Chapter 6
Body Captors and Network Profiles: A Neo-structural Note on Digitalized Social Control and Morphogenesis

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6.1 Introduction: Social Digitalization

'Social digitalization', as an indicator and substantive part of contemporary social morphogenesis, can take complex forms. This chapter examines the process using two combined indicators that will be called "devices". Firstly, the global spread of body sensors/captors, as new and invasive technologies originally designed by an alliance between scientific and military establishments, which are now fostering measurement, industrialization and commodification[1] of the body. And secondly, the construction of very large relational databases, bringing together information about individual relational networks and leading to exploitation of individual profiles for both commercial and political purposes. In such social changes, businesses and markets, large and small, find ingenious ways to transform these devices into marketing opportunities and to make this combination of technologies acceptable to diverse kinds of publics by linking them with widespread concerns (health, security) and activities (games, sports). At some point, a critical mass will be reached with the use of these tightly knit technologies in specific sub-populations whose diffusion is likely to change our social reality: in particular social control as we know it. My hypothesis is that this social digitalization will create the digital equivalent of a company town at the global level, an integrated self-contained social

[1] These terms mean that reactions of the body to all sorts of stimuli coming from commercial products (for example digital games) become part of an industrial process that measures these reactions in very intrusive ways, changes these products based on deep knowledge on individuals and groups acquired by these measurements, and creates products with addictive power over the persons and their behaviour (Dudouet 2009). The measurements are carried out on a continuous basis and the body thus becomes a thing that is part of the Internet of Things.

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ecosystem to limit welfare protection (where it exists) as well as both political and institutional entrepreneurship.[2] Both are likely to become conditional on accepting this digitalized form of social control and its consequences.

Social morphogenesis and contemporary neo-structuralism together help theorize these intertwined and emerging processes. The morphogenetic approach uses an analytical framework that emphasizes the interplay between three dimensions always at work in any social transformation: 'structure', 'culture' and 'agency' as the basis for explaining stability or change (Archer 1988, 2013). Neo-structural sociology[3] is defined here as an approach that makes the same analytical distinctions while using network analyses, combined with other methods, to enrich theories of individual and collective action. It does so by modelling generic social processes such as solidarity and exclusion, control and conflict resolution, socialization and collective learning, and regulation and institutionalisation, based on specific definitions of reflexivity, contextualization and judgements of appropriateness[4] (Archer 1979; Lazega 2003, 2012).

In particular, neo-structural sociology is concerned with understanding the concept of social capital as encompassing these social processes and helping collective actors manage the dilemmas confronting their collective actions (Olson 1995). Social capital can be considered to be a collective asset different from the relational capital of individuals. For example, observing that a group is characterized by a particularly high level of indirect reciprocity (among its members) raises the question of what makes such a form of solidarity possible. The answer to this question is to be found by looking at the economic and symbolic kinds of relationships that are mobilized in processes of generalized exchange: at the boundaries that the group has established for itself, based for example on exclusion(s), and at the norms that its members are called upon to define and apply (Favereau and Lazega 2002). A group's social capital may therefore be conceived as a product of members' "political" activity in combining structure, culture and agency. It is not merely the by-product of interactions among actors who instrumentalise their relations[5] in order to accumulate resources of the sort individuals can appropriate.

All types of collective action are based on multiple social processes that compose these variable types of "social discipline" or social order perceived as legitimate by the group. Among such processes that can be considered to represent a form of collective social capital, one generic process consists in informally organized

[2] As used here, this notion of institutional entrepreneurship does not imply a heroic and glorified conception of political activity.

[3] The prefix 'neo' is meant to differentiate this brand of structuralism from that developed in France between the 1940s and the 1960s, for which individual and collective agency did not matter much in explanations of social phenomena. A neo-structural perspective looks at collective action process by process.

[4] For early use of the notion of judgments of appropriateness to specify behavioral responses rather than assuming their uniformity, see Archer (1979, 2012) and Lazega (1992).

[5] The idea that the social order only "emerges" from interactions between members of a group has a long history in sociology. In sociology of organizations, see for example Strauss (1978) and a critique of this approach (Lazega 1992).

social control among members. I separate social control from other processes for analytical purposes only, for it is inseparable from a shared, underlying form of social discipline that includes these social processes feeding back on each other (socialization, solidarity, regulation, and many others). Faced with deviant behavior or behavior perceived as opportunistic by a dominant class or by dominant members of a group, and before turning to costly solutions that invoke the legal system to enforce the rules, a group or a community mobilizes its internal relational system of social control. Most of social control taking place in society uses relationships and happens before police and the judiciary come into the picture. This relational system enables everyone to participate in imposing sanctions and to construct personalized access to infractors to bring them back to good order, i.e. to respect their commitments or taken for granted customs and norms. This process "resolves" the problem of the "second-order free-rider" by lowering control costs through harnessing the personal relationships between sanctioners and infractors (Lazega 2000). This is why social control is usually examined as a widespread social process of collective action bringing together the basic elements of culture, structure and agency by looking at networks of relationships between members, sanctioners and infractors.

The argument here is that this is precisely what social digitalization weakens. Control can be exercised laterally at the intra- and inter-organizational levels, using relationships instead, backed up by more formal procedures. But, paradoxically – given their intrusiveness with respect to personal information – captors strengthen only asymmetric top down and bureaucratic, impersonal controls. Industrialization/digitalization of the body and the spread of captors weaken control regimes based on the management of relationships. The danger of a captor-based authoritarian order spreading in civil society via health, security and gaming technologies is based precisely on the fact that monitoring and sanctioning are no longer relational.

