

Cognitive Capitalism

Yann Moulier Boutang

Translated by Ed Emery

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What is cognitive capitalism?

1 Cognitive capitalism is a coherent system and a dynamic process

The last chapter may have given the impression of gathering up a scattering of bits borrowed from a variety of different theories. My intention in this chapter is to make clear the *coherence* of the emerging reality of this third capitalism in relation to the other large classic blocs – for those who are interested in defining a ‘historical capitalism’ (I. Wallerstein) – without, however, neglecting the internal contradictions, which, far from being factors of paralysis, are in fact its incredibly reactive driving force. One of the symptoms indicating that both the mode of production and the capitalist relations of production are changing is the importance assumed nowadays by institutional legal issues. Never has there been so much talk of property rights, by way of contesting them as well as by way of redefining them.

I shall begin by describing the physiognomy of global capitalism as it exists today. I shall then outline some basic facts that are already sufficiently solid to form a systematic picture, even if a lot still needs to be done to define that picture. Finally, I shall pay particular attention to the canonical question of the division of labour and the ‘mode of production’ of this third capitalism, viewing them in terms of the development of movements around free software.

2 A third capitalism for a globalised world economy

The general thesis advanced here is that the transformation affecting the capitalist economy and the production of value is global, and

signals an exit from the industrial capitalism that originated in the big Manchester factory, which was dependent primarily on the physical labour of manual workers processing raw materials. Just as industrial capitalism had broken with the substance of slavery-based merchant capitalism, 'cognitive' capitalism, which is now beginning to appear and which produces and domesticates the living on a scale never before seen, in no sense eliminates the world of material industrial production. Rather it re-arranges it, reorganises it and alters the positioning of its nerve centres. Financialisation is the expression of this remodelling, of this reformatting, of material production. The point therefore is not, twenty years after Daniel Bell, to sing the praises of the postindustrial era and to proclaim, together with the fans of the 'new economy', the advent of a pacified and crisis-free society,¹ but rather to list one by one the main strategic transformations – which can already be separately identified and which, above all, constitute system.

The revolution in information and communications technology has been compared by Peter Drucker and many others to the revolution that was effected with the creation of the railways. The comparison is valid as regards the scale of the changes introduced; but no comparison is possible at the level of the qualitative changes that are now affecting both the substance and the form of value. What we have with the new information technologies is a total paradigm shift, comparable only to the expansion of the world that took place between 1492 and 1660. However, here too the expansion is not of the same nature, because the intensity and rapidity of technical progress in the digital domain, and also in nanotechnology and biotechnology, more strongly resemble the most fertile periods of industrial capitalism.

Not only are the parameters of space and time being radically altered, but the radical overhaul of representations that is underway affects the conception of acting and of the agent/actor doing things, as well as concepts of producing, of the producer, of the living and of the conditions of life on earth. It is easy to point to elements of continuity between Judeo-Christian creationism, the capturing of nature by post-Cartesian Renaissance technique (Heidegger) and the Industrial Revolution on the one hand, and, on the other, cybernetics, computing and inventions related to the discovery of new media for the storing and transport of information. The nature of the radical leap that separates the earlier transformations from the present one is, however, less analysed, even though an understanding of them is crucial for the economics of the forces in action and their governability. Such insistence on the unprecedented character of this great and ongoing transformation is something that we find in (and also

share with) American authors such as L. Lessig, Y. Benkler,² Richard Stallman,³ E. Moglen⁴ and James Boyle,⁵ and European authors such as Michel Bauwens,⁶ Philippe Aigrain and Philippe Quéau – as already cited. Richard Barbrook has noted that the ideology of the Californian digital revolution flirts strangely with 'cybercommunism'.⁷ California and the whiz-kids who have established its new businesses during the past thirty years are our modern physiocrats. Instead of sneering at their naïveté, which so irritates Europe's post-historical sages, let us instead recognise that they have discovered and invented the new form of value. And when we speak of the form of value (of exchange value, of course) we are also talking about a remarkable return ('feedback' or 'backlash', depending on whether your stance is that of a progressive or a reactionary) to use-value and to the world of human relations, and hence to the mode of production and relations of production. Talk to Tariq Krim⁸ on his return from the United States, and you will soon realise that the magnetic pole of big business has shifted.

The phenomenological description of globalisation has been largely completed by now. The main characteristic is that the radical shrinking of distances and the low costs of delivery and transmission of binary-coded information are not only a nice and useful service added to already existing equipments. They also effect a radical change in the matrices of power. The administrative levels that had slowly been built out of the decomposition of the Middle Ages (the city towns, the modern state, the nation, and latterly the international organisations) lose both their substance and their relevance when it comes to addressing problems and taking decisions independently and coherently.⁹ Globalisation does not expand space – one single space – as was the case so intoxicatingly during the period of the great explorations of the world. Rather, it 'de-territorialises' and 're-territorialises' spaces, and it disarticulates homogeneities and cohesions instantaneously, both at the centre and at the periphery. During the conquests of the world, successive European empires (Venetian, Genoese, Portuguese, Spanish, French, Dutch, English, Belgian, German, Italian and then American) had started by destroying the first worlds, and they themselves only transformed themselves through a slow feedback effect due to the birth of inflation and to the possibility of higher speeds of accumulation. Accumulation no longer proceeds by diffusion or slow penetration. It acts very rapidly at a global level, and the possibility of local subsystems is given only in a reaction to this general fact. No acting locally without thinking globally, as the vulgate of this new gospel puts it.

Let us briefly situate this strange species of capitalism. We can distinguish three principal configurations in the history of capitalism: first, mercantile capitalism, which was based on the hegemony of mechanisms of merchant and finance accumulation and developed between the start of the sixteenth century and the end of the seventeenth. Next came industrial capitalism, which was based on the accumulation of physical capital and the driving role of the large Manchester-style factory in mass-producing standardised goods. Then came cognitive capitalism, which is founded on the accumulation of immaterial capital, the dissemination of knowledge and the driving role of the knowledge economy. This form adapts itself paradoxically to the world of exacerbated competition of post-Fordist and industrial capitalism. Let us examine its characteristics more closely.

3 The fifteen markers of cognitive capitalism

In what follows I examine the distinctive features of this third form of capitalism, which have been widely explored individually but rarely in relation to each other.¹⁰

- 1 The virtualisation of the economy, in other words the growing role of the immaterial¹¹ and of services related to the production of that immaterial, is one of the most distinctive features¹² of cognitive capitalism. It does not affect just one particular sector of economic activity, but nowadays it extends to agricultural production, to industry, and even to basic everyday services (the hairdresser in the model envisioned by Fourastié prospects his clients, contacts suppliers and pays his bills, his employees and his taxes by using the Internet) – as well as to more sophisticated areas such as the uninterrupted operation of the various world financial exchanges. In 1985 the volume of investment in intangibles already exceeded that of investment in material equipment.
- 2 The weight of the immaterial is an outcome of the new computer technologies, and therefore of digitalised data. It requires the inputting of information, its processing and its storage in digitised form, in the production of knowledge and in production itself.
- 3 Among these intangibles, one in particular is promoted to a decisive role in economic growth. This is the process of capturing – by the company as well as by the market and by public admin-

istration¹³ – of the innovation present in the interactive cognitive processes of social cooperation and of tacit knowledge. Knowledge and science, which had been incorporated in the valorisation of industrial capital but had remained distinct¹⁴ (E. Rullani), become a strategic location, the ‘leading sector’ of the system. They are doubly hegemonic, in the sense that:

- (a) science and knowledge determine the possibilities of innovation: they are the necessary precondition (as regards use-value);
- (b) both of them crystallise, within products and services, the essential part of exchange value.

They command the decisive linking factor of capitalist exploitation. Material labour does not disappear, but it loses its central role as a strategic asset. This fact is reflected in the indifference of the ‘hollow box’ firm (Peter Drucker) to the locality where its product-creation or process is carried out: it can be scattered anywhere in the world. Know-how and industrial techniques can now be accessed in a remarkably large number of countries. Transport costs per unit of output have decreased, thanks to economies of scale (and to lower energy costs; but that’s another story, to do with the ‘sustainability’ of this type of growth). The strategic asset for the company is what allows it to retain control over the process of valorisation as a whole. The issue is not the technical and material process, but the process of valorisation.¹⁵

- 4 It follows from this that technological progress is no longer an exogenous resource that companies can acquire on a ‘spot’ (instantaneous) market of goods or services, as development economists were a bit too ready to think. It takes the form of a socio-technical system¹⁶ characterised by information and communication technologies (ICTs). The appropriation of knowledge (a phenomenon infinitely more complex than the acquisition of information) and the use of technology are the critical variables of technological progress and innovation. This is the contribution of evolutionist theory.¹⁷
- 5 The division of labour model, which served as the basis of political economy in Adam Smith’s famous description of the pin factory and which was subsequently perfected by Taylorism, has been brought into question – and in three major respects:

- (a) the reduction of complex work to simple work;
- (b) the separation of manual execution according to an intellectual conception designed to reduce learning time;
- (c) the fact that specialisation as a function of market size loses its relevance in a world of small series production, in an 'economy of variety' (Boyer).

In a context of high uncertainty of demand, differentiation comes about through quality and innovation. However, these are hampered by an excessive division of labour. We have seen this in the case of quality, with the abandonment (including in material production) of Taylorism. As for innovation that requires not only the coordination of complex processes but also the active cooperation of agents, it is hampered, indeed blocked, by the division of labour. Productivity gains are no longer the result of economies of scale designed to overcome the law of diminishing marginal returns, but they derive from economies of learning, in an 'economy of variety' that multiplies small series over short periods. The international division of labour comes increasingly to obey these cognitive criteria.¹⁸

- 6 The growing complexity of markets is no longer manageable solely through the tool of economies of scale, although these continue to be sought for reasons related to the quest for the production of economic value through and for the market. This complexification requires a growing recourse to learning economies, which make possible a differentiation in the market and within an inter-capitalist competition; and the latter is exacerbated by the neoliberal decompartmentalisation of all markets (except for the labour market, which became far more highly segmented).
- 7 We are witnessing a revolution in sequences of production, and therefore in the division of labour and its components. The classic sequence conception/production/marketing is reversed. Now deep innovation involves 'flexible production' and 'just-in-time' production.¹⁹ We have seen this transformation in the industries sitting at the heart of Fordism, for instance the auto industry with its Toyotist organisational principles based on the ideas of the Japanese engineer Taiichi Ohno.²⁰ But flexible production – as it operates in the 'short cycle' of the garment and ready-to-wear industry²¹ or in the cultural industries²² – brings out even more clearly the productive nature of consumption as producing infor-

mation and real-time regulation of production. Finally, the nature of digital technologies means that the users of digital technology devices can also become co-producers of innovation.²³

- 8 Although commoditisation seems to be the universal rule, the possibility of measuring it by the yardstick of capital or of labour is called into question by reason of the irreducible plurality of inputs (resources contributing to production). There is now a dissolving of the traditional dividing lines between capital and labour and between skilled and unskilled labour. The fact that expressions such as 'human capital' and 'intellectual capital' come into common usage is a symptom of this. But the expression 'immaterial capital' is itself an unstable combination of terms, as we shall see. The inscription of digital technical tools is so strong that the evolutionist current in economics comes to propose a new distinction for goods and services into three types of inputs: hardware (the physical layer), software (the logical layer), and wetware (the cerebral or living layer).²⁴
- 9 But, to this, you also have to add the irresistible rise in models of social and productive cooperation of a fourth component: netware, or the network. The network society²⁵ is made possible by informatics, in other words by the creation of a coherent package of digitisation, computer programming and electronics (through the dissemination of the personal computer from 1986 onwards), and finally by the establishment of the Internet, which becomes the new global common good of collective intelligence.²⁶ We shall return to the role of the digital network, which represents a radical novelty.
- 10 This rise of 'cooperation between brains'²⁷ implies a decline in the energy and entropy paradigm of labour-power, and also in that of the transformation of material goods in the production of wealth. This occurs at a given point, namely the moment when the dissipatory energy expenditure associated with the machine-based model of industrial capitalism begins to affect adversely the limits of the terrestrial biosphere and of the global ecosystem. The controversial theory of the 'end of work', put forward by R. Reich and J. Rifkin, should not be read, as some would have it, as the advent of the leisure society, but rather as a shift in the paradigm of labour. What is coming to an end is the hegemony of the paradigm of industrial labour and manual labour power.²⁸

