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Materials for an exploratory theory of the network society[1]

ABSTRACT

This article aims at proposing some elements for a grounded theory of the network society. The network society is the social structure characteristic of the Information Age, as tentatively identified by empirical, cross-cultural investigation. It permeates most societies in the world, in various cultural and institutional manifestations, as the industrial society characterized the social structure of both capitalism and statism for most of the twentieth century.

Social structures are organized around relationships of production/consumption, power, and experience, whose spatio–temporal configurations constitute cultures. They are enacted, reproduced, and ultimately transformed by social actors, rooted in the social structure, yet freely engaging in conflictive social practices, with unpredictable outcomes. A fundamental feature of social structure in the Information Age is its reliance on networks as the key feature of social morphology. While networks are old forms of social organization, they are now empowered by new information/communication technologies, so that they become able to cope at the same time with flexible decentralization, and with focused decision-making. The article examines the specific interaction between network morphology and relationships of production/consumption, power, experience, and culture, in the historical making of the emerging social structure at the turn of the Millennium.

KEYWORDS: Information networks; social structure; information age; social theory; social morphology

INTRODUCTION

The network society is a specific form of social structure tentatively identified by empirical research as being characteristic of the Information Age. By social structure I understand the organizational arrangements of humans in relationships of production/consumption, experience, and power, as expressed in meaningful interaction framed by culture. By Information Age I refer to a historical period in which human societies perform their activities in a technological paradigm constituted around microelectronics-based information/communication technologies, and genetic

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engineering. It replaces/subsumes the technological paradigm of the Industrial Age, organized primarily around the production and distribution of energy.

In this article I aim at clarifying the theoretical implications that can be induced from my observation of contemporary social structures and social change, proposed in my trilogy *The Information Age: Economy, Society, and Culture* (see the updated, and revised 'New Millennium edition' of this work: Castells 2000a). Since, in my view, theory is simply a research tool, and not the end product of research, the purpose of this exercise is to help the construction of an analytical framework that could inform, and better organize, further research. However, given the difficulty of the task, and the necessarily collective character of this endeavour, what is presented here should be considered, literally, as materials to be used in the building of a sociological theory able to grasp emerging forms of social organization and conflict. This theory is still in its exploratory stage, and should remain, like all relevant theories, as a work in progress open to rectification by empirical research.

Because I am trying to distill theory from observation, I will not discuss here the many important, and fruitful, theoretical contributions that exist in sociology and related disciplines, which could anchor the categories and analyses proposed in this article. I will present an argument as schematic, and simplified as possible, so that it could be useful to sociologists' collective investigation, without spending space and time in reminding the reader of well-established theoretical contributions. A short bibliography indicates the works that have helped me in theorizing my investigation. Similarly, the statements on current social trends cannot be empirically substantiated in this paper: they rely on data and sources presented in the updated version of my trilogy (Castells 2000a).

For the sake of clarity, I will first present the conceptual framework I use in my analysis of social structure. I will then proceed to enumerate the main transformations taking place in social structures around the world, in the Information Age. Since a trend common to many of these transformations refers to the prevalence of information networking as the organizational form of dominant activities, I will then define information networks, and elaborate on the implications of networking in social morphology. Finally, I will present how, specifically, information networks affect social structures (as conceptualized in this article) to induce the kind of transformations we are observing. Within the limits of tentative elaboration, this exercise intends to open the way for a theoretically meaningful codification of current processes of social transformation, thus providing theoretical meaning to the ideal type of the network society. I hope the reader will be benevolent enough to use what s/he finds useful in this effort, and discard the rest. I also hope that we all end up adopting the notion of disposable theory.

CONCEPTUALIZING SOCIAL STRUCTURE

Human societies are made from the conflictive interaction between humans organized in and around a given social structure. This social structure is formed by the interplay between relationships of production/consumption; relationships of experience; and relationships of power. Meaning is constantly produced and reproduced through symbolic interaction between actors framed by this social structure, and, at the same time, acting to change it or to reproduce it. By meaning, I understand the symbolic identification by an actor of the purpose of her/his/their action. The consolidation of shared meaning through crystallization of practices in spatio–temporal configurations creates cultures, that is systems of values and beliefs informing codes of behaviour. There is no systemic dominance in this matrix of relationships. There are all layers of social structure and social causation, folded into each other, distinguishable only in analytical terms. Thus, meaning is not produced in the cultural realm: it is the cultural realm that is produced by the consolidation of meaning. Meaning results from symbolic interaction between brains which are socially and ecologically constrained, and, at the same time, biologically and culturally able of innovation. Meaning is produced, reproduced, and fought over in all layers of social structure, in production as in consumption, in experience as in power. What makes sense to anyone is defined by the endless reconstruction by humans of the sources and purpose of their action, always constrained but never pre-scripted. So, production can be oriented towards glorifying God (and punishing the infidels), as well as religious belief can be twisted to the service of capital accumulation. What actually happens, when, and where (usually by random combination of social events in a pre-existing, historically determined, social structure), makes specific societies, such as now the 'network society'.