This combination of approaches is useful when looking at contemporary societies as organizational societies, i.e. as social worlds in which the meso level, a generic level where micro and macro evolutions take place, is overdeveloped. As shown by Philip Selznick, power in such societies comes from the ability both to use organizations as 'tools with a life of their own' and live with them as institutions and meso-political communities. Building upon the Weberian tradition studying modernization, rationalisation and bureaucratisation, many sociologists – including Perrow (1991) and Stinchcombe (2001) – specify this notion of organizational society by looking at how organizations have absorbed societal functions and spread formalized and managerialized coordination, thus subjecting individuals and each other to tightly connected constraints and strong demands for increasingly close coordination.

The 'transformational capacity' of these technologies depends upon the users (i.e. those who occupy privileged positions in social hierarchies) and the organizations in question (the military, police, marketing firms). These organizations can be narrowed down to focus on the State (and its coercive organs) and market agents (e.g. large multi-nationals) –the stick and the carrot. It is also necessary to underline how the acceptability of such technologies is lubricated by the fabric of neo-liberal

economics, which translates such technologies into commodities to be bought and utilized as tools, thereby masking their inherent transformational capacities and their potential for undermining existing means of deliberative collective action. Another dimension would actually be the welfare dimension, where diffusion is aided by perceptions of the good or misperceptions of their capacity for harm (if the harm principle is the ethical principle determining social acceptability).

6.2 Sensors and Networks: Technologies of Social Control Reconfiguring Late Modernity?

Relational monitoring and sanctioning is being steered and channeled by new and combined use of technologies of social control. These technologies could be considered to be cultural/structural indicators of generative mechanism(s) reconfiguring late modernity. One possible illustration, out of many, of the emergence of new forms of social control in current societies can be found in the spread of two measurement devices. The first is the relational profile of individuals identified and measured by his/her ego-network. The second is an 'epidermal electronic system', a sensor recording neuro-vegetative variables of the body. Both are pictured below in Fig. 6.1.

Sensor technology is global. It was developed in the USA, China, Singapore and probably several other countries for military purposes and business competition. Industries using such sensors include the military, healthcare, gaming, sports,

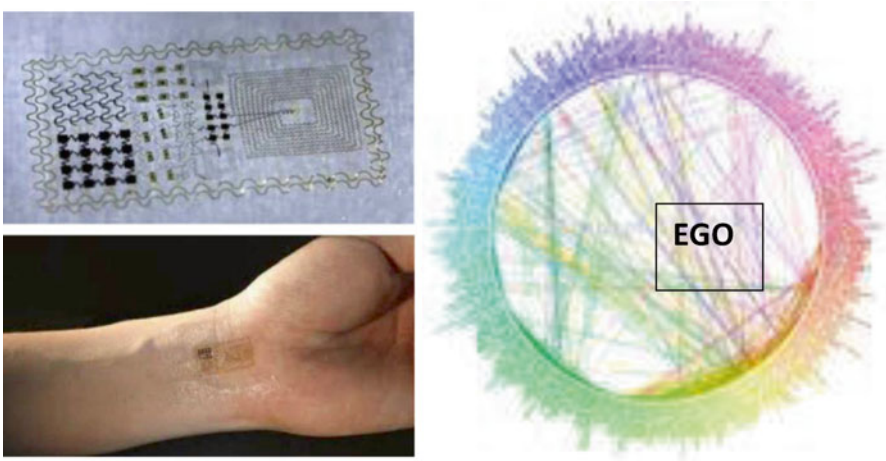

Fig. 6.1 The "epidermal electronic system (EES)", (Dae-Hyeong Kim et al. *Science* 333, 838 (2011)) and ego-network relational profile (as in ordinary visualizations of Facebook or Gmail profiles, to use brand names that are familiar to many in 2014)

building, insurance, surveillance and security, even education.[6] The devices come from the efforts of biological and medical research to measure and quantify the human body. They now measure much more than glucose levels for patients with diabetes. They monitor body temperature, brain activity, voice, heartbeat, muscular activities, and many other variables as part of body "augmentation" schemes. Intelligent captors are incorporated in watches, clothes, floors, fridges, in the apartments of persons with Alzheimer's[7] and ordinary "smart flats". Their goal is to quantify and follow human behaviour on the ground, in its environment, and characterize the sensory-motor, biological and psychological profiles so as to keep all citizens in good health by detecting their pathologies early on, help the young and less young learn at school, assist everyone with complex tasks at work, personalize the treatments of the elderly, etc.