- 11 But cognitive capitalism does not content itself with calling increasingly on living labour rather than on dead labour (crystalised in machines, to use the terminology of Marx). The rule of science had been broadly anticipated by Marx in the *Grundrisse* (1857–8). In his view, the time would come when the power of capital, accumulated and held by the capitalists, would present itself in the form of the necessary and indisputable character of science. But the novelty we are witnessing is the centrality of a living labour that is not consumed and not reduced to dead labour in machinism. We shall return to this.²⁹ This important fact of a living activity that co-produces labour as living activity is matched by the importance of an implicit knowledge that is irreducible to machinism, to standardised and codified human capital. In societies whose form resembles that of cognitive capitalism, living labour and ‘living’ consumption both occupy a central position.³⁰ This is the ‘bio-productive’ aspect of invention-power,³¹ which superimposes itself on manual labour power and whose capturing, as we shall see, defines the specific form of exploitation and surplus value extracted by cognitive capitalism.
- 12 Such a transformation goes hand in hand with the decline of concepts of individual performance within the workplace, which were based on the benchmarks of productivity developed during the period of industrial capitalism. It also tends to oust factor performance: the most relevant indicators become those of the surplus of aggregate productivity. This situation corresponds, in accounting terms, to the question of taking into account value, which does not appear in the accounting ledgers but can be assessed by ‘fair value’, in other words by its stock market valuation.³² Finally, the evaluation of aggregate performance also has to take on board the notion of productive territories, in other words ‘territorial excellence’. This has given rise to a whole literature on ‘clusters’ and local production systems, which focuses on the factors outside the individual enterprise that generate productive innovation. Innovation is no longer, or is not only, solely within the individual company; it is wherever the territory provides a productive territory or network.³³
- 13 The immaterial nature of the goods produced in cognitive capitalism induces a strong specificity of information-goods or knowledge-goods as regards their learning processes, their use, their depreciation, their enrichment and the conditions of their

- exclusive expropriation. These characteristics in turn affect the way in which information and knowledge move around in the company and in society (a much stronger ‘horizontalisation’ prevails, resulting in a radical questioning of acceptable forms of hierarchy); but they also create growing tensions over the issue of intellectual property rights. We shall return to this; but this feature, which inserts knowledge as a public or ‘free’ good – in other words open access – into the very heart of market relations cannot be separated from the revolution in information technology. This revolution leads to a crisis of implementation (enforcement) of conventional property rights such as intellectual property rights, patents and copyrights, which once constituted a particular form of social compromise between the needs of production and the public’s enjoyment of immaterial goods.³⁴
- 14 In cognitive capitalism, external effects – what we have defined as externalities – cease to be marginal and tied to simple partial phenomena of indivisibility of public goods. If the core of the value to be extracted is based on intelligent, inventive and innovative labour, and if the latter mobilises the cooperation of brains in networks, then capturing positive externalities becomes the number one problem of value. In other words, what needs to be uncovered and addressed is work done outside working hours, and implicit knowledge, and capacities for contextualisation. This shift in political economy and in the management of the chain of value is facilitated all the more by the fact that debt, which has been the inheritance of two centuries of frenzied industrial capitalism (including its version in ‘realised socialism’), is made up of negative externalities that need to be controlled and resolved. Political economy has no choice but to deal with this relation it has to its own outside. And anything in its toolbox that cannot be used in this regard is about as useful as medieval scholasticism was to the Renaissance.
- 15 Whereas industrial capitalism could be characterised as the production of commodities by means of commodities, cognitive capitalism produces knowledge by means of knowledge and produces the living by means of the living. It is immediately production of life, and thus it is bio-production. The production of new knowledges can only be done on the basis of an accumulation of knowledge that is not reduced to technical material means. But it can therefore only take place on the basis of collective

brain activity mobilised in interconnected digital networks. This type of capitalism corresponds to a development in society that has come to be known as 'the knowledge society'. Insofar as invention-power (far more than physical labour power) is what is mobilised specifically by cognitive capitalism, this creates a situation in which cognitive capitalism produces knowledge and the living through the production of the population. This production of life can be called 'bio-production'. And the power that has, as its function, the control of this 'bio-production' is called 'biopower'.³⁵ Knowledge of the living and the means of producing it are at the heart of the transformation of the contemporary paradigm of production. Biotechnologies are currently in the process of domesticating the living in order to turn it into a transformation vector that will be far more powerful and better suited to the constraints of the biosphere than mechanical tools.

These are only the most salient features of a development of productive forces – to use the standard terminology – which is increasingly coming to coincide with the development of the productive power of human brains in interaction. We can now attempt a characterisation of this cognitive capitalism, or third capitalism, going beyond mercantile capitalism and industrial and financial capitalism.

4 A definition of cognitive capitalism

In order adequately to define the third type of capitalism that is in the process of formation, we need to bring together three things: a type of accumulation, a mode of production and a specific type of exploitation of living labour. By accumulation we understand the investments that a society makes both via its public authorities and via the behaviour of private agents, whether in businesses or in households. Accumulation is thus not reducible to the 'gross fixed capital' of the economists.

When we refer to a system of accumulation, what we mean is the association of what the regulation school calls a mode of production with a type of accumulation. Whereas industrial capitalism can be characterised by the fact that accumulation was based mainly on machinery and on the organisation of manual labour, understood here as the organisation of production and the allocation of workers to fixed jobs, cognitive capitalism is a different system of accumulation, in which the accumulation is based on knowledge and creativity,

in other words on forms of immaterial investment.³⁶ In cognitive capitalism, the capture of gains arising from knowledge and innovation is the central issue for accumulation, and it plays a determining role in generating profits.

By cognitive capitalism we mean, then, a mode of accumulation in which the object of accumulation consists mainly of knowledge, which becomes the basic source of value, as well as the principal location of the process of valorisation.³⁷ Issues such as property rights, positioning in networks, alliances and project management become major institutional and organisational factors. Their role is crucial. The strategies of this capitalism are determined by the quest for a spatial, institutional and organisational positioning likely to increase its capacity for engaging in creative processes and for capturing their benefits.

The mechanical transformation of matter by means of a twin expenditure of energy and labour power does not disappear, but it loses its centrality in favour of a cooperation of brains in the production of the living by means of the living, via the new information technologies, of which the digital, the computer and the Internet are emblematic in the same way in which the coal mine, the steam engine, the loom and the railroad were emblematic of industrial capitalism.

The mode of production of cognitive capitalism, if we want to give a description that is concrete but sufficiently general to cover all of its various situations (the production of material goods, services, signs and symbols), is based on the cooperative labour of human brains joined together in networks by means of computers.³⁸ The very rapid development of organisational forms such as project management, arrangement of small units articulated into networks and operating under outsourced relations of subcontracting, partnerships and locally based relationships is the public manifestation of this transformation.

This regime manifests itself empirically through the important place of research, of technological advancement, of education (the quality of the population), of information flow, of communication systems, of innovation, of organisational learning and of management organisational strategies. On the demand side, consumption is also oriented towards technology, and particularly technologies of the mind – in other words those that set mental faculties into operation through interaction with the new technical objects: audiovisual media, computers, the Internet, game consoles.

It follows that human capital and the quality of the population have now become crucial factors in defining the new wealth of nations.

The material basis of the new information technologies (which are grounded especially in new telecommunications infrastructures) makes possible a dematerialisation of cooperation (in which distance is abolished) and a questioning of the kind of hierarchies inherited from the monastery (twelfth century), from the plantation (seventeenth–eighteenth centuries), from manufacturing (eighteenth century), from the large factory (nineteenth century) and finally from the giant firm (1880–1980).

Since we are talking about modes of production and not simply about ways of producing, we should add that a redefinition of property rights and of the social rights that used to define the respective legal position of manual workers, white collar workers, engineers, inventors and creators as well as that of the owners is also part of this 'great transformation'.

A capitalist society of this kind aims to place at the centre of the sphere of production and to integrate fully into the economic sphere (both market and non-market) resources that had previously been external to them. Often these resources are of a kind whose integration implies the establishment of a number of institutional rules. Indeed the development of cognitive capitalism cannot be achieved without a number of institutional arrangements governing its activities, relationships and property rights. In all these respects the current institutional framework shows itself to be inadequate. The guiding lines for the establishment of a stable regime of cognitive capitalism include:

- 1 the bringing out of positive externalities in a globalisation that also serves to balance out the negative externalities, in the hopes of eliminating the sources of lasting imbalance in the growth of knowledge production;
- 2 the capturing of positive externalities and their validation in the creation of private profit.

It is probable that we should interpret what otherwise appears as erratic movements of the financial markets as a function of this mutation. Alan Greenspan, governor of the US Federal Reserve, gave a speech on 1 March 2004, at a meeting organised at Stanford University (the Stanford Institute for Economic Policy Research), in which he said:

The fraction of the total output of our economy that is essentially conceptual rather than physical has been rising [. . .]. Conceptualisation is

irreversibly increasing the emphasis on the protection of intellectual, relative to physical, property rights.

It would be totally wrong to conclude that the growing 'immaterialisation' of the economy needs to lead to a generalised 'patenting'. Greenspan, in fact, citing Leibniz and Newton, asks: 'Should we have protected their claim in the same way that we do for owners of land? Or should the law make their insights more freely available to those who would build on them, with the aim of maximising the wealth of the society as a whole?' And he continues: 'Still, we must begin the important work of developing a framework capable of analysing the growth of an economy increasingly dominated by conceptual products.'

For economists concerned to understand what the economic system of capitalism has become, it is difficult not to agree with Alan Greenspan – even if their solutions do not necessarily coincide with those of the man who knows how to talk to markets, the man who fends off financial crises. But the fact that a man who has been one of the most powerful people on this planet for the past fifteen years chooses to express himself in this way should encourage those who are still wary of the notion of cognitive capitalism to accept it as being the least unfaithful description of reality.

5 The great transformation of work: How to tackle the problem

Cognitive capitalism is not only a type of accumulation oriented towards the valorisation of knowledge and innovation. It is also a new mode of capitalist production. Before turning to the social and economic division of labour, to the key variables in the production of new knowledge and of the living, and finally to the new paradigm of human activity that is beginning to appear, let us first deal with a methodological misunderstanding regarding the digital economy.

Our point of departure will be the transformation of work at a macroeconomic level. We should be on our guard against a classic mistake of empiricism, namely extrapolating a general system of labour from the observation of this or that form of concrete labour, and from there extrapolating to capitalism and then to society in general (at this point they bring back through the window everything that had been thrown out of the door in this small phenomenological reduction). We need to beware of such an approach for two good

reasons. The emergence of cognitive capitalism, like that of the previous two modalities of historical accumulation, needs more than bare facts in order to be readable. Above all, we need to advance a hypothesis about the tendency underway; and we need to privilege this tendency, even to the point of exaggeration, in order to bring development out of the shadows where we are condemned to sit for as long as we limit ourselves to the cautious adding up of 'facts'. All statistics are open to interpretation along the lines of whether the glass is half empty or half full. Thus a number of researchers who are sceptical about the relevance of the concept of cognitive capitalism bring up the continuity and reality of traditional forms of exploitation and labour, which remain majoritarian, and durations of working hours strikingly similar to the descriptions of absolute surplus value, which were once the baleful prerogative of England and today are found in the sweat shops of Asia. Some may object that there are only 600 million people connected to the Internet and phone usage, a figure that, in 2001, represented only a tenth of the world's population. This argument has been quickly overturned, however, thanks to the remarkable growth of mobile phone usage in less developed countries. When you live in a *favela* and you don't have a reliable postal address because the postal system functions so badly, your mobile phone becomes both your system of protection and your head office in terms of employment. As for the argument about the minority status of the world of work that is networked and assisted by computers, that is not worth much either. The growth rate for this type of work is very rapid, more rapid than the expansion of waged manual labour in the 1830s. But the most convincing argument is another one: you are interested in general in empirical observations, which you select out of a rhapsodic jumble of multiple pieces of information because you are looking for the relevant variables governing the overall tonality making it possible for you to predict trajectories of evolution. The great of genius of Marx and Engels was that they studied, not the largest working population in England (in other words domestic servants, of whom there were millions), but the 250,000-odd workers in the factories of Manchester.

The second argument that should lead us resolutely to shun the empirical approach that claims neutrality is that transformations in the nature of labour are not a starting point, which would then enable us to move to capitalism, and then finally to society as its appendage. Such a sequence would be doubly reductionist: it would liken the social division of labour to a technical and ordinary division; and it would make society an 'automatic' outcome of the type of capitalism

that one might deduce from technology or from market size. Such a construction is perhaps easy to draw, and elegant and conducive to econometric regressions. However, in no sense does it correspond to reality. It also sees social and political action as a convivial shadow theatre of a determinism of the development of productive forces and accumulation. This is exactly the picture of the end of history, whether in its Joseph Stalin version or its Fukuyama version (ca 1990) – take your pick. One would prefer a richer, more complex picture, in which transformations in society are not deduced either from technique or from the form of the state, but interact and open a plurality of possible worlds.

Thus, in what follows, we shall maintain an equal distance from technological determinism, from the determinism of 'the development of productive forces', and also from the determinism of forms of government, which reappears in discussions of 'governance'.