Production is the action of humankind on matter (nature), to appropriate it and transform it for its benefit by obtaining a product, consuming (unevenly) part of it, and accumulating the surplus for investment, according to socially decided goals. Consumption is the appropriation of the product by humans for their individual benefit. Analytically, it is a component of the production process, seen from the reverse side.

Experience is the action of humans on themselves, determined by the interplay between their biological and cultural identities, and in relationship to their social and natural environment. It is constructed around the endless search for the fulfilment of human needs and desires.

Power is the action of humans on other humans to impose their will on others, by the use, potential or actual, of symbolic or physical violence. Institutions of society are built to enforce power relationships existing in each historical period, including the controls, limits, and social contracts, achieved in the power struggles.

More particularly, production is organized in class relationships (or relationships of production) that define the process by which some

humans, on the basis of their position in the production process decide the organization of production, the sharing and uses of the product vis-à-vis consumption, and investment, as well as the differential appropriation of the product (consumption). The structural principle under which surplus is appropriated and controlled characterizes a mode of production, such as capitalism or statism. The concept of mode of production belongs exclusively to the relationships of production. In this view, the notion, for instance, of a capitalist state, is void of theoretical meaning, although it can usefully characterize an empirical observation, when a given state is primarily geared toward the preservation and promotion of capitalist social relationships of production.

Experience is structured around sexual/gender relationships, historically organized around the family, and characterized hitherto by the domination of men over women and children. Family relationships and sexuality are the foundations of personality systems, understanding by personality the individuation of social relationships in specific brains, in interaction with the brain's biological features.

Power is founded upon the ability to exercise violence. Historically, it is the monopoly of physical violence, embodied in the state, which has been the main expression of power relationships. Outside the direct sphere of the state, the exercise of power within production organizations or in apparatuses of experience (such as the family) ultimately relied on the ability of these apparatuses to call upon the state (or para-states, such as the Church) to enforce violently the dominant rules on restive subjects. However, symbolic violence has always been a fundamental dimension of power, and it increases in importance over time, as societies make progress in establishing institutional limits to the arbitrary exercise of physical violence. By symbolic violence I mean the capacity of a given symbolic code to delete a different code from the individual brain upon whom power is exercised.

Symbolic communication between humans, and the relationship between humans and nature through production/consumption, experience, and power, crystallize over history in specific territories, thus generating cultures which go on to live a life on their own. Individuals may adopt/adapt to cultures, so building their identities. Or else, they may construct their own, individual identities through the interaction between available cultures, and their own symbolic recombinant capacity, influenced by their specific experience.

There is another layer that is folded in production/consumption, experience, power, and culture. This is technology. By technology I mean 'the use of scientific knowledge to specify ways of doing things in a reproducible manner'. Technology is embodied in technical relationships, which are socially conditioned, so in itself it is not an independent, non-human dimension. In principle, because it is the application of knowledge to obtain a product of some kind, it could be assigned primarily to the process of production, in which we could then distinguish social relationships of production, and technical relationships of production, as proposed in the

Marxian model, and as I had proposed in my own work. I now think this is questionable. Because technology is as decisive in the realm of power (military technology, for instance) as in the realm of production. Similarly, technology plays an essential role in framing the relationships of experience: for instance, human reproductive technology frames family relationships and sexuality. Therefore, we must integrate technology, on its own ground, as a specific layer of the social structure, following an old tradition in human ecology. I would like to use for conceptualizing technology as a layer of the social structure, the Tourainian concept of 'mode of development' (also consistent with Bell's analytical framework), that I will define, in my own terms, as: 'the technological arrangements through which humans act upon matter (nature), upon themselves, and upon other humans'. By technological arrangements I mean the set of tools, rules, and procedures, through which scientific knowledge is applied to a given task in a reproducible manner. Modes of development are defined by their central technological paradigm and by their principle of performance. Following, and adapting to sociology, Christopher Freeman's definition of a techno-economic paradigm, I would characterize as a technological paradigm a cluster of inter-related technical, organizational, and managerial innovations, whose advantages are to be found in their superior productivity and efficiency in accomplishing an assigned goal, as a result of synergy between its components (1982). Each paradigm is constituted around a fundamental set of technologies, specific to the paradigm, and whose coming together into a synergistic set establishes the paradigm. Thus, energy for the Industrial Paradigm, Information/communication technologies (including genetic engineering) for the Informational Paradigm.

Technology as a material tool, and meaning as symbolic construction, through relationships of production/consumption, experience, and power, are the fundamental ingredients of human action – an action that ultimately produces and modifies social structure.

THE NETWORK SOCIETY: AN OVERVIEW

In the last two decades of the twentieth century a related set of social transformations has taken place around the world. While cultures, institutions, and historical trajectories introduce a great deal of diversity in the actual manifestations of each one of these transformations, it can be shown that, overall, the vast majority of societies are affected in a fundamental way by these transformations. All together they constitute a new type of social structure that I call the network society for reasons that hopefully will become apparent. I shall summarize below the main features of these transformations, in a sequential order that does not imply hierarchy of causation in any way.

