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Does electronic networking entail a new stage of cultural evolution?

In: Fleissner, P., J. C. Nyiri (Eds.), Cyberspace: A New Battlefield for Human Interests?, Philosophy of Culture and the Politics of Electronic Networking, vol. II, Studienverlag, Innsbruck, Áron, Budapest 1999, 3-22

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The starting point for the following considerations is the society-technology dialectic. The question is thus: does technology, in the form of electronic networking, acquire such an influential role in the interrelationship that it leads to significant qualitative change in human society? Possible criteria for defining such changes will be discussed by looking at linking agents. An excursus investigates to what extent Popper's concept of "World 3" can be seen as the forerunner of the relevant changes.

1. The dialectic of technology and society

The central theme, which reappears throughout the discussion, is that of the visibly rapid development of electronic networking, including future trends and various tendencies which can be either observed or anticipated in the cultural development of the present day. Which changes on one side have an effect on which developments on the other side? We are thus considering a question of the correlation between a particular technology and a particular culture.

This debate is founded on a much more abstract concept, namely the relationship between technology as a whole and society as a whole. Only when this broader question has been answered can more detailed points be raised, discussed and perhaps (partially) answered. In other words, any description or explanation of a concrete connection assumes some concept of what any possible connection might be like, and what it definitely cannot be like. It may therefore be advantageous to deliberately take the general society-technology relationship as our theme, in order to avoid drawing any unintended premature conclusions. This means, of course, that any contradiction between a general consideration and a detailed analysis of a specific detail should be avoided. As technology and culture are basic facets of human life, understanding them affects our opinions and values. Values, whether reflected or not, thus flow into every individual scientific activity.

My initial question is whether present developments on the part of our culture, which arise in some way or other from electronic networking, may be described as a new qualitative phase. Before I go into this, however, I would like to explain what I mean by technology and culture, and what sort of correlation between them I consider to be plausible.

What is technology? It is often considered to be a means to a particular end, the means being artificially created, not natural, and something which is not directly necessary for the individual or end-user; it serves rather to fulfil the need to produce something, which is later to be consumed. However, I believe technology to be more than just the sum of such artefacts, which are merely the crystallised, concrete manifestations of human behavioural patterns. A method is the "how", the way in which a goal is reached, and which involves the use of means. A means is a medium, in that it mediates between the starting point and the desired result, regardless of what sort of action is involved. One could thus speak of social technology, e.g. psychotherapy as a technology, and not merely of technology as something used for (material) production in a society. So, technology also includes the know-how involved in the use and application of the artefacts. In short, technology embraces the Art und Weise, the ways and means of acting in pursuit of a goal (HOFKIRCHNER 1994).

What is culture? Using the same analogy as for technology, one could mean this to be an equally artefact-based concept, which is not a means to an end, but an end in itself. That is to say, it is not in itself an essential of life, but rather something which represents a human desire, i.e. something which separates us from other animals. There is a notion that culture is not only the result of a process, but also this very manufacturing process as it moves towards the goal; that is to say, culture is a characteristic of goal-oriented actions, i.e. the striving towards goals as well as the goals themselves. Let us leave this aside for a moment; there are still two other views of culture, a wider one and a narrower one. The wider definition is the contrast to nature, human history as opposed to natural history, the sphere of human society and its characteristics which distinguish it from other living beings and inert matter. Culture thus becomes synonymous with sociosphere, the realm of human society. The narrower definition, on the other hand, describes only a part of social life, that part which (unlike politics or economics) is not involved with money or power, but concerns ideas, knowledge and values, opinions and attitudes, motivation and emotions.