6 The division of labour: Neither market nor hierarchy, but the digital network

The division of labour described by Adam Smith in his *Inquiry into the Nature and Causes of the Wealth of Nations* (1776) stands as an introduction to all classic political economy, and particularly to its most powerful and systematic thinker, David Ricardo. This, therefore, is what Marx took as his focus. This is also what lies behind Émile Durkheim's famous book *The Division of Labour in Society* (1893), which is still used to train thousands of sociologists the world over. It is precisely this division of labour that is now called into question. Table 3.1 presents the key points at which the major transformations have occurred.

The division of labour plays a fundamental part in the edifice of political economy, in other words in the economics of industrial capitalism. This fact was addressed by Charles Fourier in his time, albeit with not much success. But before him, Adam Smith had swung between *The Theory of Moral Sentiments* (1759), in which empathy and interaction play the major role, and *The Wealth of Nations* (1776), in which *labour* comes to the fore. It is a fact that capitalist civilisation, whether mercantilist and slave-owning or industrial and based on wage-slavery, was characterised by a transition from a working time of 800 hours per year to over 2,000 hours when compared to previous civilisations. The technical and social division of labour was designed to obey one cardinal principle: the maximisation

Table 3.1 Division of labour: The shift from Smithian to cognitive division of labour

Kind of capitalism	2nd capitalism: Industrial capitalism	3rd capitalism: Cognitive capitalism
Function	Originates power and classes. Cooperation as an <i>ex post</i> result (Smith, Marx)	Derived from cooperation (Benkler)
Evolution variables	Size of market	Size of network Size of public
Organisational model	Market/hierarchy/state	Networks relying on the network of networks (Internet)
Characteristics of principal resource	Exclusivity, rivalry, appropriability	Indivisible non-rival goods
Principal trading goods	Commodity goods Labour goods, energy input	Information goods Knowledge goods Mental attention and networking
Major effect	Economies of scale	Learning economy Variety economies Capture of positive network externalities
Main economic tools	Marginal calculation Short term perspective Tendency to falling profits	Flux analysis Long period perspective Increasing returns
Technical tools	Input-output matrix of homogeneous products	Quadruple goods
Externalities	Marginal in private goods Mostly for public goods	Hardware/software/wetware Prevailing even in the case of private consumer goods
Economic model	Commoditisation and endogenisation of positive and negative externalities	Decommoditisation of the new common public goods Maximal endogenisation of negative externalities Minimal endogenisation of positive externalities
Financing system	Market in general Taxation for public goods	Dedicated advertising, commoditisation of digital traces of interaction in hub of gratuitous pollination Financing by global pollination tax

of the product of activity. Maximisation in terms of market value, but also in terms of physical aggregate. The question is how to produce a maximum of the products that are the subject of trade between nations. Market size and increasing specialisation go hand in hand. The more a given country trades, both domestically and with others, the more it can impose a division of labour in order to produce at low costs and to consolidate its domination of world trade. What does it matter if the model carefully taken on board by Adam Smith (which explains why this famous text is so vague about its context, about the situation that prevailed before the onset of the division characterising big industry) is not that of the large Manchester-style factory (which did not exist at that time), but that of the Laigle manufactory in Normandy,³⁹ a pure product of Colbertist mercantilism? These two forms of capitalism shared the same obsession with setting labour in motion in the most efficient ways possible, for the purposes of producing commodities. The market and market size thus command the degree of technical specialisation – which, itself, commands the social hierarchy. Marx reverses the terms of the problem: what governs the technical specialisation of heavy industry is the social hierarchy between those who own the means of production and those who have the means of valorising them. But, in both cases, the starting point is always work and its socio-technical division within manufacturing. Social cooperation is derived from technical coordination. If we examine the trend of division of labour in the knowledge society and in its corollary, the learning company, we find that the mechanisms or arrangements no longer start from work, but from human cooperative activity and the object of knowledge. The types of division of activity and work, as well as the form of employment, derive from cooperation. Instead of planning work on the basis of time and motion studies and establishing degrees of division of labour depending on the size of the expected market, it organises work on the basis of what the teams know how to do.⁴⁰ Organisation by project tends to replace the tree-like and matrix-like organisation of the industrial era. Why? Is this a return to the craft labour [*artisanat*], or to the ‘putting out system’? Obviously not. This new form of division of labour is more efficient (in particular, it is faster, more responsive, and more capable both of innovation and of correcting errors arising in the running of the project). And the reason why it is superior is that it relies on digital networking.

Y. Benkler, in a famous essay entitled *The Penguin of Coase*,⁴¹ brought into a single frame the theory of transaction costs, the theory of property rights outlined by H. Demsetz,⁴² and de-centralised peer

to peer⁴³ exchange in digital networks. He defined the problem of production as presupposing several operations: (a) identifying the most relevant resources even before allocating them; (b) deciding what form of property contract or agreement to use to minimise transaction costs. The attribution of prices, property rights or forms of authority to particular agents is not free. Thus far Benkler follows closely Ronald Coase:⁴⁴ one evaluates the comparative costs of appealing to the market (buying resources on the market), or to state hierarchy (public organisation), or, finally, to the hierarchy of the company (private organisation). And if the expected benefits from such a productive option exceed the transaction costs incurred, the solution will be viable. R. Coase had used this line of argument to show that one has to complicate the traditional programme of standard economics (minimise costs, maximise the output value), by adding another programme, which also had to be addressed: to maximise the volume of transactions while minimising transaction costs. Y. Benkler poses the same problem. But he examines what happens when there is a network of distributed knowledge that makes relevant information – knowledge – available to an unlimited number of economic agents at practically no cost (the price of signing up with a long-term Internet service provider).

He is able to show that production through networking becomes an organisational alternative, and thus a new form of division of labour, which is revolutionary and above all far more effective in some configurations than the de-centralised market, or private enterprise, or the state. In contrast to the hierarchy and the market, the network comes to the fore as a form of cognitive division of labour.

What are the variables that apply in the social and technical allocation of work? It is no longer the size of the market, because the market is not the most efficient solution for selecting resources, attributing prices or measuring costs. In fact what makes it possible to identify resources very quickly and to associate them is the size of the network (in other words the Internet, discussion lists and the like). These could be, for instance, networks of customers, suppliers, subscribers and so on. The more your list is specialised in terms of the cognitive problem it addresses (for example, a list where motorcycle enthusiasts discuss their problems)⁴⁵ and, even more importantly, the greater the number of participants in this network, the greater the probability that you will quickly find your desired solution. I take this example deliberately, because networks of distributed knowledge existed prior to the advent of digital networks. But it is easy to see

that the Internet, as the network of networks, is a resource that has no equivalent. The effect of numbers of people participating in a discussion list on the Internet is called the 'library effect'. In more general terms, economic activity in a network situation generates a surplus, a structural surplus value that comes under the heading of 'positive network externalities'. Each member of a given network will receive benefits for which s/he does not have to pay. This theory began with 'clubs' and was later applied to the analogue telephone network. It applies even more in the case of digital networks.

What are the advantages of a form of production that is based on digital networks articulated by the Internet? Compared to the old division theorised by Adam Smith and then perfected by Taylor, both in the factory and in society at large, the advantages are threefold.

- 1 The first consists in the possibility of using a process of experimental adjustment in order to master a complex situation that is not knowable a priori by means of a conception of understanding modelled on the representation of god as given by theology.⁴⁶ In other words, the advantage is to produce, within an uncertain context, a solution that is not already programmed from the start – thus a process of innovation and learning.

Interactive information is transmitted in real time and agents are free and able to modify its action in cooperation with their colleagues. Here cooperation is the element that guarantees the efficacy of the coordination – and, definitely, not the reverse. There is no fixed system that determines *ex ante* the selection of resources to be mobilised on the basis of some checklist, the division of operations, or the sequence of action with agents at each end of the production chains – agents who are either stupid or reduced to one single way of carrying out a task – in other words the famous 'one best way' (as pioneered by the time and motion expert F. W. Taylor) to the exclusion of alternative solutions or of trial and error.

- 2 The second advantage is the possibility of escaping the tyranny of the law of diminishing returns, which holds sway in economics and is found everywhere as the covert legacy of Thomas R. Malthus. It is, however, obvious that the curse of diminishing profits is only a special case. This 'law' seems evident for a series of phenomena that are essentially physical and entropic.⁴⁷ The world of information and knowledge-goods is no longer

characterised by scarcity.⁴⁸ Nowadays the notion of scarcity applies rather in the areas of time and attention; it makes no sense in the process of accumulation and enrichment of knowledge, which is characterised, on the contrary, by increasing returns and by negentropy.⁴⁹

- 3 The third advantage is an 'end-to-end' conception of the nature of the network and of the cognitive division of labour. If the network of digital networks gives us a model of action that is appropriate and innovative in complex and uncertain systems and makes it possible to envisage cumulative processes of increasing outputs, this is because it offers a great lesson in its very organisation, as Lawrence Lessig explains in his *The Future of Ideas* (2001) – an important book, which was astonishingly ignored both by the media and by the academy when it was first published in French. Juxtaposing the technical and organisational model of the American telecoms operator American Telephone and Telegraph (AT&T) to the architecture of the Internet, Lessig draws a critical conclusion. If you want to promote innovative and dynamic solutions, you should not privilege (as AT&T did for a long time) an intelligent – that is, sophisticated and complex – network with dumb agents at the entrance and exit points. You have to adopt the solution of the Internet that is precisely the opposite: the physical and logical layer of the network of networks was designed deliberately as a platform that was simple and 'dumb'. The intelligence and complexity were entrusted to the members of the network at the periphery of the technological apparatus. The system privileges 'inter-operability'.⁵⁰ It obeys the following principle: simplify the technical organisation and complicate the knowledge and the content that pass through it. It is easy to see that the Smithian model and its great-grandchild, the Taylorist model, arise out of societies where the kind of knowledge that was mobilised as a productive resource involved only a very thin layer of the population (elites representing between 1 per cent and 10 per cent of the total). The basics of the division of labour are incorporated within the hierarchical system, which itself is highly qualified and rigid, in order to be able to bring together low-skilled operatives from whom a minimum of autonomy of initiative and a maximum of subordination is required.

Bernard Mandeville first uses the expression 'division of labour' in his famous fable of the bees.⁵¹ As noted by B. Girard,⁵²

The division of labour makes it possible to do great things with mediocre minds. 'By dividing and subdividing the occupations of a major service into many parts, it becomes possible to render each person's job so clear and certain that, once he has got used to it, it will become almost impossible for him to make mistakes.' (Fable 2, p. 267)

Two centuries later the same principle still applies. Let us not forget that Ford believed that the greatest achievement of his system of work organisation on the assembly lines in Detroit was the fact that 80 per cent of the jobs only required between two days and three weeks of training.

This quality of the division of labour, typically Smithian, permitted industrial capitalism to incorporate the mass of the peasantry 'without qualities', which was then soon joined by women, immigrants (both internal and international) and various minorities. Under mercantilism, this operation was conducted in the colonies with the plantation economy, the real test-bed of child labour and team working, which involved the use of slaves. But did we not mention the Colbertist manufactory, the ancestor of the big factory? In fact the difference between the large factory – which brings together, in one place and close to sources of energy, a large number of workers – and the manufactory lies not so much in the division of labour itself as in the manufactory's incapacity to ensure a continuous supply of labour. The 'poor' of the manufactories were not sufficiently proletarianised:⁵³ the only way to keep them in the workplace was the compulsion of law or guaranteed employment. Some of the Colbertist manufactories worked with convicts (as did the French galleys), or had workers who were more or less employed for life. As a system, this was not very conducive to specialisation, and it was not really much more productive than the labour system of the guilds.

This is why, in some cases, for instance at Laigle in Normandy, the royal authorities embarked on an experiment, comparing the productivity of artisan labour controlled by the guilds with that of free labour. The latter was divided and supplied by the surplus workers whom the countryside was beginning to supply.⁵⁴ This was described in Jean-Rodolphe Perronet's detailed account of the Laigle pin factory,⁵⁵ subsequently included in the *Encyclopédie*, which in turn offered the empirical data used by Adam Smith. Naturally, no human labour, not even the most subdivided and specialised, was able fully to mimic mechanical automata. A certain amount of the knowledge implicit in collective cooperation, judgement and 'common

sense' is required in order to run even the worst of assembly lines.⁵⁶

The cognitive division of labour that is increasingly being practised in learning companies and on the Internet is a society in which knowledge and culture are disseminated widely and shared, and where this raw material becomes abundant. Just for the record, France is lagging behind other developed countries, with less than 37 per cent of each new scholastic year going to university. This explains the incredible backwardness and timidity of the average level of political debate on schooling, research and universities, which will be our only hope of salvation. In the United States, which shares with Northern Europe the leadership at this turning point of cognitive capitalism, the proportion is 67 per cent. The use by companies of these cognitive resources, as represented in Figure 3.1, is increasingly ineffective and poorly supported – and it is doubly ineffective because poorly supported. Postgraduates cannot be commanded in the same way as high school leavers. The contribution made by the computer-based digital network in assisting mainly intellectual work⁵⁷ is the ability to exploit capabilities for complex labour, in other words for abstract qualified labour.