We have entered *a new technological paradigm*, centred around micro-electronics-based, information/communication technologies, and genetic

engineering. In this sense what is characteristic of the network society is not the critical role of knowledge and information, because knowledge and information were central in all societies. Thus, we should abandon the notion of 'Information Society', which I have myself used some times, as unspecific and misleading. What is new in our age is a new set of information technologies. I contend they represent a greater change in the history of technology than the technologies associated with the Industrial Revolution, or with the previous Information Revolution (printing). Furthermore, we are only at the beginning of this technological revolution, as the Internet becomes a universal tool of interactive communication, as we shift from computer-centred technologies to network-diffused technologies, as we make progress in nanotechnology (and thus in the diffusion capacity of information devices), and, even more importantly, as we unleash the biology revolution, making possible for the first time, the design and manipulation of living organisms, including human parts. What is also characteristic of this technological paradigm is the use of knowledge-based, information technologies to enhance and accelerate the production of knowledge and information, in a self-expanding, virtuous circle. Because information processing is at the source of life, and of social action, every domain of our eco-social system is thereby transformed.

We live in *a new economy*, characterized by three fundamental features. First, it is *informational*, that is, the capacity of generating knowledge and processing/managing information determine the productivity and competitiveness of all kinds of economic units, be they firms, regions, or countries. While it took two decades for the new technological system to yield its productivity dividend, we are now observing substantial productivity growth in the most advanced economies and sectors, in spite of the difficulty in measuring informational productivity with the categories of the industrial era.

Second, this new economy is *global* in the precise sense that its core, strategic activities, have the capacity to work as a unit on a planetary scale in real time or chosen time. By core activities I mean financial markets, science and technology, international trade of goods and services, advanced business services, multinational production firms and their ancillary networks, communication media, and highly skilled speciality labour. Most jobs are in fact not global, but all economies are under the influence of the movements of their globalized core. Globalization is highly selective. It proceeds by linking up all that, according to dominant interests, has value anywhere in the planet, and discarding anything (people, firms, territories, resources) which has no value or becomes devalued, in a variable geometry of creative destruction and destructive creation of value.

Third, the new economy is *networked*. At the heart of the connectivity of the global economy and of the flexibility of informational production, there is a new form of economic organization, the *network enterprise*. This is not a network of enterprises. It is a network made from either firms or segments of firms, and/or from internal segmentation of firms. Large

corporations are internally de-centralized as networks. Small and medium businesses are connected in networks. These networks connect among themselves on specific business projects, and switch to another network as soon as the project is finished. Major corporations work in a strategy of changing alliances and partnerships, specific to a given product, process, time, and space. Furthermore, these co-operations are based increasingly on sharing of information. These are information networks, which, in the limit, link up suppliers and customers through one firm, with this firm being essentially an intermediary of supply and demand, collecting a fee for its ability to process information.

The unit of this production process is not the firm, but the business project. The firm continues to be the legal unit of capital accumulation. But since the value of the firm ultimately depends on its valuation in the stock market, the unit of capital accumulation (the firm) itself becomes a node in a global network of financial flows. In this economy, the dominant layer is the global financial market, where all earnings from all activities and countries end up being traded. This global financial market works only partly according to market rules. It is shaped and moved by information turbulences of various origins, processed and transmitted almost instantly by tele-communicated, information systems, in the absence of the institutional regulation of global capital flows.

This new economy (informational, global, networked) is certainly capitalist. Indeed, for the first time in history, the whole planet is capitalist, for all practical purposes (except North Korea, but not Cuba or Myanmar, and certainly not China). But it is a new brand of capitalism, in which rules for investment, accumulation, and reward, have substantially changed (see Giddens and Hutton 2000). Besides, since nothing authorizes capitalism as eternal, it is essential to focus on the characteristics of the new economy because it may well outlast the mode of production where it was born, once capitalism comes under decisive challenge and/or plunges into a structural crisis derived from its internal contradictions (after all, statism died from its self-inflicted flaws).

Work and employment are substantially transformed in/by the new economy. But, against a persistent myth, there is no mass unemployment as a consequence of new information technologies. The empirical record is conclusive on this matter (Carnoy 2000). Yet, there is a serious unemployment problem in Europe, unrelated to technology, and there are dramatic problems of underemployment in the developing world, caused by economic and institutional backwardness, including the insufficient diffusion and inefficient use of information technologies. There is a decisive transformation of work and employment. Induced by globalization, and the network enterprise, and facilitated by information/communication technologies, the most important transformation in employment patterns concerns the development of flexible work, as the predominant form of working arrangements. Part-time work, temporary work, self-employment, work by contract, informal or semi-formal labour arrangements, and

relentless occupational mobility, are the key features of the new labour market. Feminization of paid labour leads to the rise of the 'flexible woman', gradually replacing the 'organization man', as the harbinger of the new type of worker. The key transformation is the individualization of labour, reversing the process of socialization of production characteristic of the industrial era, still at the roots of our current system of industrial relations.

