) behave more fluctuatingly because of their dependence from hetero-directed NiT. In fact the first version of the model seems to confirm this hypothesis.

We also wanted to verify the role of education in the development of the CP. Therefore, as said, we did not only insert in the simulation world some info patches but also some EDU pills functioning as a more structured intervention than the random and occasional encounter with info patches. By increasing the number of the pills we have got a first confirmation – to be further verified however – to the hypothesis that more structured, diffused and systematic educative interventions do play a positive role in the development of the CP, and most of all tend to stabilize the fluctuations, a clear sign that the agents tend to be less dependent from a NiT and replace it with IT. This conclusion (albeit temporary) about the role of education, let us make an interesting observation – which needs to be verified however – about the second version of the simulation model. As said, in this case the formula expressing the PC is such that social control appears to be weaker and yet fluctuations in the PRP persist, an outcome that we have interpreted with the *sour grapes effect*. It is precisely this outcome that makes us state another hypothesis: is it possible that in this case the social control exerted through main info patches, being disseminated and pulverized in the manifold aspects of daily life, is not at all weaker but indeed stronger? Is it possible that discipline has not so much declined, nor has been replaced by *anti-discipline*, but has rather been internalized and turned into *self-discipline*, as Foucault argued?
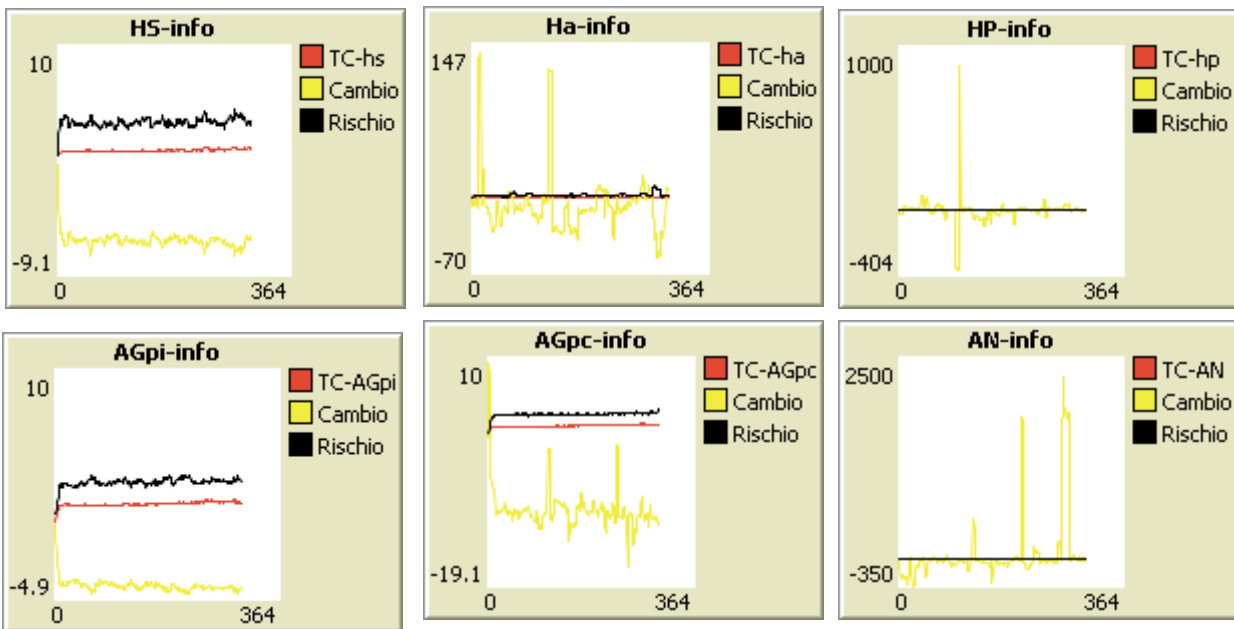
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