What connections between society and technology can be imagined? The two ideal-typical extreme positions are well known, each making absolute a direction of determination. The first of these is technological determinism, which postulates the total, or at least dominating, influence of technology on the social sphere, be it society as a whole or only in part. Technology is supposed to develop more or less under its own control, pushing social development along as it goes. This may be interpreted positively or negatively. An uncritical opinion of Marxist origin saw social advancement as an inevitable result of technical achievements, just as the ideology of the bourgeoisie justified the progress of the technically possible as socially desirable. An entirely opposed view is held by fundamentalist "Greens" and environmental activists, as well as by reactionary elements, who hold technological development responsible for the loss of important values in society. Neither philosophy accepts the possibility of technological development being influenced in any way, seeing it as something like the magic broom which the sorcerer's apprentice could no longer stop or control. Both ignore the fact that there would be no such development if multinational corporations and national governments were to stop investing in research and development, if there were no economic, military or political grounds to divert their resources into these areas. The fact that on a micro-level there are countless thousands of engineers constantly involved in technology design, and that on a macro-level managers and politicians dictate which technological options are realised, supports the second theory, social constructivism, that technology is deliberately constructed to be a part of society. The dominating view of the time as to the best means and methods of reaching specific goals are supposed to be represented in technology, which in itself cannot be neutral. Here again, both a critical and an approving variant may be distinguished. Whilst the one bemoans the inability of existing technology to pursue socially acceptable, peaceful and environmentally sound objectives, the other sees the existing democratic and economic structures as the best guarantee of developing optimal technological options. Both versions overlook the inherent dynamism within technological development.

Do the two theories, technological determinism and social constructivism, together give a realistic view of the relationship between technology and society? Are we talking about a cybernetic circular argument, a feed-forward and a feed-back loop, in which technology pushes society and society pulls technology? It would then be a case of two equally matched factors, the technical and the social, neither one being complete without the other. One might break away somewhat from strict determinism and grant each side a measure of independence, thus denying that one side totally dominates the other. But would we then have a workable proposition to discuss, or would we be reduced to saying that one factor partly influences the other, but is itself partly influenced by its counterpart? Would the essential elements, which make this relationship of importance to society, not be lost? Is it not rather the case that the actions we are talking about, whose dependence on mediating factors we want to stress if we are talking about technology, and whose immersion in value judgements we wish to highlight when we are discussing culture, not only have an individual character, but rather, through the availability of technological methods and cultural values on the part of society, acquire a deeply societal nature? The use of technology makes every action one which is no longer unique to any individual person. Technology is based on co-operation, be it in the application of special methods, the implementation of these in specific social areas, their invention and development, or in