This being so, the idea of asking employees to interpret, revise and modify the execution of projects can no longer be seen as some disorganising anarchist fad. Such operations require intelligent coordination, and thus cooperation in exchanging information and in sharing of languages. All producers of knowledges and all those who implement these new knowledges in order to valorise them need to be connected in ways that are symmetrical (with information, affects and language travelling in both directions, and with each person being in contact with each other person).

In as much as it is a production of knowledge through knowledge that has been acquired, interpreted and contextualised, the development of software (for example) derives from a cognitive division of labour and not from a Smithian division of labour. The general characteristics of this division are illustrated in the table given at the start of the present chapter. So let us summarise the ways in which the cognitive division of labour differs from the division of labour obtaining in industrial capitalism. It differs in three respects:

- As regards specialisation in productive activity, the reduction of complex work to simple labour and the division of manual execution according to an intellectual conception designed to reduce learning time are no longer the factors that determine increased productivity.

- As regards the size of the market, this becomes less relevant in a world of small-series production and in an 'economy of variety', subject to substantial uncertainties of demand. The result is that innovation, insofar as it involves the coordination of complex processes, is hampered by the Taylorist and Smithian division of labour. Productivity gains no longer come from economies of scale, but from economies of learning.
- As regards levels of output, de-centralised coordination in the delivery of services based on the processing and delivery of information is recognised as one of the characteristics of a knowledge-based economy. Under the very strong axiomatic constraint of programming, the possibility of such a complex coordination relies not on standardisation and homogenisation, but on the fractal nature of the modules that are found at each level or layer of the software (library, documentation, services). This fractal rather than simply modular character could explain why the repeated waves of sequential innovations do not bring about a return to declining productivity and growing learning costs. Growing productivity of innovative learning is the rule. Declining productivity is the exception.⁵⁸

The production of software therefore belongs more to the model of scientific research production than to the industrial model. But in the case of free software (and, to a lesser extent, in open source software) the role played by the Internet and by the very nature of the product adds the following characteristics:

- a cooperation in real time, which shares knowledge without any of the legal restrictions of the kind that exist for the goods defined as intellectual property, which limit their usage, reproduction and circulation;
- a horizontal and no longer hierarchical or commodity-based character (the two major forms of organisation of human activities in capitalism: the company and commodity exchange).

The digital network of the Internet, when it operates as an intranet within the productive unit, is a simple guarantor of the 'interoperability' of means of communication. It does not carry within itself any of the elements that were the core of the Smithian division of labour (fixed equipment, codified data, processing and calculating programmes, memory). This is what L. Lessig refers to as the 'neutrality' of the digital

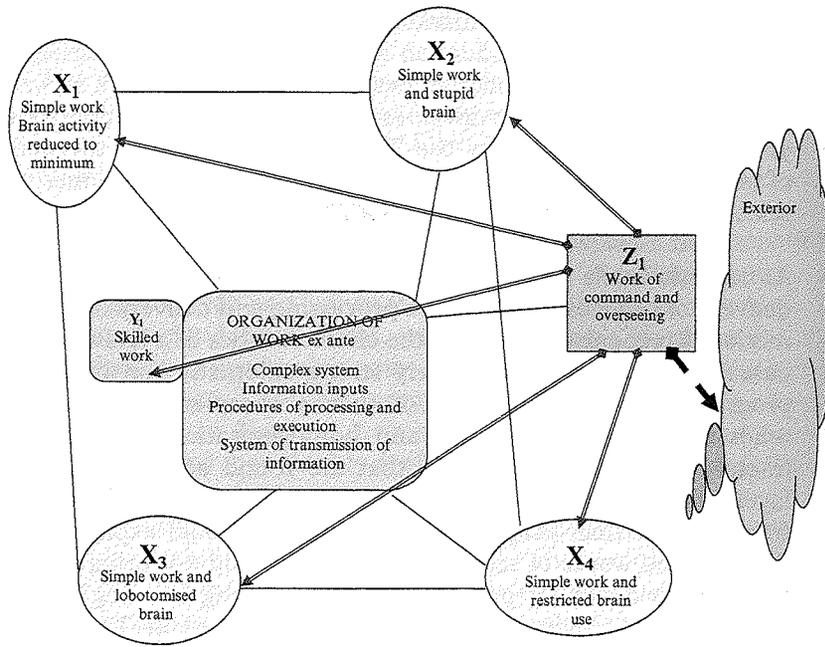


Figure 3.1 The Smithian division of labour

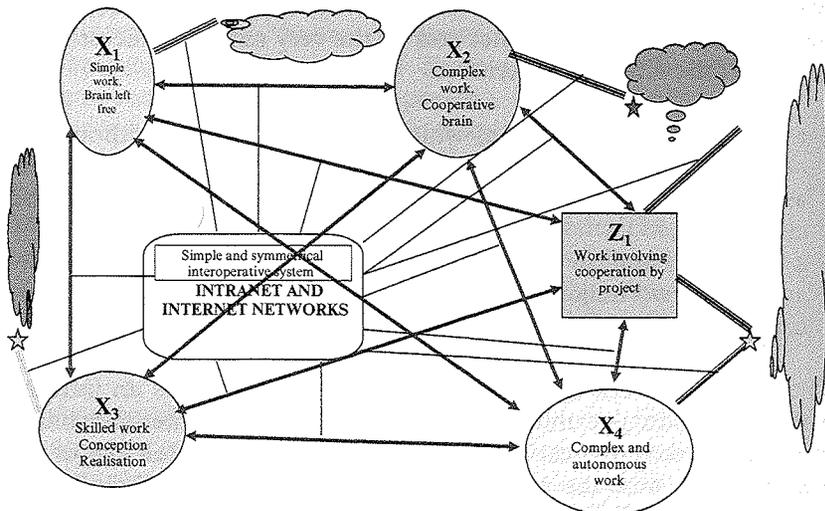


Figure 3.2 The cognitive division of labour

network in terms of organisation and hierarchy. On the other hand, communications between cooperating brains via digital networks incorporate the hierarchical relationships that the network reveals. Thus a discussion list can either operate under modalities of symmetry and complete transparency, or it can introduce asymmetries. The two main asymmetries are partial or total opacity of horizontal communication, depending on whether all employees receive e-mails, or only some. The recipients of e-mails either appear in the header or they are hidden.

The second asymmetry is the relationship with the outside. The Smithian and industrial division of labour involved building a wall around the production facility⁵⁹ and the construction of specific internal norms (regulation, secrecy, prohibition of entry into factories), which are different from those governing society as a whole. The relationship with the outside is the exclusive prerogative of the hierarchy. In the cognitive firm based on digital networking, employees are connected to the Internet, which is a working tool but also the prime tool for relations with other enterprises and with territories, customers, suppliers and subcontractors. This characteristic of openness to productive territories is one of the biggest differences from the old system of big industry.⁶⁰ What remains of the hierarchical technical function is absorbed into the network on the same footing as the other collaborators. Here we are not talking about the patrimonial aspect of hierarchy – for instance, in a consultancy firm, what counterposes the old-timers, who originally set it up and have most shareholdings, to the more recent arrivals, who are simply paid workers. The boss becomes the coordinator or project manager, while part of the directorial function switches to the shareholders.

Of course, Figure 3.2 is only expressing a tendency. Few companies actually operate like that, except start-ups. But the more the resources produced and valorised by them come to be represented by brainpower and innovation, the more this particular schema of division of tasks tends to grow in importance.

There is a lesson here, and one of considerable significance. The cognitive division of labour is not based on a codification of the procedures used in programmes and of data, in the sense of an increasing specialisation – unlike in the old division of labour, in which things were run according to unchangeable rules. On the contrary, it seeks to ‘de-specialise’, to de-compartmentalise disciplines, to transversalise the circulation of knowledge. It can only do this with the aid of the digital network, which capitalises on specialised knowledge on the Web. Given that, the essence of the activity of the brain and of collective cooperation is to apply, contextualise, and move beyond

codified knowledge. The cognitive division of labour recomposes jobs, but it also has to de-individualise its production in order to innovate. The correlative of this imperative is the constitution of new informational common goods and an easier access to the stock of knowledge, as well as the 'de-marketisation'⁶¹ of the resources of positive externalities.

The cognitive division of labour has as its objective the production of new knowledges that can feed innovation upstream. We are still very much in a division of activity that is closely linked to cognitive capitalism, whose object is the capture of intelligence. If the Smithian division of labour, and also Taylorism, are increasingly being abandoned, this is simply because they are unable to guarantee that the aspects of implicitness and the power of contextualisation, which are the strongest and most vibrant part of value, can be captured in its nets. With the emergence of the Internet the network becomes much more efficient, and, furthermore, it is far less expensive in terms of fixed capital for private companies.

The mercantilist economy had to confront a twin shortage of capital and labour. Classic economics had to deal with the fact of a scarcity of resources in terms of capital, whereas labour was abundant. Neoclassic economics addressed itself to the allocation of an abundance of capital in a situation of scarcity of labour.⁶² The contemporary digital economy has to deal with a world in which there is an abundance of the immaterial, but a scarcity of time and attention. Once we have reviewed the division of labour, this brings us to another particularly striking aspect of the production of knowledge through knowledge: that of its relationship to time and attention. This temporal dimension is strangely absent from the traditional analysis of the political economy of the mode of production.

7 The production of knowledge by means of knowledge: A new frontier – Attention and time – Care and value

It would not be accurate to say that our era has become a world of abundance in terms of either material goods or information and knowledge. The fact is that there is still plenty of work for economists, because other forms of scarcity – depletion of scarce resources, non-renewable resources and hard-to-renew resources – are now appearing as a result of ecological disequilibria. But the three key resources that now appear to be scarce are: cognitive attention; time; and what people call 'care' (affective attention).

Unlike the muscles of the body, the human brain works all the time. It operates by different rules. When it works by using its logical functions (reading or re-reading, writing, speaking, supervision, behaviour), it consumes attention. It has been calculated that the attention span of students attending lectures is limited to about fifty minutes. The modalities of attention should not be confused with those of concentration. The floating attention of the psychoanalyst who sits and listens to a patient without interrupting, the auditory attention of the cat watching a mouse, the attention that we might pay to a piece of music are modalities of a different kind of perception. The overabundance of information and knowledge creates a particular modality of attention: that of being able to draw classifications within a totality, although it is too often chaotic or rhapsodic and produces noise rather than meaning. Working on a computer entails both the functioning of a machine, which is automatic and only requires our attention when a breakdown blocks other forms of activity, and also the logical layer, in other words the programs for operating the machine and for processing the data. Although not totally automatic, the layer of software that runs operating systems is usually pre-set. Application software requires greater intervention on the part of the operator. The layer of content is the one that requires most attention: if you enter the values of a regression, you have to input the data and their rank order and not make mistakes. If you write a text, you have to mobilise your knowledge on the topic in hand and your grammar and semiotic skills in one or several languages, and at the same time find the required functions on your keyboard. This is unlike the concentration involved in physical effort, which seeks to create a void so as not to let you be distracted by images. The 'mindset' of sportspeople is a suspension of 'over-attention'. The kind of attention required by computer work is multi-oriented and geared to multi-tasking. It does not tolerate monotony, because attention is driven by desire and intentionality – particularly since the computer and its programs have automated the operations of mechanical memory (repeating things exactly identically, something we generally never need to do) – and because it invites creativity. They speak of lack of attention not when you stop concentrating on a single task, but when your attention, in fragmenting itself indefinitely over disparate elements (each of which can require a lot of attention), gets lost or returns to a mass of images and multiple relationships. This complexity of mental operations draws a serious line of demarcation from the kind of attention required in performing a fragmented task. Certainly, people have described the gathering of digital data as an operation that is as split

up as that of semi-skilled manual labourers – a kind of electronic piece work. However, repetitive tasks of data capture are increasingly automated by direct scanning media. The attention required of a worker working in a network and with a computer is that of contextualising and comparing data or files coming from different classifications or fields. A telephone operator answering a helpline for a company will be dealing with frequently asked questions (FAQs) in real time, while talking with the client with the assistance of a drop-down menu. But what is mostly required from such workers is to identify cases that fall outside standard practice and, where possible, to offer new viable solutions; to ensure against the possibility of unexpected failure – the kind of breakdown whose solution is not programmed; or, as in the early days of television, to act like the TV presenter improvising on the spot in order to avoid a black hole.