Use of these sensors/captors is also part of a new kind of behaviourism that tries to use and guide human reflexivity and judgments of appropriateness in the orientation of action. Their economic cost has decreased so much that biomedical and epidemiological research uses it to equip not only 'high-maintenance cohorts' of soldiers on the battlefield or high-level athletes, or those with post-traumatic syndromes, burnout and depression, but also representative samples of the population or clients of specific services (travellers on long flights, adolescents playing online games, etc.). The definition of 'high maintenance cohorts' is being relaxed to include patients with neurological troubles, psychiatric patients, patients in depression or re-education, senior people in general, handicapped persons, but also groups that are temporarily in situations of pressure, vigilance, anxiety or immobilisation, such as long-haul air passengers. It is obvious that cultural changes are on their way that will make it acceptable to extend the use of sensors from 'high maintenance cohorts' to the entirety of civil society. Statistical analysis of such data will identify intra- and inter-individual norms just as much as they will direct their users towards "personalized" treatments and closely monitor patient adoption of these personalized treatments. Long term follow up of such cohorts over decades was launched in various countries and is added to their databases on a regular and continuous basis.[8]

These efforts aim to construct very large databases combining, for each individual, biological (genotype and other), medical, psychological (based on questionnaires and interviews), behavioural and socio-demographic variables, plus network profiles

[6] For an illustration of the circular relationship of technology transfers between civil healthcare, the defence industry and academic scientific laboratories at the global level, see Ian Sample & agencies, 'Soldier controls bionic arm using power of thought, *The Guardian UK* (11 Dec, 2013) [http://www.theguardian.com/science/2013/dec/11/soldier-controls-bionic-arm-using-power-of-thought] (Accessed 13 December 2013).

[7] The novelty of this technology should not be overstated. This technology is continuous with the appeal of "self quantification", as with equipment such as joggers' bracelets or use of smartphones to track people; an existing mode of being in the world that has become normalized. The tools may be new but the practices are already entrenched and they fit into a ground that is already prepared.

[8] See for example Zhengming Chen et al. (2013) on a longitudinal cohort of half a million persons in China wearing these captors for months.

and activities tracked by Global Positioning System (GPS) and Radio-frequency identification (RFID) chips that are deemed to be key for everyone's "maintenance" as biological and cognitive machines. Projects are extended to include measurements of "emotions" and collective reactions of workgroups and teams, so as to ensure "harmonious" functioning of the team by managing the turnover of its members and their collaboration. Analyses of databases bring together applied mathematicians, computer scientists, engineers, medical doctors, epidemiologists, and representatives of human and social sciences. Questions such as "should these databases exist?" and if so "Who does or should control them?" are of some economic and political importance. Right now, the most popular global corporations, email operators and semi-conductor and gaming industries master biofeedback much better than public services and do so worldwide.

6.2.1 Marketing Fear, Fun and Social Comparisons

Combined captor and network profiles, their diffusion and their databases can be considered part of the contemporary 'exponential addition of new items, novel sources of ideational variety' illustrating the situational logics of both structural competition and cultural opportunity, thus redefining the relation between culture and structure in Late Modernity (Archer 2013). The most obvious vector of diffusion for bodily devices and ego network information (and their associated databases) is the neo-liberal market with large private actors who do what they want, supposedly with good public intentions but also with weak regulators. At least three models already exist in internet commerce for how this equipment is advertised, marketed and legitimized. Firstly, through reductions in transaction costs that are offered for buying goods online if the consumer fills in all the required information and accepts the cookies, thus trading information for reduced purchasing price. In the case of sensors, the message might be "If you have this chip, your health insurance premium will be reduced".[9] Secondly, another way in which this monitoring equipment will spread is the promise of security coupled with the propaganda of fear. Fear and security are among the most powerful motivating feelings used for gaining access to private information for control purposes. Especially in an era of diminishing State authority and power, large private oligopolies (in the industries mentioned above) and smaller entrepreneurial companies at the fringes of these oligopolies will work to increase the social acceptability of these technologies and spread them in civil society as tools of 'governance', if not 'self-governance'. The third model for the diffusion of these technologies is the provision of increased capacity to make systematic and personalized social comparisons. Building relational

[9]This kind of contract is already in place in many countries and sectors of the economy. For example, in Italy, the law rewards drivers who agree to install a black box in their car for a reduction in their insurance premiums.

profiles leads individuals to link fear and fun, protection and pleasure with the selection of alters, i.e. to rationalize their differences in terms of social niches and social status.

These techniques "introduce new variety" in social control and "encourage still greater variety" (Archer 2013) in that same process. Their joint diffusion can be seen as a case of "culture and structure in a mutually morphogenetic relationship", i.e. the potential for "changes in culture that amplify those in structure and vice versa through positive feedback" and marketing. The extent to which civil societies, whether national or 'global', will be able to resist the spread of these combined technologies of social control and the development of these databases on behalf of freedom and human rights remains to be discovered. There are consumer accounts of these technologies in contemporary self-quantification practices and movements that accentuate and play upon a gentle, 'gamified', and participatory dimension in social control, one that argues that it is liberating people from frustrating problems through newly acquired knowledge. There is an element of massive individual and collective participation in this process of social control found in the fact that we expose ourselves, whether through narcissism or simply as a labour market strategy.

Michel Foucault's concept of governmentality can be useful here. With such devices, which are part of a chain of permanently redesigned and nested instruments of "biopowers" and "sanitation" of various populations, the State, but also collective actors and institutions of all kinds participate in the production of knowledge, norms, and practices, i.e. the government of conduct and the 'general economy of power' that adapts its devices to what the governed themselves consider reasonable and rational (Foucault 2002; Foucault and Senellart 2008).

The morphogenetic character of these technologies might thus lie in their potential as slippery slopes: the more sensors and profiles spread together, the more different technologies must continue to exploit 'contingent complementarities'. The cluster of institutions that makes up the social structure surrounding these technologies at the meso level is then enriched by markets, i.e. private businesses that will find creative ways for making them acceptable to almost everyone.