The work process is interconnected between firms, regions, and countries, in a stepped up spatial division of labour, in which networks of locations are more important than hierarchies of places. Labour is fundamentally divided in two categories: self-programmable labour, and generic labour. Self-programmable labour is equipped with the ability to retrain itself, and adapt to new tasks, new processes and new sources of information, as technology, demand, and management speed up their rate of change. Generic labour, by contrast, is exchangeable and disposable, and co-exists in the same circuits with machines and with unskilled labour from around the world. Beyond the realm of employable labour, legions of discarded, devalued people form the growing planet of the irrelevant, from where perverse connections are made, by fringe capitalist business, through to the booming, global criminal economy. Because of this structural divide in terms of informational capacities, and because of the individualization of the reward system, in the absence of a determined public policy aimed at correcting structural trends, we have witnessed in the last 20 years a dramatic surge of inequality, social polarization, and social exclusion in the world at large, and in most countries, particularly, among advanced societies, in the USA and in the UK (see UNDP 1999; Hutton 1996; Castells 2000b, for sources).

Shifting to the *cultural realm*, we see the emergence of a similar pattern of networking, flexibility, and ephemeral symbolic communication, in a culture organized primarily around an integrated system of electronic media, obviously including the Internet. Cultural expressions of all kinds are increasingly enclosed in or shaped by this electronic hypertext. But the new media system is not characterized by one-way, undifferentiated messages through a limited number of channels that constituted the world of mass media. And it is not a global village. Media are extraordinarily diverse, and send targeted messages to specific segments of audiences responding to specific moods of audiences. They are increasingly inclusive, bridging from one another, from network TV to cable TV or satellite TV, radio, VCR, video, portable devices, and the Internet. The whole set is coming together in the multimedia system, computer-operated by the digitalized set-top box that opens up hundreds of channels of interactive communication, reaching from the global from the local. While there is oligopolistic concentration of multimedia groups, there is, at the same time, market segmentation, and the rise of an interactive audience, superseding the uniformity of the mass audience. Because of the inclusiveness and flexibility of this system of symbolic exchange, most cultural expressions are enclosed in

it, thus inducing the formation of what I call a culture of 'real virtuality'. Our symbolic environment is, by and large, structured by this flexible, inclusive hypertext, in which many people surf each day. The virtuality of this text is in fact a fundamental dimension of reality, providing the symbols and icons from which we think and thus exist.

This growing enclosure of communication in the space of a flexible, interactive, electronic hypertext does not only concern culture. It has a fundamental effect on *politics*. In almost all countries, media have become the space of politics. To an overwhelming extent people receive their information, on the basis of which they form their political opinion and structure their behaviour, through the media and particularly television and radio. Media politics needs to convey very simple messages. The simplest message is an image. The simplest, individualized image is a person. Political competition increasingly revolves around the personalization of politics. The most effective political weapons are negative messages. The most effective negative message is character assassination of opponents' personalities, and/or of their supporting organizations. Political marketing is an essential mean to win political competition, including, in the information age, media presence, media advertising, telephone banks, targeted mailing, image making and unmaking. Thus, politics becomes a very expensive business, way beyond the means of traditional sources of political financing, at a time when citizens resist giving more of their tax money to politicians. Thus, parties and leaders use access to power as ways to obtain resources for their trade. Political corruption becomes a systemic feature of information age politics. Since character assassination needs some substance from time to time, systemic political corruption provides ample opportunity, as a market of intermediaries is created to leak and counter-leak damaging information. The politics of scandal takes centre stage in political competition, in close interaction with the media system, and with the co-operation of judges and prosecutors, the new stars of our political soap operas. Politics becomes a horse race, and a tragicomedy motivated by greed, backstage manoeuvres, betrayals, and, often, sex and violence – a genre increasingly indistinguishable from TV scripts.

As with all historical transformations, the emergence of a new social structure is linked to a redefinition of the material foundations of our life, of *time and space*, as Giddens (1984), Adam (see chapter below), Lash and Urry (1994), Thrift (1990), and Harvey (1990), among others, have argued. I propose the hypothesis that two emergent social forms of time and space characterize the network society, while coexisting with prior forms of time and space. These are timeless time and the space of flows. In contrast to the rhythm of biological time characteristic of most of human existence, and to clock time characterizing the industrial age, timeless time is defined by the use of new information/communication technologies in a relentless effort to annihilate time. On the one hand, time is compressed (as in split second global financial transactions, or in the attempt to fight 'instant wars'), and on the other hand, time is de-sequenced, including

past, present, and future occurring in a random sequence (as in the electronic hypertext or in the blurring of life-cycle patterns, both in work and parenting).