The more you work in a digital network, the more you are asked for connectivity, responsiveness, autonomy and inventiveness (which may conflict with the imperatives of cost, but which are themselves the subject of a compromise between the desire for savings and the gain to be expected from a quality service that can ensure customer loyalty). All this cookbookery that is the delight of management manuals interests us less than the two following observations:

- 1 Work on a computer makes it possible continually to solicit people's attention, a kind of attention that is more complex than mono-concentration. The minute you relax your global attention, the computer shuts down or the game that you're playing dumps you in the hedge. When computers were slow, people had time to relax or do other things in the time it took to execute computational programs – a bit like the routines of manual workers on machines. Nowadays such execution has become much harder. The result is an extraordinary densification of activity time – a bit like driving continually at 90 mph on a motorway. The development of electronic games (now one of the biggest industries in the world) is, in relation to attention, what sewing was to the dexterity of women workers assembling transistor radios in the years 1950–1980. The nervous exhaustion experienced by many workers working on screens put you in mind of the exhausting working day of dockworkers. However, the fatigue generated is both more intense and more total, because the spirit of the manual worker remains largely free, whereas for people working on computers this operation of freeing oneself from control is far more complicated and . . . tiring. This picture of a production

system that is bulimic as regards attention contrasts dramatically with the banishment of attention in the sphere of consumption, and particularly in the sphere of the image. Here we have a situation of cause and effect. The nervous fatigue brought about by attentive activity on the computer seeks to repair itself by summoning up the kind of half-sleep of the brain experienced by people when they stretch on a bed and release images that roll by in no particular relation, like a reprogramming or defrag of their cerebral hard drives. So we can say that all the strategies to capture value basically revolve around the issue of attention time. The value of a television channel is measured by its audience. That was the old advertising. But, in the era of cognitive capitalism, the value of advertising is measured by the intensity of the cerebral attention devoted to a given channel and by the absence of viewer zapping during commercial breaks.

- 2 The second observation has to do with the question of the incomplete nature of cognitive labour and of the possibility of measuring it in time units. In the case of labour involved in the production of material goods or in services that are strictly job-defined, time is a discrete time. It has a beginning, a middle and an end. The production of knowledge-goods and services is much harder to define; it resists this chopping up. The care of young children or dependants, and more generally any care given to a person (understood as a brain in a body, and not as a mechanism with needs to be met at regular intervals), is limitless. It is terribly time consuming. The production of continually renewed knowledge is, similarly, without end. Measuring the performance of a task by means of an assessment that compares the initial objectives with the final results turns out to be inadequate. The need is to assess, not products or procedures, but processes. The result is a feeling of non-accomplishment, of incomplete knowledge – a source of repeated anxiety, which formerly prevailed only in academic or artistic work, as we shall see now.

8 The attractors of invention-labour: Art, the university and *libido sciendi*

Cognitive capitalism profoundly alters the organisation of work and its technical division. But it also overturns the paradigm of work itself. The real-life test bench of this transformation can be found in

communities practising 'peer to peer' as their mode of production of knowledge. Communities of free software developers have attracted the greatest attention, but other kinds of digital work, such as the so-called 'click workers' or Wikipedia's network of multilingual inputters, have also generated a stimulating debate.

In the past twenty-five years we have witnessed not only a crisis of the foundations of the paradigm of industrial-type labour (the 'refusal of work' of the years 1960–1970), but also the emergence of a new paradigm. Alongside the two traditional motivations (material interests and the taste of power), there appears also the desire for knowledge and for cognitive recreation. Furthermore, creativity becomes a collective and an individual value. The work paradigm in cognitive capitalism now seeks its models in the world of art and of the academy.

While the importance of motivation has been recognised since the days when work was studied in big industrial companies, the limits of purely material motivation (wages and benefits in kind paid to workers) were also identified, for instance when the Schneider and de Wendel steelwork companies in northern and eastern France embarked on the methodical installation of a culture of enterprise operating under the fairly vague label of 'paternalism'. However, if we were to classify the main incentives, direct and indirect, that industrial capitalism has used in its history, we could say that they fall under two headings in the satisfaction of human passions: the *libido sentiendi* (a 'desire to feel', in the limited sense of enjoying a maximum of material goods as consumer – or as *homo economicus* maximising utility) and the *libido dominandi* (a 'desire to dominate' others, to exercise power over them). Paternalism obviously has elements of the latter passion. It motivates the management staff as effectively as material incentives. Within the wage-labour system it strengthens the employers' authority over their subordinates, who accept the fact of an extra-economic rule, a power similar to that of the *pater familias*, the 'father' or 'master of the household', prevailing over material considerations.

But in cognitive capitalism we are witnessing the emergence of the systematic exploitation of a third passion – or desire – as a factor of efficiency in human activity deployed in an enterprise. That passion is the good passion we experience when we have to come to grips with the problem of the innovative management of immaterial resources. What I am referring to here is the *libido sciendi* – the passion for learning and the taste for the game of knowledge. This is to be understood in a double sense:

- (a) On the one hand, the functioning of the production of knowledge by means of knowledge requires a cooperation between agents that is much deeper and more continuous than the simple coordination achieved by the Smithian or Durkheimian technical and social division of labour. Neither material interest based on market exchange (Adam Smith) nor the satisfaction of exercising a role in the immediate social hierarchy (Emile Durkheim) explains the sharing of implicit knowledge, as opposed to the sharing simply of knowledge objectified in databases. The more the elements of objectified knowledge come to be absorbed by cyber organisation (hardware, software, databases), the more irreplaceable the role becomes of sharing in networks, of collective creative intelligence, of attention and of the management of the fuzzy logics of language, which prove to be strategic resources. Thus the question of motivation is no longer simply that of the conditions that will encourage people to coordinate with each other in hetero-organisation, in other words in organisations structured from the outside and without the active and continuous consent of their members. Rather we have to ask: what are the conditions under which one can produce – via global institutions and mechanisms – self-referential and self-developed global organisations, in which individuals and collectives can cooperate and innovate? At that point the question of motivation shifts to the following terrain: what is the motivation that sustains collective intelligence? This is what is discussed in P. Lévy, I. Nonaka and Eric von Hippel. We could sum up the position by using the very expressive image offered by Maurizio Lazzarato in *Puissances de l'invention*: if productive activity becomes essentially a cooperation between brains linked in networks by computers and the Internet, what is it that motivates these human brains that are interacting with each other? Certainly economic interest and a drive to domination continue to guide human action, both in society and in the workplace, but as motivations they are insufficient to explain why researchers work on discoveries, why artists work in the performing arts, and why the developers of free software toil at their computers day and night.
- (b) On the other, less psychological side of things, the innovating human activity of cooperation between brains in the digital era produces – in science, in art, and in the collective forms of social bonding – new and impressive deposits of positive externalities for enterprises, in other words free labour that can be incorporated into new mechanisms of capturing and formation.

What we are seeing, then, is a convergence around the *libido sciendi* that may well turn out to be far more innovative (and hence efficacious and creative of wealth in a knowledge-based economy) than the other two resources of *libido* captured by industrial capitalism. But this same *libido sciendi*, this desire to understand the complex and to act on it, proves as capable as *libido dominandi* when it comes to forgetting the question of mediocre material remuneration. In the case of production of the living by means of the living, the proud Promethean impulse to become masters of creation and producers of human life is a very powerful driving mechanism, which laboratories, motivated by very economic interests, are moving to capture in the name of profit.

But in this game, which seems already to have been played, a crucial element arises that has been sidelined by the power of the material organisation of industrial labour: the importance of confidence and its fragility, or volatility. The management of the immaterial (creative resources, organisational and institutional resources, human resources of intellectual capital) requires a high degree of cooperation, of 'involvement' of the person and of the brain (and no longer simply the mechanical and schizophrenic body of machine-based capitalism). Now, it has to be said that this 'involvement' cannot do without confidence, trust and faith.

One of the great strengths of capitalism – cynical, we must admit, but also terribly effective – had been its willingness to govern, by means of the wage system, only the use of physical labour power, by mobilising only the body of the employee, by claiming from him/her only a limited and strictly framed initiative. Certainly the brain as a mechanism for coordinating movement – the primitive brain of the medulla oblongata and the reptilian part – was necessarily mobilised. But the mobilisation of affects, of the cerebral lobes, was extremely limited. Worse, it was considered to be a spoiler and a source of dangerous complications. What would happen if the workers ever learned to read? The British, with their great practical sense, went straight to the point and, already during the reign of Queen Mary at the end of the seventeenth century, banned Irish Catholics from learning to read, on pain of death. Then, when, by a thousand ruses, these same Irish had learned to read and write, they simply banned them from going to university, until 1851. And supposing masses of waged workers suddenly started going to university? Well, that's exactly what happened. As Carlo Vercellone has correctly pointed out, cognitive capitalism, in which we include its impressive information technology apparatus, is the historical product of a profound

movement of working-class rebellion. This took various forms of refusal of work (absenteeism, sabotage, wildcat strikes), but mainly it fed a continuous pressure for the democratisation of access to universities and institutes of technology.⁶³

The capturing of the cooperation of brains today cannot be achieved without a reduction in overly authoritarian forms of command. Nor can it be obtained without trust. Hence the proliferation of mechanisms to ensure employees' loyalty in the digital sector – mechanisms that are perceived as yet further stressful elements and as an intrusion in the private lives of individuals and groups. I have addressed this topic extensively above.

9 The challenges of free software as a model of production

The production of free software has attracted the attention of economists. Its non-profit character was an enigma that Lerner and Tirole, in a classic article,⁶⁴ proposed to reduce, by a conventional technique of absorption into the neoclassic model, to a maximisation of utility deferred in time. If developers work for free today, it is because they are hoping to increase their reputations, so that tomorrow this may result in better paying jobs. So everything goes back to normal. There is no place for altruism, and the sacrosanct postulate that *homo economicus* is only driven by the prospect of gain remains unchallenged. Too bad for the results of our empirical investigations into long-term trends during the past decade.⁶⁵

Yet the social and economic phenomenon of the free [*libre*], with the 'commercial' triumph of the Apache software for professionals servers and the increasing market penetration of Linux compared with Windows, seems to illustrate almost paradigmatically what Renaud Sainsaulieu, in the last book he wrote before his death, called the creation of 'intermediary institutions'.⁶⁶ This is what we mean in economic language when we talk about the beginning of a true model of production. This applies at the level of new social forces, and also of the social division of labour and of the rationality of economic agents, which thus finds itself invented and promoted, and at the level of forms of identity not to work, but to a work that has very much changed in terms of content. On the institutional terrain of property rights and of the conditions of consolidation and reproduction of the major innovations they represent, the free software model and the movement known as 'open source'⁶⁷ (whether free access or public archives) are a major social

innovation, which has largely survived the bursting of the bubble of the new economy.

If 'living at work is to live in society; and if the construction of such relationships is called institution and not just organisation'⁶⁸ – then we are in the presence of a genuine creation, of a truly emergent institution, and not simply of a microeconomic modality of organising industrial work. This institution (which is at the same time an activist movement) is consistent with new typologies of companies that have emerged since the 1980s: the firm as an 'empty box' without factories, as described by Peter F. Drucker;⁶⁹ the quasi-firm or the network-company; and the cognitive firm, broadly described by Ikujiro Nonaka and Hirotaka Takeuchi⁷⁰ – in other words it moves towards a profound transformation of the American firm of Alfred Chandler,⁷¹ of the bureaucratic firms of William Baumol and of the Japanese firms of Masahiko Aoki.⁷²

This 'small' transformation that governs people's relationship with work in the era of new information technologies, in communities of practice, heralds a new grand transformation, a major transformation of society, because it has a direct impact on the key institutions of capitalist production (the markets, respectively, of commodities, of capital and of labour, especially in the relation between market and non-market production).

The socio-technical analysis of 'new' products appearing on the market may have many surprises in store and may lead well beyond 'marketing', to generate implications in terms of organisation, and then of institutions. Taking a glass of water, a diamond, or a pin as the starting point for reflections about the nature of value is not the same thing as starting from a book. Gabriel Tarde showed this in his *Economic Psychology*.⁷³ A watermill, a book and a train: all represent a paradigm shift in the organisation of society and its representations. If we look at the scene today, with the very powerful computers at the Massachusetts Institute of Technology (MIT), the network of the Internet, informatics, the digitisation and storage of information, and the objects or products that constitute an articulated 'socio-technical' system of technical inventions and of practices of appropriation of these innovations, software can be seen as the concentrated essence of the new information technologies. They constitute the immaterial part of the computer; they intervene in the machines of the old industrial system. Software is therefore a symbolic and strategic knowledge-good of the immaterial economy and of the new capitalism based on innovation and the production of value. The following box summarises some of the indispensable elements as far as software is concerned.