6.2.2 Cultural Acceptance of Conditional Access to Welfare

At this stage of the analysis, we need a better sense of how the use of these combined technologies on the part of individuals and organizations leads to the potential transformation of the organization of users by these technologies. The paradox of these new technologies is that they can be used for ends for which they were never envisaged. Supermarkets started accumulating information about each individual several decades ago, and they deploy it for all sorts of purposes. It thus began to become culturally accepted that this information should be accumulated. We have a crisis of faith when this information comes closer to the body, but we are culturally prepared to accept the payoff (as in Zelizer 1979), the comfortable and productive

side of technology. Trust and naiveté about what can be done with this information are already culturally constructed even if we have not yet seen all the consequences.

Considering different forms of social control that are relevant in social relations, cultural change that works through relationships[10] can drive real morphogenesis, reshape attitudes, goals, and behaviour. There is a marked contrast between cultural change in which people are immunized from social relations and cultural change where people have to deal with social relations. Indeed, showing that relationships can be at stake when bringing others back to good order or when changing the rules of the game is very different from situations in which social control or cultural change happen independently of these relations. As Pierpaolo Donati maintained at the Workshop, captors may immunize people from social relations and culture that is not intrinsic to social relations. This is highly conducive to conformism. Soldiers conform to a cultural model embodied in the captor.

6.2.3 Hardwired Controls Undermining Bottom Up Institutional Entrepreneurship

Individuals can look at their own network profile or at profiles of their friends, but cannot reconstitute "communities" and organized social movements that are created by the concatenation of these profiles, i.e. they lack the capacity to zoom in and out of social networks that are the carriers of collective action. Today, a private company such as Google not only certainly has this capacity but is almost the only organization in the world that has the data to preside over the whole process at a global level.

Aggregation of information on individuals helps current powers to make individuals transparent in relevant (manipulative) respects (Lazega and Prieur 2014); it is therefore important to ask whether or not this form of social control decreases the possibilities for individuals to become institutional founders, players or leaders. At each level, agency is rife with various forms of both structuring and destructuring effects through intertwined social processes feeding back on each other: continuous reproduction and changes in horizontal and vertical social differentiation (hierarchy and status, division of work and role sets, for example) facilitate or hinder generic social processes listed above (Sect. 6.1).

This reflection on the use or possible misuse leads to the question of their regulation, in particular in the context of scandals such as that of the American National Security Agency, and thus to the design of adequate regulatory institutions. It is important to identify the conditions under which the technology is developed, its uses and diffusion mechanisms, but also the question of the slippery slope with

[10] See for example the case of a 'lateral control regime' among rival peers exercising early monitoring and sanctioning through appropriate use of their own relationships to choose sanctioners who are relationally close to the infractors (Lazega 2000).

respect to the impossibility of anonymizing the data.[11] Big Data – one of the most recent and powerful tools bureaucratization – collects large and dangerous amounts of information on individuals, and this information acquires market value for various powerful private operators. American marketing operators, for example, challenge the applicability of European protections of datasets by arguing for their "anonymity", in which European institutions do not really believe, especially when the data is so precise that people can be directly or indirectly recognized – based on information that they themselves gave away. How are large databases constructed? Under what constraints? Are they proprietary? Owned by whom? Built with what kind of consent? Stocked where? Sold to businesses? Destroyed or accessible for secondary analyses? If accessible, to whom? These questions prompt legal, ethical, and political reflections.

6.2.4 Consequences at the Societal Level

But the implications of participation, especially at the collective level, in what Foucault called 'securitarian' societies, are quite different from what individuals seek to do at the individual level. Even if self-quantification is about identification of people's needs (as some doctors argue) by people using these devices and giving away their data, there are ways in which these databases are less useful to meet needs than they are for social control purposes. Given the intrusive yet participatory character of these technologies of social control and the role of markets, how would their emergence and spread reconfigure late modernity? The hypothesis formulated below is that these tendencies can have at least three consequences that can be measured only if society is understood to be an organizational society, i.e. a multilevel context in which vertical differentiations at the meso level between individuals and organizations have become crucial. My argument will be that the three effects that are derived from the combination of data from hardwired controls with data from relational profiles are the following.

The first is to help elites in public and private organizations issue new rules (i.e. culture) that demonize certain kinds of behaviour (the most obvious example being smoking) and condition access to welfare with conformity to these rules; sensors will monitor and test in conformity to these rules, relational profiles will help make conformity a social selection criterion, and markets will make the combination of both sensors and network profiles acceptable to individuals. The second will be that relational profiles and derived "community detection" will track those types of mobilization and institutional initiatives and practices that are likely to challenge these rules and possibly reduce their capacity to reorganize behaviour in the interests of control. Institutional management, being intrinsically multilevel, means that tracking will be both individual and organizational. Thirdly, since technologies are

[11] When people are reduced to an object of research, they are necessarily exposed. One well known example is the case presented in Rebecca Skloot (2010), *The Immortal life of Henrietta Lacks*.

used by elites with control of organizations, the transformation that they will create will benefit those who control these organizations; they will do so by shifting social synchronization costs between levels "downwards" in terms of social stratification, thus increasing inequalities. Synchronization costs include energy and efforts invested, mostly by individuals, to adjust to requirements by the organizations in which they are affiliated, in terms, for example, of repeated secondary socializations, participation in costly forms of solidarity and control schemes designed from above, or even in forms of regulatory competition in which normative choices by individuals are pressed to align with that of the organization.