The space of flows refers to the technological and organizational possibility of organizing the simultaneity of social practices without geographical contiguity. Most dominant functions in our societies (financial markets, transnational production networks, media systems etc.) are organized around the space of flows. And so to do an increasing number of alternative social practices (such as social movements) and personal interaction networks. However, the space of flows does include a territorial dimension, as it requires a technological infrastructure that operates from certain locations, and as it connects functions and people located in specific places. Yet, the meaning and function of the space of flows depend on the flows processed within the networks, by contrast with the space of places, in which meaning, function, and locality are closely interrelated.

The central power-holding institution of human history, *the state*, is also undergoing a process of dramatic transformation. On the one hand, its sovereignty is called into question by global flows of wealth, communication, and information. On the other hand, its legitimacy is undermined by the politics of scandal and its dependence on media politics. The weakening of its power and credibility induce people to build their own systems of defence and representation around their identities, further de-legitimizing the state. However, the state does not disappear. It adapts and transforms itself. On the one hand, it builds partnerships between nation-states and shares sovereignty to retain influence. The European Union is the most obvious case, but around the world there is a decisive shift of power toward multi-national and transnational institutions, such as NATO, IMF/World Bank, United Nations agencies, World Trade Organization, regional trade associations, and the like. On the other hand, to regain legitimacy, most states have engaged in a process of devolution of power, decentralizing responsibilities and resources to nationalities, regions, and local governments, often extending this de-centralization to non-governmental organizations. The international arena is also witnessing a proliferation of influential, resourceful non-governmental organizations that interact with governments, and multinational political institutions. Thus, overall the new state is not any longer a nation-state. The state in the information age is a network state, a state made out of a complex web of power-sharing, and negotiated decision-making between international, multinational, national, regional, local, and non-governmental, political institutions.

There are two common trends in these processes of transformation that, together, signal a new historical landscape. First, none of them could have taken place without new information/communication technologies. Thus, while technology is not the cause of the transformation, it is indeed the indispensable medium. And in fact, it is what constitutes the historical novelty of this multidimensional transformation. Second, all processes are enacted by organizational forms that are built upon networks, or to be more

specific, upon information networks. Thus, to analyse the emerging social structure in theoretically meaningful terms, we have to define what information networks are, and elaborate on their strategic role in fostering and shaping current processes of social transformation.

SOCIAL STRUCTURE AND SOCIAL MORPHOLOGY: FROM NETWORKS TO INFORMATION NETWORKS

A network is a set of interconnected nodes. A node is the point where the curve intersects itself. Networks are very old forms of social organization. But they have taken on a new life in the Information Age by becoming information networks, powered by new information technologies. Indeed, networks had traditionally a major advantage and a major problem, in contrast to other configurations of social morphology, such as centralized hierarchies. On the one hand, they are the most flexible, and adaptable forms of organization, able to evolve with their environment and with the evolution of the nodes that compose the network. On the other hand, they have considerable difficulty in co-ordinating functions, in focusing resources on specific goals, in managing the complexity of a given task beyond a certain size of the network. Thus, while they were the natural forms of social expression, they were generally outperformed as tools of instrumentality. For most of human history, and unlike biological evolution, networks were outperformed by organizations able to master resources around centrally defined goals, achieved through the implementation of tasks in rationalized, vertical chains of command and control. But for the first time, the introduction of new information/communication technologies allows networks to keep their flexibility and adaptability, thus asserting their evolutionary nature. While, at the same time, these technologies allow for co-ordination and management of complexity, in an interactive system which features feedback effects, and communication patterns from anywhere to everywhere within the networks. It follows an unprecedented combination of flexibility and task implementation, of co-ordinated decision making, and decentralized execution, which provide a superior social morphology for all human action.

Networks de-centre performance and share decision-making. By definition, a network has no centre. It works on a binary logic: inclusion/exclusion. All there is in the network is useful and necessary for the existence of the network. What is not in the network does not exist from the network's perspective, and thus must be either ignored (if it is not relevant to the network's task), or eliminated (if it is competing in goals or in performance). If a node in the network ceases to perform a useful function it is phased out from the network, and the network rearranges itself – as cells do in biological processes. Some nodes are more important than others, but they all need each other as long as they are within the network. And no nodal domination is systemic. Nodes increase their importance by

absorbing more information and processing it more efficiently. If they decline in their performance, other nodes take over their tasks. Thus, the relevance, and relative weight of nodes does not come from their specific features, but from their ability to be trusted by the network with an extra-share of information. In this sense, the main nodes are not centres, but switchers, following a networking logic rather than a command logic, in their function vis-à-vis the overall structure.

Networks, as social forms, are value-free or neutral. They can equally kill or kiss: nothing personal. They process the goals they are programmed to perform. All goals contradictory to the programmed goals will be fought off by the network components. In this sense, a network is an automaton. But, who programmes the network? Who decides the rules that the automaton will follow? Social actors, naturally. Thus, there is a social struggle to assign goals to the network. But once the network is programmed, it imposes its logic to all its members (actors). Actors will have to play their strategies within the rules of the network. To assign different goals to the programme of the network (in contrast to perfect the programme within the same set of goals), actors will have to challenge the network from the outside and in fact destroy it by building an alternative network around alternative values. Or else, building a defensive, non-network structure (a commune) which does not allow connections outside its own set of values. Networks may communicate, if they are compatible in their goals. But for this they need actors who possess compatible access codes to operate the switches. They are the switchers or power-holders in our society (as in the connections between media and politics, financial markets and technology, science and the military, and drug traffic and global finance through money laundering).