Box 3.1 On free software and the GNU/Linux operating system

First a few words about the nature of software. Software can be defined as an ensemble of activities related to the design and use of electronic computers (codification, organisation, analysis, programming). It comes in two forms: the first is the digitised binary runtime version of its program, which does not allow the user access to the instructions (this is known as the compiled version) and the second, called source code, allows anyone with a knowledge of computers to read the sequences of operations and to modify them where necessary. We can thus define software as a set of instructions for a computer or electronic machine – instructions that are written in a programming language.

But a given piece of software is not just a program. To paraphrase the received international definition, a computer program is a set of instructions that, once entered into a machine capable of processing data in a medium readable by that machine, will make the machine indicate, accomplish or obtain a particular function, task or result. The notion of software includes, in addition to the program so defined, the description of the program, its supporting documentation and the 'preparatory conception material'. So the frontiers of software are not precisely defined. They are liable to stretch, sometimes very widely. This characteristic suggests that software is much closer to a knowledge-good rather than to an information-good, which can be reduced to data already compiled in binary fashion and perfectly delimited.

Certainly, all software contains an informational component from the fact of its (binary) digital nature, which means that it can be duplicated and transmitted at almost no cost, thanks to the new information and communication technologies. However, this is not the only significant point.

Indeed, an additional factor in refining the categories is that software has a hybrid character because of its threefold complementarity:

- 1 Complementarity with hardware (equipment, machinery): software is thus an ambivalent good that can be materialised on a number of media (floppy disc, CD-ROM, etc.). It complements the hardware, 'the totality of elements constituting an electronic computer'.

- 2 It has to be activated in combination with *wetware* (brain activity, attention, life), in other words both with the attention of the brain that appropriates it and with the degree of training and activation of knowledge and skills that makes possible the handling of this particular tool.
- 3 Finally, software can only operate in conjunction with *netware* (the cooperative network) within which it is always activated and without which it loses a large part of its interest.

If we want to summarise the full range of functions carried out by a piece of software, we can give the following simplified definition: software is a suite of codes interpreted by a computational medium giving meaning to human utilisation. However, we should not forget that two levels are combined in software: it is both the program – the totality of the source code – and the executable (usually known as ‘compiled’) form of the program. For the standard user with no computer skills, only the second level is important. Once all this has been established, pieces of software are distinguished by the rights that govern their forms of usage and sale.

Proprietary software is software the source code of which is not generally accessible and usage of which is subject to restrictions; distribution of the original, the making of emended versions, modification and redistribution are prohibited. It may be a level 1 software (operating system) or level 2 (application software). It usually takes a material form; but, when the program is downloadable in return for a payment, then it takes an immaterial form, yet without ever eliminating the flow of digital information that ensures its transmission. It is generally durable. It can accommodate several types of usage.

Then there are the software packages known as ‘freeware’, the code of which is not accessible, and as ‘shareware’ (proprietary software whose use, after a free trial period, is subject to payment to its creator). Public domain software (‘open source’) is not subject to copyright legislation. It belongs to nobody, and anyone can become its owner. It can then become the basis of proprietary software.

Free software, on the other hand, is software provided together with its source code (its program), giving all persons the right to use, copy, modify and freely distribute it (including in modified versions). It can be marketed in an executable version, but it is always possible to read its source code. Often it is available for downloading from a website, or it may come as a CD-ROM copy.

Free software may be free or not, but, since it grants its users freedoms such as to run the software, to study or even change it, and also to copy and distribute it, it is always possible to obtain it for free. When free software is paid for, the price generally includes services associated with its distribution and installation. The principal free software is the GNU/Linux system, and at this point it would be worth giving a brief sketch of its history.⁷⁴

10 Free software: A model of production

A model of production needs to fulfil three conditions:

- It has to present, at a micro-economic level, specific mechanisms of functioning, especially in terms of the division of labour, and also as regards the organisational forms in which they occur. We have explored these aspects extensively above.
- One also needs to identify the emergence of an overall macro-economic structure in which the effects produced by economic agents become compatible and can be regulated between each other. This too we have discussed at length.
- That leaves the third condition: for free software to function as a model of production, it needs to be the bearer of a set of values and representations that intervene at the two preceding levels, both to define the type of rationality of the agents and to validate, at a collective and social level, the tradeoffs that govern property relations and the market or public convention.

Any sociologist would object that such a statement is not clear about the role of representations and actors in this intermediary institution. It lacks in effect the new values of which the productive models are bearers, as well as the elements of legitimisation and inscription of behaviours in the legal system, without which there can be no institutionalisation of innovation and accumulation of social change. Now let us ask the question: what alternative values does the ‘system of the free’ create?

It is more than just a neutral technical operating system. As shown in our short history of the GNU/Linux system in Box 3.2 below, the motivations that drive the developers of free software and its devotees go far beyond mere ‘consumer interests’ or a desire to earn money.

Box 3.2 The history of GNU/Linux free software

Linux, or more exactly GNU/Linux, is the most widely used free operating system in the world. It can be used with any hardware (Mac, PC, Amiga, Sun, etc.).

The concept of free software was created by Richard Stallman, in the 1980s, for ethical reasons. In 1971, when Stallman began his career in the Artificial Intelligence Laboratory at the MIT, computer 'hackers' and researchers in the biggest American universities were using basically free software. The computer companies were distributing proprietary software and sometimes also free software. But gradually they began to impose proprietary software, even going to the extent of privatising what had previously been free code. The creation of the Sun company in the 1980s, by taking advantage of loopholes in software copyright, symbolised this movement by privatising software of the world of Unix.

However, it still remained possible to find free applications. One day Richard Stallman had a problem with a Xerox printer. He found that he was unable to add a supplementary function to the program because he did not have the source code. A fellow researcher had the code, but he could not pass it over to him because he had signed a non-distribution contract with the Xerox Corporation. In Stallman's opinion this person had not respected the ethics of the computing community because he had made an immoral promise to deny to others what he wanted for himself. Instead of continuing his computer career in the university and of signing non-diffusion contracts, he decided to resign and then devote himself to writing a free operating system, thus preventing the university from being able to file patents on his software to the detriment of users. At that time the community of hackers was going through a hard time, being unable to resist the financial proposals of companies that were producing only proprietary software.

By the start of the 1980s almost all the free software had become proprietary software. Those who held the rights on them were thus able to ban all cooperation between users. So in 1983 Stallman developed a project called GNU as a way of restoring the cooperative spirit that had previously prevailed in the community of hackers and researchers. GNU is an acronym: 'GNU's Not Unix'. In January 1984 the idea began to take shape, and in October 1985 he founded the Free Software Foundation (FSF) to develop a community of active users who could finance themselves by selling CDs with free software or by receiving donations.

The GNU project has made it possible to develop a complete system of free software. Three specific freedoms are upheld: (1) the freedom to copy and distribute the program; (2) the freedom to change or improve it, through access to source code; (3) the freedom to distribute a modified or improved version in the community.

The first step of the GNU project was to build an operating system of the same name. This software is the central element of a computer, making it possible to use that computer independently from the applications programs and the management of peripherals (printers, disk drives and the rest of it). An operating system consists of a core, but it also includes compilers, editors, text formatters and e-mail software. Writing a complete and coherent operating system is a necessary prerequisite if one wants to keep one's freedom and independence in the face of proprietary software. This took a number of years. The initiators of the project, basically Richard Stallman, decided to make the operating system compatible with the Unix operating system, because the latter had already proved itself and because this compatibility would make it easier to make the transition from Unix to GNU.⁷⁵

By the early 1990s all the major components had been written, except the kernel. A free kernel, Linux, was then developed by a Finn, Linus Torvalds. This work of elaboration and development of free software was made possible via the Internet. Mailing lists and bulletin boards then made it possible to multiply and internationalise cooperation between computer people, but also between passive and active users, the former testing the software written by the latter. The combination of the Linux kernel with GNU software created a complete operating system: a system based on GNU Linux (GNU/Linux). Richard Stallman estimates that there are 20 million users of GNU/Linux systems, including companies such as Debian, Red Hat, Mandrake, SuSe.

This encounter was also the meeting of two different worlds, which existed side by side throughout the 1980s: that of information processing in the Unix world, using big machines, and that of computer 'hackers' in the world of personal computers (PC). The launch of Apple and International Business Machines (IBM) personal computers (PCs) in the early 1980s had contributed to a democratisation of computing by making it financially accessible to millions of people. But users soon found themselves faced with the impossibility of reading or modifying the source code of the

operating systems. The contribution of Linus Torvalds was to have unified these two worlds by taking the GNU tools of the Unix world, which up until that time had only been usable at workstations and on expensive computers, and by putting them onto PCs. This was only possible through the creation of a kernel that could be compiled both on workstations and on PCs.

However, the GNU project was not limited to operating systems. It also extended to applications software (spreadsheet, word processing and so on). In addition, it sought to provide software for users who were not computer experts, in part by developing ergonomic graphic interfaces, but also by developing games; and this also involved providing documentation and software user manuals, which were free too. For Stallman, this was another essential element in the development of free software. Free software cannot exist without a manual that has to be free as well – in other words appropriable by everyone in order for anyone to improve it, to make it better.

Free software began its spread in 1997, and since 2001 that spread has become massive. Free software, far from ending up as a marginal addition to the system of proprietary software, is fast encroaching on the latter's domain.

The Apache free http server has succeeded in winning and holding onto a 60 per cent market share of Internet servers. It was also estimated that, by 2002, Linux had a 30 per cent share of the worldwide server market. Because it is distributed free, it is hard to know the percentage of users of free software. But the expansion of ancillary support structures for free software and of the services associated with them (especially Red Hat, which offers 'hot line' assistance) suggests a very rapid growth.

It is worth noting that many large private companies (L'Oréal, Total-Fina-Elf and Walt Disney among them) and government departments (such as the French Ministry of Culture or the South Korean government) have switched to the GNU/Linux operating system (and, soon, the German federal government will do the same). In 2001 IBM spent a billion dollars on research and development in GNU/Linux, and recently the company decided to install free software on its computers, making this a central pillar of its strategy. It was computers running GNU/Linux that did the special effects for the film *Titanic*. The share of free software in Internet access is still very modest (less than a few per cent currently), but it is still a vital part in the basic functioning of

the Internet (especially the http protocol) and more generally in enabling interfaces between internet service provider (ISP) equipment, messaging, 'proxies', applications servers and development platforms. In the auto industry or in the avionics industry and equipment – in short, in industries that incorporate information technology directly into their products – the use of free software is predicted to spread rapidly.

The success of free software derives not only from the fact that it is quasi-free, but above all from its quality. To date, all available empirical studies have reported the superiority of the GNU/Linux operating system over Windows NT. The main limitation – but this is progressively being solved – is at the level of interface and applications software.

For standard economists, the success of free software raises a serious paradox: market exchange turns out to be less efficient and more expensive than cooperation outside the market.

The practitioners of free software, and also its supporters, who do not necessarily have the computer skills to feel the scientific need to use it, form a community, the so-called 'open source community'. It has its advocates, its non-governmental organisations (NGOs), its unions and its lobbies – or rather its counter-lobbyists – who seek to dissuade government authorities from bowing to the pressures of industrial interest groups promoting the 'patenting' of software or the installation of proprietary standards through the provision of free hardware.

Supporters of free software broadly overlap with proponents of a dual independence of the Internet network, from national states and from international organisations, in a context dominated by interstate interests and private sector companies that follow Microsoft.

The 'job identification' characteristics of these network activists are nowadays quite identifiable. They do not like hierarchy or the market, at least not the market as it exists in the old economy. They are committed to values of de-centralisation (see the famous comparison made by Raymond between the centralised cathedral of the industrial division of labour and the bazaar of the Net),⁷⁶ freedom, sharing, and to the denunciation of Microsoft's monopoly and of intellectual protectionism. Some display anarchist leanings, others defend a kind of cyber communism, while others such as Eric Raymond are libertarians of the right. The birth of the 'open source' movement in 1999 signalled a diversification in the culture of the

free [*culture du libre*]: managers of large companies who had rallied to the generalisation of non-proprietary software standards, both for reasons of efficiency and innovation and as part of an anti-monopoly drive against Microsoft, began to distance themselves from supporters of a resolutely non-commercial culture of the free.⁷⁷ Lawrence Lessig, a radical and determined supporter of the free, who sat on the board of Richard Stallman's Free Software Foundation, was less severe than the grand wizard of the GNU⁷⁸ towards Raymond and the supporters of open source.