Cultural changes (normative) and structural changes (profiles and communities) will thus co-evolve with sensor implementation, redesigning social control at both individual and organizational levels so as to monitor enforcement and strengthen the elites. The spread of such technologies of social control threatens to reconfigure late modernity (1) by weakening the capacity of individuals and groups to act as institutional entrepreneurs to change their institutions, and (2) by redistributing the cost of control 'downwards' in terms of social stratification, thereby increasing inequalities. Before linking body captors and network profiles to each of these consequences, however, it is necessary to look at the multilevel dimension of social control technologies, and thus sketch a multilevel account of morphogenesis itself.

6.3 Multilevel Logic, Social Control and Morphogenesis

Empiricism and empirical evidence alone cannot demonstrate social morphology, for it cannot inherently express any causal mechanism that applies here: the combined technologies by themselves cannot be the 'cause'; they can only be such if they are put to use by individuals and organizations. From a neo-structural perspective on organizational social forms, the logic of the spread of this technology and the social control process implemented with it, is multilevel. It can be derived from the dynamics of networks at both levels of agency: individual and organizational. To track the two, it is useful to reframe the question "how do systems change?" by asking "how do systems change at each level of agency?" and "how does change at each level of agency influence change at the other levels?". The dynamics of 'diffusion' require a 'top-down' and 'bottom-up' account. Technology transfer is both an organizational game and a process dependent upon the individual (scientific or engineering or business) entrepreneur. The latter's ability to build intermediary level entities (such as stable workgroups) or (new) organizations to hoard the opportunities[12] offered by structural positioning and cultural diffusion of knowledge is intrinsically multilevel. The institutional entrepreneur as official ("bureaucrat")

[12] the notion of organizations as 'opportunity hoarding' tools as introduced by Tilly (1998) following his discussions with Harrison White who used networks as measurements of structures of opportunities and constraints.

acting at the organizational level and the institutional entrepreneur as individual opportunity seeker might even be dual roles played by the same individuals performing several functions in recursive organizational processes.

The social reality that we observe is relational, multilevel, and dynamic.[13] In it, institutional management entails multilevel collective action. As each level constitutes a system of agency, in which interdependencies are managed (as in "managerialized") by exchanges of various resources, it is also necessary for sociologists to examine these levels of agency as part of the same social system.[14] In terms of datasets, it is possible to do so by using the specific format of "linked designs" (Lazega et al. 2008, 2013; Wang et al. 2013) so as to avoid upwards or downwards conflation, reducing actor to structure or structure to action (Archer 1982) and leading to the denial of either actor's freedom or the constraining power of structure (Archer 1995). Here the causal emergent properties of both structure's and actor's influence are recognized. This is possible by assuming that institutional entrepreneurs are actors who use the causal powers of pre-existing structures to create new organizations or institutions, or challenge existing ones (Leca and Naccache 2006; Lazega 2014). There is little agency of that kind in the organizational society that does not use organizations as "tools with a life of their own" (Selznick 1949), which can either reproduce these structures or change them. To change them they go beyond existing routines by reaching out to relationships leading to new recognition and resources. By doing so, they can try to use the causal powers and logics of both competition and opportunity (Archer 2015).

The skills with which organized actors use institutional logics to change institutions, to influence the evolution of other institutions or to create new ones include, among others, the capacity to exercise social control, i.e. monitoring and sanctioning of others both as managers of resources in their current organization, as opportunity seekers beyond its boundaries and opportunity hoarders in their new organizations. This is true at both the inter-individual level and at the inter-organizational level (Lazega 2014).

[13] For example, in the situations of cooperation among competitors examined by economic sociology, coordination tends to rely on relational investments that are channeled into relational and personalized substructures facilitating this cooperation – even when entrepreneurs wait for opportunities to behave opportunistically. Without this social exchange, coordination of collective action among competitors would be much more costly, if not impossible. Such relational structures are complex, multilevel and sometimes unstable. A clear analytical distinction must therefore be made between networks of entrepreneurs (persons) and networks of companies. A clear articulation needs also to be reconstituted between the two levels (Lazega et al. 2008). The meso level forces members to perceive the coevolution, over time, of actors' strategies and opportunity structures as represented by their multilevel networks. In effect, if the games that actors play restructure their immediate environment, new constraints emerge on the options and behaviors of these actors. The conditions of stability of these structures constitute one of the most difficult questions for a meso-sociology (Lazega and Mounier 2002; Lazega et al. 2006).

[14] For neo-structural sociology, Archer's (1995) "stratified ontology of the social order" is a natural: "Each stratum is activity-dependent on that or those beneath it and that downwards causation and upwards causation are continuous and intertwined".

At the inter-individual level, social control is relational, i.e. used, for example, for the protection of common resources against free-loading, by pressuring members of social groups back to good order by utilizing their relational influence. Forms of collective responsibility are often challenged by the recognition that some members neglect their commitments, while still deriving de facto benefits from sharing common resources. Enormous amounts of self-policing to enforce rules and commitments in social life (in the family, at work, in the community) take place at the inter-individual level. Social life provides relational paths for lowering the costs of such controls. The existence of such paths and pressures was explored by research on the organizational efficiency of social control as depending on the quality and configuration of interpersonal relationships between members (Lazega 2000). The social structure of collective responsibility gains quasi-voluntary compliance by spreading the relational control costs among members, thus organizing collective responsibility and renewal of solidarity in delicately constituted communities or institutions. But relational leverage at the inter-individual level disappears with the centralization of controls and the bureaucratic use of big data, remote surveillance and captors at the organizational or inter-organizational or inter-organizational level.