The speed and shape of structural transformations in our society, ushering in a new form of social organization, come from the widespread introduction of information networks as the predominant organizational form. Why now? The answer lies in the simultaneous availability of new, flexible information technologies and a set of historical events, which came together by accident, around the late 1960s, and 1970s. These events include the restructuring of capitalism with its emphasis on deregulation and liberalization; the failed restructuring of statism unable to adapt itself to informationalism; the influence of libertarian ideology arising from the countercultural social movements of the 1960s; and the development of a new media system, enclosing cultural expressions in a global/local, interactive hypertext. All processes, interacting with each other, favoured the adoption of information networks as a most efficient form of organization. Once introduced, and powered by information technology, information networks, through competition, gradually eliminate other organizational forms, rooted in a different social logic. In this sense, they tend to assert the predominance of social morphology over social action. Let me clarify the meaning of this statement by entering into the heart of the argument, that is, by examining how specifically the introduction of information

networks into the social structure accounts for the set of observable transformations as presented in the preceding section. Or, in other words, how and why information networks constitute the backbone of the network society.

THE ROLE OF INFORMATION NETWORKS IN SHAPING RELATIONSHIPS OF PRODUCTION, CONSUMPTION, POWER, EXPERIENCE, AND CULTURE

Information networks, as defined above, contribute, to a large extent, to the transformation of social structure in the information age. To be sure, this multidimensional transformation has other sources that interact with the specific effect of information networks, as mentioned above. Yet, in this analysis, I will focus on the specificity of the interaction between this new social morphology and the evolution of social structure. I will be as parsimonious as possible, trying to avoid repetition of arguments and observations already presented in this text.

A social structure is transformed when there is simultaneous and systemic transformation of relationships of production/consumption, power, and experience, ultimately leading to a transformation of culture. Information networks play a substantial role in the set of transformations I have analysed in my work and summarized here. This is how and why.

Relationships of Production

Although I suppose information networks will shape, eventually, other modes of production, for the time being we can only assess their effect in the capitalist mode of production. Networks change the two terms of the relationship (capital, labour), and their relationship. They transform capital by organizing its circulation in global networks and making it the dominant sphere of capital – the one where value, from whichever origin, increases (or decreases) and is ultimately realized. Global financial markets are information networks. They constitute themselves into a collective 'capitalist', independent from any specific capitalist (but not indifferent to), and activated by rules that are only partly market rules. In this sense, capital in the Information Age has become a human-made automaton, which, through mediations, imposes its structural determination to relationships of production. More specifically, global financial markets and their management networks constitute an automated network, governed by interactions between its multiple nodes, propelled by a combination of market logic, information turbulences, and actors' strategies and bets (see Castells 2000b).

Relationships between capital and labour (all kinds of capital, all kinds of labour) are organized around the network enterprise form of production. This network enterprise is also globalized at its core, through telecommunications and transportation networks. Thus, the work process is

globally integrated, but labour tends to be locally fragmented. There is simultaneous integration of production and specification of labour's contribution to the production process. Value in the production process depends essentially on the position occupied by each specific labour or each specific firm in the value chain. The rule is individualization of the relationship between capital and labour. In a growing number of cases, self-employment, or payment in stocks, leads to workers becoming holders of their own capital – however, any individual capital is submitted to the movements of the global automaton. As labour comes to be defined by a network of production and individualized in its relationship to capital, the critical cleavage within labour becomes that between networked labour and switched-off labour which ultimately becomes non-labour. Within networked labour, it is the capacity to contribute to the value-producing chain that determines the individual bargaining position. Thus labour's informational capacity, by ensuring the possibility of strategic positioning in the network, leads to a second, fundamental cleavage, between self-programmable labour and generic labour. For self-programmable labour, its individual interest is better served by enhancing its role in performing the goals of the network, thus establishing competition between labour and co-operation between capital (the network enterprize) as the structural rule of the game. Indeed game theory and rational choice theory seem to be adequate intellectual tools to understand socio-economic behaviour in the networked economy. While for generic labour, its strategy is survival: the key issue becomes not be degraded to the realm of discarded or devalued labour, either by automation or globalization, or both.

In the last analysis, the networking of relationships of production leads to the blurring of class relationships. This does not preclude exploitation, social differentiation and social resistance. But production-based, social classes, as constituted, and enacted in the Industrial Age, cease to exist in the network society.