The Finnish writer Pekka Himanen⁷⁹ was dissatisfied with the opposition between the creative, progressive, de-centralised bazaar model and the hieratic, rigid and conservative model of the centralised cathedral. He set out to show that the hacker ethic of the supporters of the free was in the process of completely overturning our conceptions of work. He set about a serious displacement of the constitutive models of the normative representation of work. For Himanen, this involves invoking the model of the Platonic Academy as a means to generate innovation and knowledge among peers. It replaces the two major components upon which the paradigm of labour has been built under capitalism:

- 1 that of the Catholic monastery during the period of the reform of the regular clergy in the eleventh and twelfth centuries, which provided the real model of the collective division of labour, with its base in voluntary obedience and subordination of the activity of the individual. These elements were to be decisive in establishing the wage model of labour, whereby subordination to a collective ensemble replaced the model of a personalised relationship between a serf and a lord;⁸⁰
- 2 the other major contribution of religion to the model of work is the better known notion of the Protestant ethic of capitalism, which offered the model of the individual and of the legitimacy of profit and accumulation of money as capital. Pekka Himanen's thinking is complemented by the ideas of Maurizio Lazzarato. In *Puissances de l'invention*, the latter speaks of the reinstatement of values of creativity, autonomy and creative repetition at the centre of the new work paradigm of cognitive capitalism. That this is the object of not disinterested afterthoughts is obvious; but the fact remains. Work comes to dress itself in the clothes of the artist or of the university. The values of creativity only become capable of being exploited by an intelligent capitalism to the extent that they were promoted as a value, first experimentally and then as a norm of living.

Table 3.2 Changes in the paradigm of work.

	Industrial capitalism	Cognitive capitalism
The representations and institutions of human activity	The monastery The organisation of large numbers in voluntary compliance The Protestant ethic of capitalism: the individual and legitimate profit	The academy: peer recognition
Microeconomic agents Local levels	Abbey The Individual The contractor Calling	The hacker The creative individual Voluntary membership groups Networks
Macroeconomic systems	Market and money The company Hierarchy	Networks Enclosures by government intervention
Values	Money Work Optimality Flexibility Stability Selfishness Control of outcomes	Passion Freedom Social value Opening Altruism Pleasure (Do what thou wilt) of the Abbey of Thelema Creativity

Table 3.2 summarises this change of values around human activity that follows from Pekka Himanen's theses.

What interests us here is not the item-by-item validity of the overall diagnosis, but rather the fact that, starting from the social phenomenon of the free, we have the elaboration of an alternative proposition for the global representation of identity and of work. This proposition also brings to light different characteristics of the relationship to time and money.

The values promoted by the members of the communities of the free, but also by everyone who works cooperatively in digital networks, form a 'culture' – in the Anglo-Saxon sense of 'cultural studies', and not in the rather Latin sense of adhering to values that are already strictly defined in political and ideological terms. These

values range from peer recognition, the constitutive model of the university, to a variant of individualism that is not possessive but rather constituted within the cooperating collective or the creative environment. In other words, the 'hacker' individual is closer to the creative artist and the ivory-tower professor than to the risk-taker or the possessive individualist. The hacker manifests an individuality similar to the one that occurs in voluntary membership of a group. But, as we have seen, this is not a question of subordination to a binding structure, even if the community is continuously giving itself rules of living related essentially to digitally equipped action. Strangely, the fact that society is now omnipresent at a global level means that any specific and dedicated rule passes only through the production of community. The more society becomes commodity-based (whereas, at the time of Polanyi, it seemed capable of 'embedding' the economic), the less it manages to fulfil this role of 'embeddedness'. It is then the community that serves as a bulwark against the domination of market values. It is the community that offers a space propitious for the creation of common goods.

This community rests on the highest attainment of societal modernity, namely the digital network. In the thinking of Ferdinand Tönnies, the community is the opposite of the public norm, which could not constitute itself except in society. There, it is the community of users of the free that becomes the space for the development of new common areas and a meeting place for defenders of public policies.

Core values have become crystallised in the representation of human productive activity, and thus in what the society of industrial capitalism labels and regulates as work. Those values are money, finding the optimal use for resources, obedience, the stability that may be acquired in exchange for subordination and the characteristic that jobs are determined in advance by someone else. These values have been built over the course of several centuries. There is nothing 'natural' about them. The Greeks and Romans would probably not have understood this combination and would have found it strange.⁸¹ What appears with the free software communities and, more generally, on Internet discussion lists, in the area of 'peer to peer' production, is almost the exact antithesis of work as it is codified in the world of industrial capitalism: its quality of being free; a hedonistic passion for free activity and cognitive play; an avoidance of subordinated work; and freedom and recognition among peers. These values imply the disruption of relations between the private sphere and the sphere of work that is commanded, either directly (by

a boss) or indirectly (by the market). What we are seeing is a reinstatement of utilitarian altruism (in other words, the pursuit of the happiness or utility of the greatest number of people).⁸²

Of course, its values had never completely disappeared from the overall picture of activity in society. At the margins of industrial waged labour or commercial activity stood the artist and the scholar, whose motivations and values were recognised as an exception – and the exception that proved the rule.

But in cognitive capitalism, when the issue is how to capture creativity as a general model of activity and of subordinated work, we find that these values are brought back to the centre of gravity of the model. The cognitive division of labour shapes society on the model of the Abbey of Thelema in Rabelais: 'Do what thou wilt.' Its referent is no longer the Calvinist model of profit, or the model of the secular monastery. In modern industrial society, where once one worked for the glory of God and for the church [*pour le compte de l'Église*], now one works for . . . another [*pour le compte d'autrui*] . . . and for one's own bank account [*pour son compte . . . en banque*] . . .!

But have we not perhaps drawn too idyllic a picture of this third capitalism, which has turned to its advantage what Luc Boltanski and Eve Chiapello, in *Le nouvel esprit du capitalisme*, call 'artistic critique'?⁸³ Are we not swimming in some kind of utopia? Not really. Like the revolution dear to Mao, the third capitalism is not exactly a gala dinner. As we shall see in the next chapter.

Notes to Chapter 3 What is cognitive capitalism?

- 1 B. Paulré, 'Introduction au capitalisme cognitif', 2004 (online seminar available at: <http://seminaire.samizdat.net/spip.php?article61>).
- 2 Yochai Benkler, *The Wealth of Networks. How Social Production Transforms Markets and Freedom*, Yale University Press: New Haven and London, 2006 (also available at: http://www.benkler.org/Benkler_Wealth_Of_Networks.pdf). On Lessig's important 2001 book *The Future of Ideas*, see discussion below.
- 3 Richard Stallman has given many talks on the subject. See his personal website (<http://www.stallman.org/>; and <http://www.gnu.org/>).
- 4 Eben Moglen, 'L'Anarchisme triomphant: Le logiciel libre et la mort du copyright' (available at: <http://emoglen.law.columbia.edu/publications/anarchism-fr.html>). This famous text is only available on the web.
- 5 James Boyle, 'The second enclosure movement and the construction of the public domain', *Law and Contemporary Problems*, 66 (1–2), 2003, pp. 33–74 (also available at: <http://james-boyle.com>).
- 6 See the work of Michel Bauwens on peer-to-peer production, 'The political implications of the peer to peer revolution', *Knowledge Politics*, 1 (2) 2008, pp. 1–24 (also available at: <http://www.knowledgepolitics.org.uk/kpq-1-2-Bauwens.pdf>).
- 7 Richard Barbrook, 'Le Cybercommunisme ou le dépassement du capitalisme dans le cyberspace', *Multitudes*, 5, 2005, pp. 186–99 (also available at: http://multitudes.samizdat.net/Le-cyber-communisme-ou-le.html?var_recherche=Richard+Barbrook).
- 8 Generation MP3 (available at: <http://www.generationmp3.com>).
- 9 The most concise and striking account of this change is found in Hardt and Negri's *Empire*, Harvard University Press, 2000, which unexpectedly became a bestseller worldwide, including in the United States.
- 10 I have outlined these traits in several articles, such as 'Nouvelles frontières de l'économie politique du capitalisme cognitif', a paper presented at the symposium *Textualités et Nouvelles Technologies*, 2002, pp. 23–5; also in *Rivista éclartS*, Museum of Contemporary Art of Montreal, no. 3, October 1999, pp. 121–35. Eight years on I see few fundamental changes in these broad trends.
- 11 The immaterial is an economic resource that is not reducible to a given product or service. Accountants use the phrase 'intangible assets'. The category includes elements such as the quality of a given population, interactions between agents, the quality of those relations (trust, cooperation), the quality of organisations, implicit knowledge, know-how and culture. The character of intangibility (in the sense that something cannot be grasped physically, or in a physical aggregate) can apply to a current resource or to a resource that represents a value in the future. There is also talk of integrating the virtual into economics. The virtual is something other than the current equivalent of the present, and it is

- also something other than the potential, which is a non-real future (in the sense of the Greek *dynamis*). The virtual is a present potential, and so it is a future, an estimate, a value of the future that modifies the present. Computer technology has enabled the virtual to deploy itself fully, even if it was already present, for example, in the calculations of the world of finance.
- 12 See for example Charles Goldfinger, *L'Utile et le futile – L'économie de l'immatériel*, Éditions Odile Jacob: Paris, 1994; also Danny Quah (1996–2000) (at: <http://econ.lse.ac.uk/~dquah/tweir10.html>); and the report of M. Lévy and J. P. Jouyet, *L'Économie de l'immatériel, la croissance de demain*, La Documentation Française: Paris, 2006 (available at: http://www.finances.gouv.fr/directions_services/sircom/technologies_info/immateriel/immateriel.pdf).
 - 13 See B.-Å. Lundvall, 'Innovation as an interactive process: From user-producer interaction to the national system of innovation', in G. Dosi, C. Freeman, R. Nelson and L. Soete (eds), *Technical Change and Economic Theory*, Pinter Publishers, Bloomsbury Academic: London, 1988; Enzo Rullani and Luca Romano, *Il Postfordismo. Idee per il capitalismo prossimo venturo*, Etas Libri: Milan, 1998; and, of course, the classics: Ikujiro Nonaka and Takeuchi Hirotaka, *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press: New York, 1995, and Eric Von Hippel, *The Sources of Innovation*, Oxford University Press: Oxford, 1998 (details at: <http://web.mit.edu/evhippel/www/democ.htm>). See also Eric Von Hippel, *Democratizing Innovation*, MIT Press: Cambridge, MA, 2005 (details at: <http://web.mit.edu/evhippel/www/democ.htm>).
 - 14 Enzo Rullani, 'Production de connaissance et valeur dans le postfordisme', *Multitudes*, 2, 2000, pp. 97–112.
 - 15 J. Perrin, 'Analyse de la valeur et valeur économique des biens et services', *Revue française de gestion industrielle* (Special Issue: *Le Management par la valeur*), 2, 2001, pp. 9–20.
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- 25 M. Castells, *La Société en réseaux*, Fayard: Paris, 1999.
- 26 P. Lévy, *L'Intelligence collective. Pour une anthropologie du cyberspace*, La Découverte: Paris, 1994; L. Lessig, *The Future of Ideas: The Fate of the Commons in a Connected World*, Random House: New York, 2001.
- 27 M. Lazzarato, *Puissances de l'invention. La psychologie économique de Gabriel Tarde contre l'économie politique*, Les Empêcheurs de penser en rond/Le Seuil: Paris, 2002.
- 28 R. Reich, *The Work of Nations*, Alfred Knopf: New York, 1991; J. Rifkin, *The End of Work: The Decline of the Global Labor Force and the Dawn of the Post-Market Era*, Tarcher/Putnam: New York, 1995.
- 29 I developed this thesis in 2001 in a paper presented at the Third International Marx Colloquium, 'Marx in California: The third capitalism and the old political economy', published in German as 'Marx in Kalifornien: Der dritte Kapitalismus und die alte politische Ökonomie', *Aus Politik und Zeitgeschichte*, 52–3, pp. 29–37.
- 30 It is no coincidence that Y. Benkler cites, as an epigraph to his seminal book *The Wealth of Networks*, the following passage from J. S. Mill (*On Liberty* [1859], ch. 3): 'Human nature is not a machine to be built after a model, and set to do exactly the work prescribed for it, but a tree, which requires to grow and develop itself on all sides, according to the tendency of the inward forces which make it a living thing' (emphasis added).
- 31 M. Lazzarato, *Lavoro immateriale, forme di vita e produzione di soggettività*, Ombre Corte Edizioni: Verona, 1997.
- 32 Antoine Rébiscoul, 'La Firme fluide? Montée de l'immatériel, délocalisation et nouvelle territorialisation des savoirs', paper presented at the international seminar *Le Problème du goodwill*, Université de Technologie de Compiègne, 27–28 January 2005.
- 33 Pierre Veltz, *Des territoires pour apprendre et innover*, Éditions de l'aube: Paris, 1994, and *Mondialisation, villes et territoires: une économie d'archipel*, PUF: Paris, 1996 (new edition, April 2005); Y. Moulier Boutang, 'Les nouvelles clôtures: Les NITC ou la révolution rampante des droits de