At the inter-organizational level, control operates through formal governance arrangements, such as contracts or hierarchy, but also through social and relational mechanisms closer to spying and hostage taking. Exchange partners in markets, for example, can use reputation (Raub and Weesie 1990) and embed commercial transactions in social attachments and networks (Granovetter 1985, 1994). Control depends upon social embeddedness and relation-specific investments between organizations. For example, issues of conflict resolution in markets can be framed in terms of formal external control over organizational life (Hawkins 1984; Reiss 1984; Shapiro 1984; Vaughan 1983), but also in terms of more informal mechanisms such as reputation and ostracising (Macaulay 1963) or private arbitration (Dezalay and Garth 1996; Lemercier 2007). Both formal and informal processes help interdependent managers to monitor and sanction each other before resorting to well-defined but costly court procedures (Cheit and Gersen 2000; Dunworth and Rogers 1996; Macaulay 1963; Rooks et al. 2000; Lazega 1994, 2001).

Mechanisms based on embeddedness are weakened when control as a local process at the inter-individual level is carried out, at least in part, by businesses at the inter-organizational level using centralized and impersonal monitoring (and possibly sanctioning) based on electronic captors and network profiles. Sub-structural regularities in relational life (forms of direct and indirect reciprocity, for example) are no longer needed for that purpose. This does not mean that meso and macro level processes weaken interpersonal processes at the ground level so much that they disappear entirely. Indeed, the essence of 'networks' is to help actors cut across predefined organizational boundaries to create new relationships (Baker 1992; Lazega 1992), identify new opportunities and, eventually, create new organizations to use or hoard these new opportunities (Tilly 1998; Lazega 2012). Breaking barriers to create inter-individual ties with people on the other side and thus to recreate new barriers is not necessarily a form of disloyalty to the current affiliation. In many cases it is a way to reach out to "dual alters" (Lazega et al. 2013) with the help of their employers or

'embedded brokerage' by hierarchical superiors, senior family members, association managers, professional brokers, etc. and by the complementarity of the resources provided at both levels. But the issue raised by social control via captors is not only that of individual freedoms. It is also the issue of the ability of institutional managers to act at both levels at once, to keep changing their organizations, or to mobilize to recreate new ones. The transfer of technology from science labs to military equipment to hospitals to markets, with the help of cooptation removing regulatory and legal obstacles, might be the mechanism accounting for the spread of this new technology and the transition from one regime of social control to that of late modernity precisely because it undermines institutional management and collective activity.

Indeed captors/sensors combined with network profiles strengthen only asymmetric top down controls by organizations that collect, analyse, and react based on these datasets in a bureaucratic way. Their combination should weaken the capacity of institutional managers to change their institutions, including in the production of common goods as relational goods of the commons whose maintenance reflects concern for the whole (Donati 2011). With this bodily technology, control mechanisms as part of social discipline could represent the danger of totalitarian order spreading in civil society through health, security and gaming techniques. Making some people transparent to others, and not the other way around, is not new, but here it reaches a level of sophistication and organization that represents a threat to the public sphere and democracy as much as a threat to individual privacy.

The spread of the two combined technologies from science labs to battlefields, hospitals, workplaces, and households makes this morphogenetic process a slippery slope.

6.3.1 Hardwired Controls Shifting Social and Synchronization Costs "Downwards"

Why bother measuring all this and combining the morphogenetic approach with neo-structuralism? Empirically, to develop contemporary knowledge of the meso-social level is based on a research program focused on the co-evolution of interdependence systems of individuals and organizations, at the different "floors", layers or strata of social reality. Coordination at each level and across levels is based on all the ingredients supplied by collective agency, as long theorized by sociology: boundaries, resource interdependencies, formal power, division of work, etc. But this co-evolution is not well understood: what are the effects of evolution of one level on the evolution of another? In particular, what constrains the co-ordination of these evolutions in economic and social reality? If each level has its own temporality, one issue is "who shall pay for the costs of synchronization?" Separate dynamics at different levels of analysis raises new research questions about invisible effects of agency at these different levels.

One can try to measure the social costs hidden in the operations of these systems by focusing on the efforts of adaptation at one level to the dynamics of the 'other'

level (costs of adjustments to the dynamics of inter-organizational networks for individuals and efforts of adaptation to the dynamics of inter-individual networks when looking at this phenomenon from the perspective of the management of the organization). It is particularly revealing to look at the relationships between networks and mobility in individuals' careers when they belong to these organizations (Lazega et al. 2012). The making and unmaking of careers at the intra-organizational and inter-individual levels is one powerful such device. Violence in contemporary labour markets does not come only from brutal layoffs and exclusions, but also from requirements generated by mobility in relation to blind bifurcations, rapid adjustments, cascading forms of secondary socialization, serial successive and temporary 'commitments', etc.