Relationships of Consumption

Relationships of consumption (that is, the culturally meaningful, differential appropriation of the product) are determined by the interplay between relationships of production and culture. Who does what, in a given value production system, determines who gets what. What is valued as appropriation is framed by culture. The networking of production relationships, and the consequent individualization of labour, leads on the one hand to increasing differentiation and thus inequality in consumption. It also leads to social polarization and social exclusion following the opposition between self-programmable labour and generic labour, and between labour and devalued labour. The ability of networks to connect valuable labour and territories, and to discard dispensable labour and territories, so enhancing their performance through reconfiguration, leads to cumulative growth

and cumulative decline. The winner-takes-all system is, in the consumption sphere, the expression of value creation by/in the networks.

On the other hand, the fragmentation of culture, and the individualization of positions in relationships of production, lead jointly to a growing diversification of consumption patterns. Mass consumption was predicated upon standardized production, stable relationships of production, and a mass culture organized around predictable senders and identifiable sets of values. In a world of networks, self-programmable individuals constantly redefine their life styles and thus their consumption patterns; while generic labour just strives for survival.

As culture is similarly fragmented and constantly recombined in the networks of a kaleidoscopic hypertext, consumption patterns follow the variable geometry of symbolic appropriation. Thus, in the interplay between relationships of production and cultural framing, relationships of production define levels of consumption, and culture induces consumption patterns and life styles.

Relationships of Power

The most direct impact of information networks on social structure concerns power relationships. Historically, power was embedded in organizations and institutions, organized around a hierarchy of centres. Networks dissolve centres, they disorganize hierarchy, and make materially impossible the exercise of hierarchical power without processing instructions in the network, according to the network's morphological rules. Thus, contemporary information networks of capital, production, trade, science, communication, human rights, and crime, bypass the nation-state, which, by and large, has stopped being a sovereign entity, as I argued above. A similar process, in different ways, takes place in other hierarchical organizations that used to embody power ('power apparatuses' in the old Marxist terminology), such as churches, schools, hospitals, bureaucracies of all kinds. Just to illustrate this diversity, churches see their privilege as senders of belief called into question by the ubiquitous sending and receiving of messages in the interactive hypertext. While religions are flourishing, churches have to enter the new media world in order to promote their gospel. So doing, they survive, and even prosper, but they open themselves up to constant challenges to their authority. In a sense, they are secularized by their co-existence with profanity in the hypertext, except when/if they anchor themselves in fundamentalism by refusing to bend to the network, thus building self-contained, cultural communes.

The state reacts to its bypassing by information networks, by transforming itself into a network state. So doing, its former centres fade away as centres becoming nodes of power-sharing, and forming institutional networks. Thus, in the war against Yugoslavia, in spite of US military hegemony, decision-making was shared in various degrees by NATO governments, including regular video-conferences between the leaders of

the main countries where key decisions were taken. This example goes beyond the former instances of traditional military alliances, by introducing joint war-making in real time. NATO was reinforced by NATO's state members, when these states, including the USA, entered the new world of shared sovereignty. But individual states became weakened in their autonomous decision making. The network became the unit.

Thus, while there are still power relationships in society, the bypassing of centres by flows of information circulating in networks creates a new, fundamental hierarchy: the power of flows takes precedence over the flows of power.

Relationships of Experience

If power relationships are the ones most directly affected by the prevailing networking logic, the role of networks in the transformation of relationships of experience is more subtle. I will not force the logic of the analysis. I do not believe that we must see networks everywhere for the sake of coherence. Yet, I think it could be intriguing to elaborate tentatively on the links between networking and the transformation of relationships of experience.

This transformation, empirically speaking, revolves around the crisis of patriarchalism, and its far-reaching consequences for family, sexuality and personality. The fundamental source of this crisis is women's cultural revolution, and men's resistance to reverse their millennial privileges. Additional sources are the feminization of labour markets (undermining male domination in the family and in society at large), the revolution in reproductive technology, the self-centring of culture, the individualization of life patterns and the weakening of the state's authority to enforce patriarchalism. What networks have to do with all this?

There is one direct connection between the networking of work and the individualization of labour, and the mass incorporation of women to paid labour, under conditions of structural discrimination. Thus, new social relationships of production, translate into a good fit between the 'flexible woman' (forced to flexibility to cope with her multiple roles) and the network enterprise. Networks of information, and global communication are also critical in diffusing alternative life styles, role models and, more importantly, critical information, for instance about self-control of biological reproduction. Then, there is an additional, meaningful connection. The disintegration of the patriarchal family does not let people, and children, isolated. They reconfigure life-sharing forms through networking. This is particularly true of women and their children, relying on a form of sociability and solidarity tested by millennia of living 'underground'. But also men, and men and women after going their own ways, come to rely on networks (some times around children of multiple marriages) to both survive and reinvent forms of togetherness. This trend shifts the basis of interpersonal relationships from nuclei to networks: networks of individuals and their children – which, by the way, are also individuals. What is left of families

are transformed in partnerships which are nodes of networks. Sexuality is de-coupled from the family, and transformed into consumption/images, stimulated and simulated from the electronic hypertext. The body, as proposed by Giddens some time ago, becomes an expression of identity (1991). It is individualized and consumed in sexual networks. At the level of personality, the process of socialization becomes customized, individualized, and made out of composite models. The autonomous ability to reprogramme one's own personality, in interaction with an environment of networks, becomes the crucial feature for psychological balance, replacing the strengthening of a set personality, embedded in established values. In this 'risk society' (Beck 1992), the management of anxiety is the most useful personal skill. Two conflicting modes of interpersonal interaction emerge: on the one hand, self-reliant communes, anchored in their non-negotiable sets of beliefs; and on the other hand, networks of ever shifting individuals.