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- 34 Boyle, 'Second enclosure movement'; Moulier Boutang, 'Les nouvelles clôtures'; see M. Lazzarato, 'Du biopouvoir à la biopolitique', *Multitudes*, 1, 2000, pp. 45–57 (also available at: <http://multitudes.samizdat.net/Du-biopouvoir-a-la-biopolitique>; in English as 'Biopolitics/bioeconomics: A politics of multiplicity', available at: <http://multitudes.samizdat.net/Biopolitics-Bioeconomics-a>).
- 35 Besides the two references above, see also Veltz, *Mondialisation, villes et territoires*.
- 36 Tom Healy and Sylvain Côté, *Du bien être des nations, le rôle du capital humain et social*, OECD: Paris, 2001.
- 37 See B. Paulré, 'Introduction au capitalisme cognitif', for a more detailed discussion. Here I have given a free adaptation of his very clear exposition.
- 38 Lazzarato, *Puissances de l'invention*; also M. Lazzarato, *Les Révolutions du capitalisme*, Les Empêcheurs de penser en rond / Le Seuil: Paris, 2004.
- 39 I thank Anne Querrien for making this interesting point, which was the subject of an article in the *Annales de l'École des Mines* in the 1920s.
- 40 This cognitive division of labour was employed by Renault when subcontractors were involved in the process of designing the Clio.
- 41 Y. Benkler, 'Coase's penguin, or, Linux and the nature of the firm', *Yale Law Journal*, 112 (3), 2002, pp. 369–446 (available at: <http://www.benkler.org/CoasesPenguin.pdf>).
- 42 A. Alchian and H. Demsetz, 'Production, information costs and economic organization', *American Economic Review*, 62 (5), 1972, pp. 777–95.
- 43 'Peer to peer' exchange works on the basis of an equality between Internet users X, Y and Z when they exchange music files in MP3 format, for example, on the Web. This is not an exchange that assumes a symmetric reciprocity between X and Y, as in the gift economy. User X makes his files available for download by user Y or Z, or by any Internet user, without even needing to know them, because he knows he may in turn benefit from the same possibility to open files from Y, Z or any other user. Peer to peer works because there exists among its practitioners a confidence in reciprocity that is guaranteed by the technical system of the Internet, and not by knowing a given person directly or by exchange oversight exercised in centralised fashion by an arbitrator. This is the second sense of peer to peer, which could be seen in opposition to downloading from a central server of Napster-type files. Here we could use a nautical metaphor and speak of ship-to-ship exchanges on the high seas rather than of transfers taking place in ports or on quaysides (i.e. servers).
- 44 R. H. Coase, 'The nature of the firm', *Economica*, 4 (16), 1937, pp. 386–405.

- 45 The development of networks of truck drivers equipped with citizens' band radio (CB) has proved remarkably effective.
- 46 The God of theology was well represented by Leibniz. He has the totality of knowledge needed for action in an immediate and problem-free manner. He can determine the best solution in the best of all possible worlds – worlds that are co-possible, and therefore compatible between themselves. It is this omnipotent god who is present, in a secularised form, in microeconomics and in the obsession with optimisation. Herbert Simon, in his work on 'bounded rationality' in decision-making in large organisations, has demonstrated that the human brain, being limited in its memory and in its possibilities of information processing, displays its intelligence and reason (its *logos*) by concentrating on procedures and on the meta-level of problem-solving.
- 47 The original discovery of the law of diminishing returns (by Anne Robert and Jacques Turgot in their *Observations sur les mémoires de Graslin et Saint-Péray*, 1767) took place in agriculture. The obsession with overcoming this law by means of technological progress (the message of the physiocrats) then passed over into industry.
- 48 For a stimulating presentation of the end of the paradigm of scarcity in economics, see Bruno Ventalou, *Au-delà de l'économie de la rareté*, Albin Michel: Paris 2001.
- 49 To the principle of entropy, often supported by physicists, which states that all physical entities slide inexorably towards disorder, disorganisation and death, biologists oppose the concept of negentropy, which describes the capacity of the living to reconstruct materials, beings, forms from the material elements available, from solar energy . . . but also from information.
- 50 Lessig, *The Future of Ideas*.
- 51 Contrary to the sociobiologists, who make a reductive use of the comparison with the complex organisation of insects in order to reduce human societies to a similarly complex mechanism, Jean de La Fontaine and Mandeville do the opposite. They magnify animal societies observed from a great distance in order to understand what is specifically human. This is mostly a disguise adopted in order to pass the censorship of Montesquieu and Voltaire, exercised by this time through the artifice of distancing in space.
- 52 Bernard Girard, 'Histoire des théories du management en France du début de la révolution industrielle au lendemain de la première guerre mondiale', n.d. (available at: <http://www.bernardgirard.com/Management.pdf>), quoting from a French translation of Bernard Mandeville's *Fable of the Bees: or, Private Vices, Publick Benefits* [1714], 2nd edn. Edmund Parker: London 1723.
- 53 I refer the reader to the study of proletarianisation and of 'the poor' in my book *De l'esclavage au salariat. Économie historique du salariat bridé*, PUF: Paris, 1998, chapters 9, 10 and 11.

- 54 Anne Querrien, 'Intermittence et fabrique d'épingles. À propos de l'article d'Antonella Corsani et de Maurizio Lazzarato dans le n° 17 de *Multitudes*', *Multitudes*, 2004 (available only at: <http://multitudes.samizdat.net/Intermittence-et-fabrique-d.html>).
- 55 Jean-Rodolphe Perronet, *Description de la façon dont on fabrique les épingles à Laigle, en Normandie*, published in Paris in 1740.
- 56 This is what some commentators in the sociology of non-academic work have called 'counter-planning', without which the plans set out by the factory's time and motion department would never work.
- 57 This, of course, does not mean that brain work lacks a physical or a bodily dimension, which can be very intense and can result in work-related maladies (stress, nervous exhaustion).
- 58 In other words its effectiveness depends on the extension of networks of users and on the means they give themselves to amplify the effects of 'learning by interacting'. See Brian W. Arthur, 'Competing technologies, increasing returns and lock-in by historical events', *Economic Journal*, 99 (3), 1989, pp. 116–31.
- 59 See chapter 11 of Peter Linebaugh's book *The London Hanged: Crime and Civil Society in the Eighteenth Century* (Cambridge University Press: Cambridge, 1992, pp. 371–401), which is devoted to British shipyards and their restructuring by Samuel Bentham (Jeremy Bentham's brother).
- 60 The case of small and medium enterprises (SMEs) is more complex. Pre-digital networks may have filled that role of opening without effecting revolutionary changes in the division of labour. But we know that SMEs have proved to be most recalcitrant to the job classifications and nomenclatures used by the Union des Industries Métallurgiques et Minières.
- 61 The concept of 'decommodification' is presented by Gøsta Esping-Andersen in the first chapter of *The Three Worlds of Welfare Capitalism*, Cambridge/Princeton: Polity/Princeton University Press, 1990.
- 62 As William Arthur Lewis noted in 'Economic development with unlimited supplies of labor', *Manchester School of Economic and Social Studies*, 22, 1954, pp. 139–91.
- 63 C. Vercellone, 'From formal subsumption to general intellect: Elements for a Marxist reading of the thesis of cognitive capitalism', *Historical Materialism*, 15 (1), 2007, pp. 13–36; and C. Vercellone, 'Les Politiques de développement à l'heure du capitalisme cognitif', *Multitudes*, 10, 2002, pp. 11–21 (also available at: <http://multitudes.samizdat.net/Les-politiques-de-developpement-a>).
- 64 Josh Lerner and Jean Tirole, 'The simple economics of open source', NBER Working Paper 7600, March 2000 (available at: <http://www.nber.org/papers/w7600>).
- 65 See Michael Vicente's (Costech, UTC) Ph.D. 'New forms of socio-economic division and organisation of work: The production of free software and its techniques' ('Nouvelles formes de division socio-

- économique et organisationnelle du travail: La production des logiciels libres et ses techniques').
- 66 R. Sainsaulieu, *Des sociétés en mouvement. La ressource des institutions intermédiaires*, Desclée de Brouwer: Paris, 2001.
- 67 Chris DiBona, Sam Ockman and Mark Stone, *Voices of the Open Source Revolution*, O'Reilly: Cambridge, MA, 1999 (see: <http://oreilly.com/catalog/opensources/book/toc.html>).
- 68 Sainsaulieu, *Des sociétés en mouvement*.
- 69 Peter F. Drucker, *Innovation and Entrepreneurship*, HarperBusiness: New York, 1985 and 1999.
- 70 Nonaka and Takeuchi, *The Knowledge-Creating Company*.
- 71 A. D. Chandler, *The Visible Hand: The Managerial Revolution in American Business*, Harvard University Press: Cambridge, MA and London, 1977.
- 72 M. Aoki, 'Horizontal versus vertical information structure of the firm', *American Economic Review*, 76 (5), 1986, pp. 971–83; and M. Aoki, *Information, Incentive and Bargaining Structure in the Japanese Economy*, Cambridge University Press: Cambridge and New York, 1988.
- 73 For an analysis of Gabriel Tarde's *La Psychologie économique* (Félix Alcan: Paris, 1902), see Lazzarato, *Puissances de l'invention*. Lazzarato has collaborated with Eric Alliez in producing a new edition of Tarde with *Les Empêcheurs de penser en rond*.
- 74 This historical account, and the following one, are from Jérôme Gleizes. I should also cite his 'Introduction au logiciel libre', *Multitudes*, 1, 2000, pp. 161–5, which is available on the journal's website (<http://multitudes.samizdat.net>).
- 75 See the Free Software Foundation (www.fsf.org) and Richard Stallman's contributions at the meetings of the anti-globalisation protest movement; also the two associations APRIL (Association pour la promotion et la recherche en informatique libre, www.april.org) and AFUL (Association des utilisateurs de logiciels libres, www.aful.org).
- 76 Eric S. Raymond, 'The magic cauldron', in his *The Cathedral and the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary*, O'Reilly: Cambridge, MA, 1999.
- 77 Bruce Perens, 'Definition of open source', in DiBona, Ockman and Stone (eds), *Voices of the Open Source Revolution* (chapter 11 and Appendix B, version 1.0 of the definition of open source).
- 78 GNU (symbolised by the mascot of wildebeest, as Linux is by the famous penguin) is also an acronym: 'GNU is not Unix'.
- 79 Pekka Himanen, *The Hacker Ethic and the Spirit of the Information Age*, Random House: New York, 2001.
- 80 This genealogy, by focusing on a subordination – which is not a bondage, but which has something of the pastoral relations of power over the population (in the sense in which Foucault uses it) – seems more accurate and pertinent than the very general observation of John Hicks, who attributed the tradition of wage subordination to the medieval servitude.

- 81 See Hannah Arendt, *The Human Condition*, Chicago University Press: Chicago, 1958.
- 82 Bentham's utilitarianism during the late Enlightenment legitimates the pursuit of human happiness and not the pursuit of the selfish interests of each. It is the utility of the greatest number that is the legitimate purpose of man in society. Contrary to Bernard Mandeville and to classic (and, later, neoclassic) political economy, Jeremy Bentham does not agree that private vices can be public virtues, because the pursuit of the interest of individuals is useful if it is generalisable.
- 83 Luc Boltanski and Eve Chiapello, *Le nouvel esprit du capitalisme*, Gallimard: Paris, 1999.

Notes to Chapter 4 New capitalism, new contradictions

- 1 This is a scandalous aspect, and one that I addressed in my book on wage labor and slavery (*De l'esclavage au salariat. Économie historique du salariat bridé*, PUF: Paris, 1998). The description of labour value as being without any interference from land rent (a situation dreamed of both by Ricardo and both Marx), and of the price of labour power as the price of its reproduction matches even better the model of the second serfdom in the large agricultural estates of Central Europe and the model of the plantation with slaves in European colonies. As proof of this, land itself is worth nothing in plantation economy. It is only the number of slaves, or its population, that give it value. And then it will be worth only the price that prevents the slave or the squatter from escaping from waged employment (see my book, above). Political economy is housed in the same boat as philosophy: it only begins to fly at nightfall. The imposing edifice of labour value is the finest description of plantation economy at the point when it was wobbling under the blows of the revolution in Sint Domingue.
- 2 An increase in unpaid work by means of increasing working hours and by the maximum possible reduction of the cost of reproduction of labour power.
- 3 The increase in labour productivity by means of increasing the capital invested in machinery, which grows faster than increases in wages and in employee qualifications.
- 4 See my book *De l'esclavage au salariat*.
- 5 The Junkers were the biggest landowners in Prussia, and the Boyars were their Russian equivalent.
- 6 Franco Berardi, in 'The factory of unhappiness. Interview with Franco Berardi', 2001 (available at: www.makeworlds.org/node/142), used the expression 'cognitariat'. Joel de Rosnay and Carlo Revelli, in *La Révolte du pronétariat: Des mass média aux média de masses* (Fayard: Paris, 2006), suggested the term 'pronetariat'. Ursula Huws, in *The Making of a Cybertariat, Virtual Work in a Real World* (Merlin Press/Monthly Review