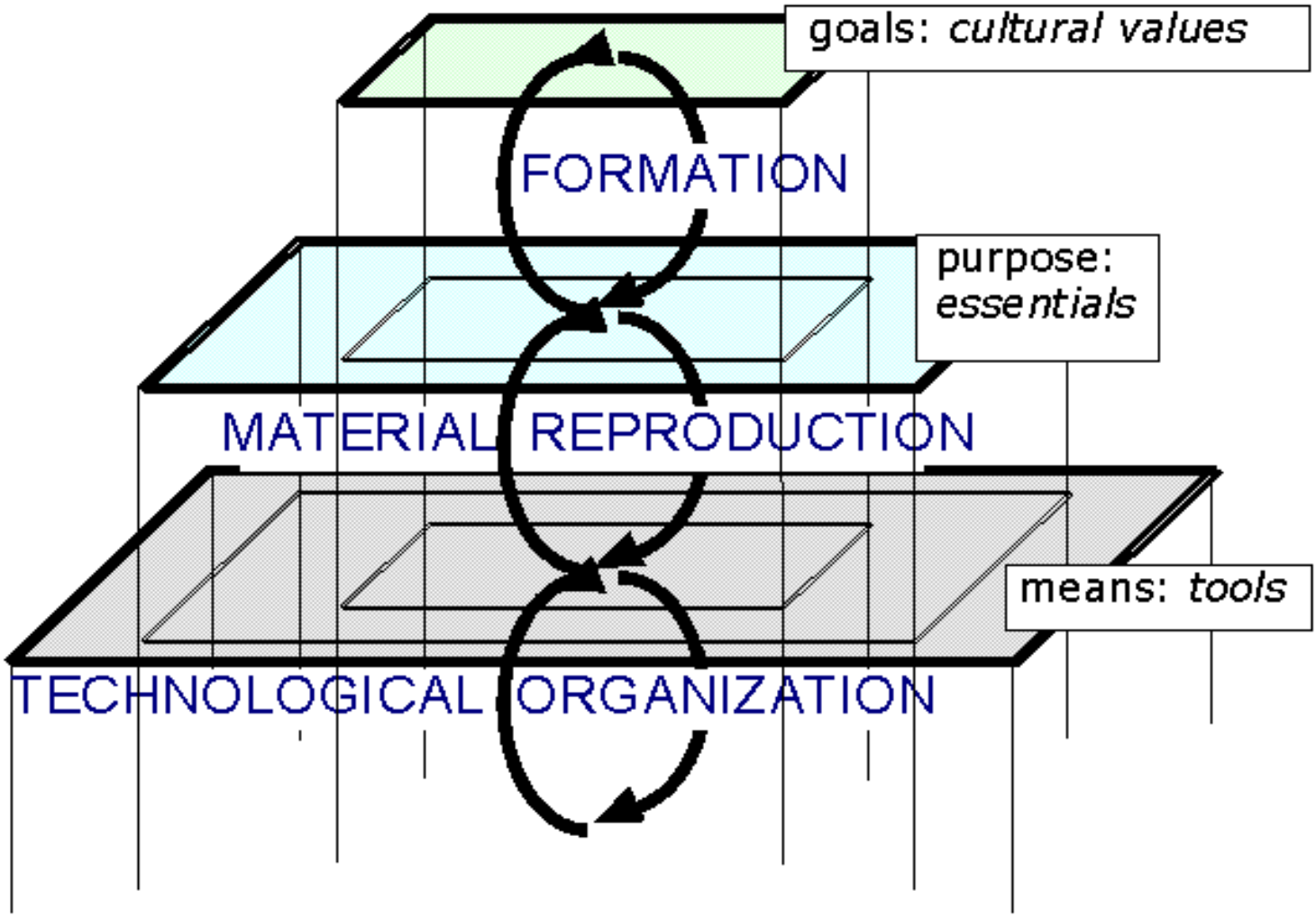
any situation where the skills and knowledge of other members of society are required. The same holds for convictions, value judgements, instructions, standards, behavioural patterns and so on. These are just as much a part of the context of life in which individuals are set, and they promote certain technological methods but discourage others. Technology makes every technologically mediated action into a socially determined one, and its use is one of the characteristics of humans which make us separate and different from other animals. Technological development is part of cultural, i.e. societal, development; this means that technology is part of society, and so their relationship to each other is one of part to whole. Society is the all-embracing factor in this context.

In every part-whole relationship, the parts are the necessary preconditions for the emergence of the whole, but are not the sufficient condition for the complete determination of the result. The whole arises from the parts, but then exerts control over them in the form of downward causation; the parts are no longer independent of each other, with separate existences, but are dominated by the whole. The dialectic of whole and part as regards technology and society is therefore as follows: technology has the meaning, the purpose, the task of functioning as means and method for solving social problems. Social interests are thus in the origin and manifestation of technology, in its invention, diffusion and application, in the entire process of its development, as its reason for existence. This, however, is insufficient to enslave technology completely. Technology is ambivalent; sometimes it appears to resist our intentions by wholly or partly failing to do what is wanted of it, other times it not only fulfils our expectations but goes on to do other useful tasks which had not originally been anticipated. Technology represents potential for the realisation of social goals. These technologically realisable goals may correspond to pre-existing goals within society; the practical attainment of these by technological means may, however, cause them to change, at least slightly. It is of course also possible that the intended goals may differ from those which can be reached with technological support. In this case, new technology may be developed in order to meet the requirements, or the requirements may, as it were, be adapted to fit the reality of what is technically possible. Realisable goals do not therefore always exist at the start of the process, but may be discovered as options made available by technology. Whether society decides to pursue these goals on the grounds that they are possible is no longer a question of technology, but rather of social decision-making (HOFKIRCHNER 1996). The significance of this whole viewpoint is that there is room for new developments, as opposed to an eternal cycle of the same things, in which all happenings are strictly controlled.

The question which was initially posed can now be put more precisely: is it possible, within the concept of the technology-society dialectic, to foresee an impact by electronic networking on social development which could be viewed as a totally new quality?