Mutual adaptation between the evolutions at each level of social reality (for example inter-individual and inter-organizational networks) may happen through the relational adjustments and turnover required by mobility and the increased flexibility of labor markets. If different forms of adjustment exist, costs that are invisible generate still further inequalities that are almost always incurred by individuals, rarely by the organization and by the elites using them as 'tools with a life of their own'. The need for synchronizing evolutions is found at each level of social reality, for example, in the relational adjustment required by mobility within professional careers. This co-ordination is achieved in part by the contemporary functioning of flexible labour markets, where the costs and benefits of adapting business to individuals – but more frequently of individuals to enterprises – are most easily transferable to the weakest. These adaptations and their invisible costs, are almost always the responsibility of individuals and rarely that of the organization and are still badly measured. Combining hardwired controls with relational profiles is also a way for preparing the dumping all these invisible costs of synchronization on the weakest individuals in society.

6.3.2 Towards Neo-structural Modelling of Morphogenetic Slippery Slopes

Thus see all the consequences of these combined technologies on generic social processes such as social control, measurements and models of the dynamics of multilevel forms of collective agency must become part of sociologists' methodological toolkits. The coevolution of activities such as making rules, monitoring enforcement, choosing/selecting your friends, steering collective action related to these rules, managing turnover in one's personal network and participation in collective action, is intrinsically multilevel. Indeed the logics of opportunity and competition operate in stratified contexts and the morphogenetic slippery slopes can be modelled by these dynamics of multilevel networks. The evolution of relational structures at each level will help understand recursive social processes feeding back on each other to contribute to the emergence of new social orders.

To work at a higher level of abstraction and generality and transform these questions to make them tractable, we need to reframe the question "how do systems

change?" by asking "how do systems change at each of their levels of collective agency?" and "how does change at each level of agency influence change at the other levels?" This means finding the main determinants, at one level, of changes at any other level. Evolution of each level must be examined jointly and separately with the evolution of the other strata because these other levels provide explanatory variables for people's management of relationships. Problems of co-ordination or synchronization between levels arise, for example, as in orchestral music, and it is worth measuring them because both are high and hidden, especially in a society where individuals often move from one organization to the other and have to experience many successive forms of secondary socialization (Lazega 2014).

For example, Berends et al. (2011) have attempted to understand the coevolution of two partly nested levels through attempts by actors from each level to orient themselves to the structure at the other level in terms of sequences of maintenance, creation and dissolution of ties (at the dyadic level). The inter-organisational level is measured by agreements and contracts between firms; the inter-individual level is measured by collaboration, advice and friendship ties within organizations and across organizations. They differentiate between five phases of interaction between levels (contacts and contracts): (1) Persistence: in this phase, contacts outlast contracts, and inter-individual relationships can live on without inter-organizational ones. (2) Prospection: in this phase, contacts build contracts, and inter-individual relationships build inter-organizational ones. (3) Consolidation: in this phase, contracts build contacts, as inter-organizational ties build inter-individual relationships. (4) Dissolution: in this phase, contacts end with contracts, and relationships at both levels are broken. (5) Reconfiguration: in this phase, contacts change contracts, and inter-individual relationships transform inter-organizational ones. These phases can be articulated in very different sequences accounting for multilevel structures in action. Building on similar intuitions, models must introduce superimposed networks in these multilevel dynamics.

Minimally, statistical analysis aims at displaying the morphology of the networks at each level to examine the extent to which they are different, but also to show that the context of relationship creation, maintenance or dissolution of relationships is different for each level. This morphology can be influenced by various kinds of structural positions and actors' attributes (Porpora 1989; Brailly et al. forthcoming). Statistical models can deconstruct this new process of social control to test hypotheses about it. This can be done by proposing a multilevel extension of Snijders model (Snijders 2001; Snijders and Bosker 1999) of the dynamics of networks in which dynamics of alignment and synchronization are equivalent to co-evolution of behavior and position at micro and meso levels. This model specifies both endogenous and exogenous factors as driving network evolution, i.e. the creation of new relationships and also the co-evolution of actions and relationships. In the linked design model (Brailly and Lazega 2012; Lazega et al. 2008), this means that, at each level, both exogenous and endogenous factors contribute to the evolution of the structure. This model uses the characteristics of level 2 networks as a set of exogenous factors in the evolution of level 1 networks, and vice versa. Characteristics of each level can thus contribute to upward and downward causation (Archer 2013; Lawson 2013). Each level thus contributes to the coevolution of behaviour and relational choices at the

other level without conflation, by adding specific variables as exogenous effects. In model specification, new 'independent' variables can be derived from inter-organizational networks impacting at the inter-individual level, and vice-versa. Co-evolution of relationships is measured at each level as a function of three sets of factors: same level endogenous factors, same level exogenous factors, and other level factors counting as a new category of exogenous factors. Over time, levels can evolve in a way that strengthens their alignment in a hierarchy, or in a way that weakens this alignment. Upward and downward causation feed on each other.

To use the vocabulary of multilevel network analysis, we can hypothesize that the more control is asymmetrical, the more exogenous pressures from above become systematically stronger than endogenous mechanisms on the ground. Bottom up pressures can also be exercised from the ground floor on the upper-level, but with much less efficiency. Synchronization as upward or downward participation in same level processes, such as control, is turned into a unidirectional downward process. Exogenous effects are never homogenous, and the existing form of social stratification rarely allows lower level strata to influence what happens at the upper echelons. But, here, the hierarchy of effects is further modified to the point where local effects matter much less and the change can be labelled morphogenetic.[15] The paradox is that the deployment of this asymmetric social control as multilevel dynamics might either tame morphogenesis to bring back morphostasis or generate escalating social conflicts and resistance against dumping the costs of synchronization across levels to layers "below", both of which will keep morphogenesis going.