These are social networks, not information networks. So, in a way, they are a fundamental part of our societies, but not necessarily a feature of the network society – unless we extend the meaning of the concept beyond what I propose: information networks-based social structure. However, as communication technology, biological technology, transgender networking, and networks of individuals, develop in parallel, as key elements of social practice, they are interacting, and influencing each other. Thus, the Internet is becoming a very instrumental tool of management of new forms of life, including the building of on-line communities of support and collective learning.

I see, however, a much stronger connection between networks and relationships of experience through the cultural transformations induced by communication networks, as experience becomes practice by its rooting in cultural codes.

Networks and Cultural Transformation

Culture was historically produced by symbolic interaction in a given space/time. With time being annihilated and space becoming a space of flows, where all symbols coexist without reference to experience, culture becomes the culture of real virtuality. It takes the form of an interactive network in the electronic hypertext, mixing everything, and voiding the meaning of any specific message out of this context, except that is for fundamental, non-communicable values external to the hypertext. So, culture is unified in the hypertext but interpreted individually (in line with the 'interactive audience' school of thought in media theory). Culture is constructed by the actor, self-produced and self-consumed. Thus, because there are few common codes, there is systemic misunderstanding. It is this structurally induced cacophony that is celebrated as postmodernity. However, there is one common language, the language of the hypertext. Cultural expressions left out of the hypertext are purely individual experiences. The hypertext is the vehicle of communication, thus the provider of shared cultural codes.

But these codes are formal, voided of specific meaning. Their only shared meaning is to be a node, or a blip, in the network of communication flows. Their communicative power comes from their capacity to be interpreted and re-arranged in a multi-vocality of meanings, depending on the receiver, and on the interactor. Any assigned meaning becomes instantly obsolete, reprocessed by a myriad of different views and alternative codes. The fragmentation of culture and the recurrent circularity of the hypertext, leads to the individualization of cultural meaning in the communication networks. The networking of production, the differentiation of consumption, the decentring of power, and the individualization of experience, are reflected, amplified, and codified by the fragmentation of meaning in the broken mirror of the electronic hypertext – where the only shared meaning is the meaning of sharing the network.

CONCLUSION: SOCIAL CHANGE IN THE NETWORK SOCIETY

Social structures are sets of organizational regularities historically produced by social actors, and constantly challenged, and ultimately transformed by deliberate social action. The network society is no exception to this sociological law. Yet, the characteristics of specific social structures impose constraints on the characteristics of their transformation process. Thus, the recurrence and flexibility of information networks, their embedded ability to bypass, ignore or eliminate, instructions alien to their programmed goals, make social change in the network society a very tricky task. This is because, apparently, nothing must be changed – any new input can theoretically be added to the network, like free expression in the global media system. Yet, the price for the addition is to accept implicitly the programmed goal of the network, its ancillary language and operating procedures. Thus, my hypothesis is that there is little chance of social change within a given network, or network of networks. Understanding by social change, the transformation of the programme of the network, to assign to the network a new goal, following a different set of values and beliefs. This is in contrast to reprogramming the network by adding instructions compatible with the overarching goal.

Because of the capacity of the network to find new avenues of performance by switching off any non-compatible node, I think social change, under these circumstances, happens primarily through two mechanisms, both external to dominant networks. The first is the denial of the networking logic through the affirmation of values that cannot be processed in any network, only obeyed and followed. This is what I call cultural communes, that are not necessarily linked to fundamentalism, but which are always centred around their self-contained meaning. The second is alternative networks, that is networks built around alternative projects, which compete, from network to network, to build bridges of communication to other networks in society, in opposition to the codes of the currently

dominant networks. Religious, national, territorial, and ethnic communes are examples of the first type of challenge. Ecologism, feminism, human rights movements are examples of alternative networks. All use the Internet and electronic media hypertext, as dominant networks do. This is not what makes them networks or communes. The critical divide lies in the communicability or non-communicability of their codes beyond their specific self-definition. The fundamental dilemma in the network society is that political institutions are not the site of power any longer. The real power is the power of instrumental flows, and cultural codes, embedded in networks. Therefore, the assault to these immaterial power sites, from outside their logic, requires either the anchoring in eternal values, or the projection of alternative, communicative codes that expand through networking of alternative networks. That social change proceeds through one way or another will make the difference between fragmented communalism and new history making.

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NOTES

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