2. Moments of the technology-society dialectic

Now, what arises in the area of technology and works itself into the area of culture, where it causes a reaction, is not (of course) the result of a direct cause-and-effect process, but is reached via a variety of steps, which may or may not exhibit a qualitative leap. I would like to list at least three of these here. We are talking about three part-whole relationships, one encapsulated within another, a nested hierarchy of systems as it is termed in system-theory jargon; each system may be seen as part of a larger, more complex system. These relations encompass the basic elements of society, such as humans, technology, nature, culture. The technology-society dialectic is made up of several mediating moments (see fig 2).



The question can thus be differentiated further: can qualitative changes be proved anywhere within the make-up of society, which arose from technology and are now continuing step by step?

2.1. The dialectic of humans/technology and technological organisation of society

Humans and technology together comprise the innermost unit or lowest-level system. We have already said that technology opens up the potential for specific happenings, whilst closing it for others. Specific technologies as the ways and means of achieving particular goals are dependent on people who are able to use them in practice. It often happens that e.g. factory machinery which is imported into third-world countries cannot be used anything like as effectively as in its country of origin, because the local workforce is unfamiliar with it and so is unable to make proper use of it. Technology used in the work process requires particular knowledge and skills on the part of the human beings who operate it. New technologies need new qualifications; modified technologies thus exert a certain pressure on their operators to adapt to them. However, this pressure may be represented in different ways (or not at all). For example, high qualification of some members of society may arise simultaneously with low qualification of others.

In addition, the interplay of the two factors, human and technological, requires a specific form of organisation. More highly developed technology demands different information flows, and, as a rule, more competence and autonomy in decision-making from its users. For example, the introduction of computer-integrated manufacturing has often failed in businesses because they were too inflexible and retained old methods of work organisation. This resulted in the potential advantages of the new technology being turned into drawbacks. The correct organisation of work and infrastructure for a particular type of technology does not arise automatically, but has to be thought out and put into practice, considering the specific nature of each case. This means that the progress of technology from bottom to top is neither linear nor unambiguous, but requires suitable action for each appropriate step.

On the level of technological organisation, those structures are made available which enable purposes to be fulfilled and goals to be reached on a higher level. This organisation of the technological base is also dependant on what freedom of movement is available from higher levels downwards.

2.2. The dialectic of technological organisation and material reproduction of society

The technostructure of a society depends on its method of reproduction. This includes the members of society, their technology and the natural world surrounding them, all with their material characteristics; they exist as elements which relate to each other in a particular way. Members of society and their technology thus form the technostructure, and are as such linked to nature. More precisely, they are linked to a particular section of the natural world, in as far as this has been used historically by mankind to develop its way of life and ensure its material reproduction. Material reproduction means that a mechanism exists which steers flows of materials, energy and information between humans and nature; it does so in such a way that the activities of the individuals together serve to sustain the body of society, and that products are made which cover society's material, energy and information needs. The conditions which form the starting point for the production of societal life must thus be perpetually reproduced if society is to continue. In the same way that workers, tools and materials combine to produce work, and must constantly be renewed in order to ensure continuation of the process, so must people, their necessary natural living conditions, and technology, continually be produced in order to prevent the collapse of society. A new technological infrastructure gives rise to new objects of nature, which were previously not subject to change by society; however, not everything which becomes accessible through new technology must necessarily become part of technological change. For example, the steam engine was invented in classical antiquity, and used only for society's amusement. Although mining was known at the time, it was only in the Industrial Revolution that it was converted to pump water from mines and for other uses. Nature, once altered, requires a certain degree of feedback or interaction in order to achieve the desired goals, and excludes some possible approaches. Flooded-field farming, for example, is no longer adequate once dam construction exists, and so new methods have to be found. Industrialisation in England led to large-scale deforestation, with the result that wood was no longer so widely available as a heating fuel, so the use of an alternative (coal) became necessary. The technostructure and natural environment of a society, brought together by the society's material development, to some degree acquire an independent existence. Today this can most clearly be seen in the globalisation of problems which arise from the reproduction of human, technological and natural resources. The mechanism of material reproduction in society has reached the limits of its ability, on a global scale. The coupling of people and technology, and of these two with nature, has reached crisis point, and needs a creative solution. Without an intervention on the part of its members, society may lose the basis for its reproduction, i.e. for its continued existence and development.

We will now see that this mechanism is influenced itself by the next highest level, which determines which changes in the mechanism may or may not be induced.