The multilevel character of structure makes it possible to observe and understand that processes can be morphogenetic at one level (for example at the inter-organizational level) and morphostatic at another level (for example at the individual level). Collective action at the individual level may also slow down processes of collective action at the meso-level. One unknown factor is whether civil society will resist and refuse to grant legitimacy and acceptability to the kind of technology discussed, precisely because it undermines bottom up contributions to institutional entrepreneurship, or, instead, will drift with the current. Social costs imply resistance to the establishment of this new social discipline. How this resistance might transform this social order into a 'relationally contested system' (Donati 1983, 2011, 2013) remains to be investigated.

6.4 Conclusion: The Role of Markets and the State in Facilitating the 'Gamified' Slippery Slope

Coevolution of culture, structure and agency accounts for these changes. Future generations may not be as amused or as terrified as we are by these devices and prospects because these technologies, combined with social processes, may be

[15] Perhaps an indicator of changes in the "relational molecule" that characterizes modernity (Donati1983, 2011, 2013) could be measured by changes in the social capital of collectives?

harbingers of new cultural and ontological perceptions of oneself and new ways of being in the world. Nevertheless, as already mentioned above, the transformational capacity of these technologies depends upon users who occupy privileged positions in social hierarchies and the organizations that they control (the military, police, marketing firms, among many others). It is worth narrowing them down to focus on the State (and its coercive organs), and market agents (e.g. large corporations). The acceptability of such technologies is increased by their transformation into commodities to be bought and used as tools, thereby masking their inherent transformational capacities at the collective level and their potential for undermining existing means of deliberating upon collective action.

For example there are many ways in which the market, particularly (health) insurance, can get access to data provided by both technologies combined and to the leverage its position exerts by selecting whom to insure and at what level. Metadata in each string provided by both devices can be automatically analyzed in the same way Google automatically scans Gmail messages and then advertises in the light of them. Runners of marathons think that they can beat the insurance companies by accepting to wear the jogging bracelet in exchange for lower premiums. But this insurance strategy is in fact a market and a cultural process combined. Indeed, this will be a way to start demonizing a whole range of cultural practices and activities: it could be about diet and spinach, as much as about smoking, drinking, etc. In the beginning, no one can stop anyone from being tempted to play this cultural insurance game and there are individual winners in it; but in the end the total population loses in terms of control and democracy. Society might very well accept these changes because they will be ushered in by a market for 'gamified' culture. This is very much the paradox of these new technologies. Their morphogenetic potential arises because they can be used for collective ends for which they were never envisaged at the individual level.

Archer's argument about 'social digitalization' (Chap. 7) and how (morphogenetic) synergy comes about can be applied to this technology of social control. The social processes that have been modeled using network analysis are the generic micro and meso-level processes helping members of any kind of collective to manage the dilemmas of collective action. It is not hard to see that they are at the heart of social life and a central preoccupation of sociology from its beginnings. The question underlying the attempt to provide a neo-structural specification of the very general logics (competition and opportunity) that have causal force and effects in the morphogenetic approach is part of a wider questioning about the determinants of variations observed over time in the deployment of these processes.

The cultural change of control based on relationships versus control without reliance upon relationality is the same as between collegiality and bureaucracy: with captors and network profiles combined, we see a new moment of the Weberian rationalization and bureaucratization of social life, a new avatar of the iron cage; we thought it was over, but it is not. In collegial contexts people value and use their relationships to coordinate their activities more or less conflictually, but not in the bureaucratic model where they think about coordination without personalized

relationships (i.e. through bureaucratic regulation) and the cultural outcomes are correspondingly different.

The huge databases that global private actors build today mix network profiles, biological data and much more information about individuals and collectives (Lazega et Prieur 2014). The spread of captors, whether seen as simply amusing or as sinister, is part of the increasingly close and efficient standardisation of life and current creation of a new social order/control that will separate those who conform to dozens of new everyday rules from those who do not. It will make access to healthcare and welfare conditional with lifelong consequences for individuals and their families, and prove consequential for the restructuring of societies. In particular, the relatively invisible but nevertheless violent exclusions of many generate servitude for a newly defined social class with access to benefits.

Data on people's ego-networks, when assembled into complete networks representing a "community" will allow organizations with access to this data to identify social movements and social movement organizations in the making, and perhaps to undermine, in many unobtrusive and Machiavellian ways, the latter's development and rights to defend their interests in regulation. Conditional access to healthcare and welfare and the stifling/steering of institutional work could co-evolve, and this co-evolution could indeed spell the very end of democracy. These processes have the flavour of Orwellian science fiction, but they are already woven together in the recognizable here and now.

Understanding these twenty-first century sociotechnical systems in a context of blurred public/private boundaries and increased robotization of skilled jobs is a necessary first step to contemplating their possible impact on social action. Such technologies threaten to (1) weaken institutional entrepreneurship, and (2) increase inequalities. Their combined intrusiveness, however, in conjunction with the global scale of their implementation and with forms of social stratification and inequalities, imposes new forms of social violence. These databases will allow private companies to begin to understand how social life and biology co-evolve.[16] Social digitalization – defined here as articulation of numerical identity, industrialization/commodification of the body and the creation of socio-organizational networks – indeed calls for a reaction from public authorities but, in fact, raises the key political issue of their credibility as enduring counter-powers.

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[16] On the relationship between these approaches and the ideology of "human enhancement", see Bateman and Gayon (2012).

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