2.3. The dialectic of material reproduction and formation of society

We have now reached the third level, the overall system of society. The reproductive mechanism of society in its material sense makes up the substance of society as a whole; however, the latter is equally strongly shaped by its form. This level is the one on which society is formed, and includes not only the moment of material reproduction but also the moment of the forms in which societal life becomes complete, and the specific human character of cultural development is expressed. The formation is based on goals on which the life of society depends, and these are related to the degree of control which society's members have over their own lives. They are also connected to the ways and means in which the exchange of individual roles and contributions are regulated; to the ways and means in which violence against others is practised and justified; to the ways and means in which ideas are created, spread around, and transformed into parts of society's activities. Thus they are related to the point of view of the economy, politics and culture in the specific sense, in which money, power and knowledge play a decisive mediating role in the formation of cultural values. The development of the industrial (material) reproduction mechanism allows the development of the (form-determined) capitalist economic and social systems, just as these allow the development of the former. Capitalism which is not based on industrial development is unthinkable today. The economic and social system put into practice in communist countries created such restrictions for industrial reproduction, its technological basis, and people, that it led to its own collapse and takeover by the capitalist model. We can thus observe opportunities for mutual influence between, on the one hand, societal matter (here industry) and form (here economy); and, on the other hand, between the two parts together and the whole of society. These relations have the equivalent roles of the respective relationships of part to part and part to whole already seen on other levels.

3. Possible periods of cultural evolution

The history of human development is full of changes. Which changes can be viewed as quantitative, gradually blending into one another, and which can be viewed as qualitative, with sharp dividing lines, depends on two conditions: the objective make-up of the changes, and the subjective criteria, standards and values which are attached to them by us. What to one mind is merely an increase or decrease in some factor may be considered by another to be a discontinuous leap. It is therefore important to bear in mind what we believe such a change to be.

For every degree (how far-reaching or profound) of change in technology-induced societal developments which may be interpreted as a qualitative leap, several levels of viewing may be defined. We want to base the previously discussed levels on this observation. We assume that the existence of a particular quality on any level allows the characterisation of a period whose beginning is linked to the appearance of this quality, and whose end is marked by the disappearance of the quality's dominance. The structure of the layered format of order in society provides the framework for the dynamics in which qualitative leaps mark the progression through time of periods, which in themselves become the scaffolding for further development.

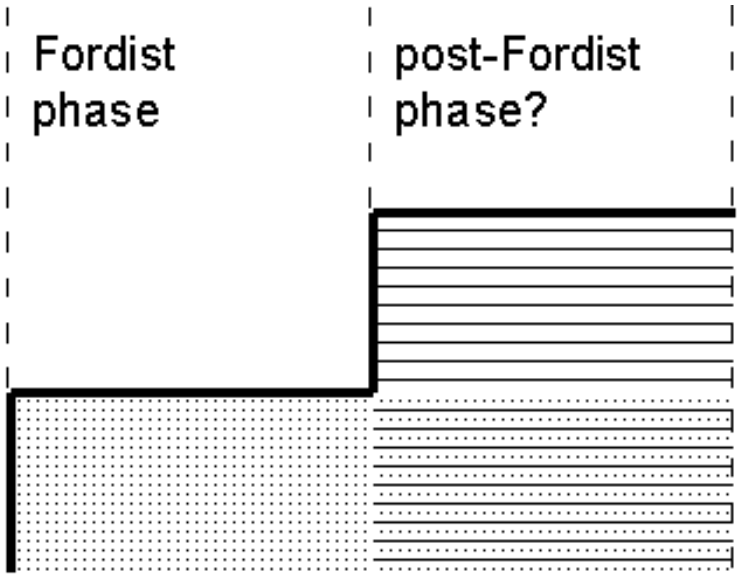
My initial question thus culminates as follows: what evidence for technology-induced qualitative changes exists on what level (which allow us to speak of different development periods)?

I would like to define the different possible methods of periodisation, before considering whether there are indicators of massive alterations.

Let's begin with the smallest scale.

3.1. The case of a post-Fordist phase of industrial society

Are there indications of a phase shift on the lowest level, namely that of technological organisation? Does the existence of new information and communication technology lead to a qualitative transformation on this level (see fig. 3.1)?



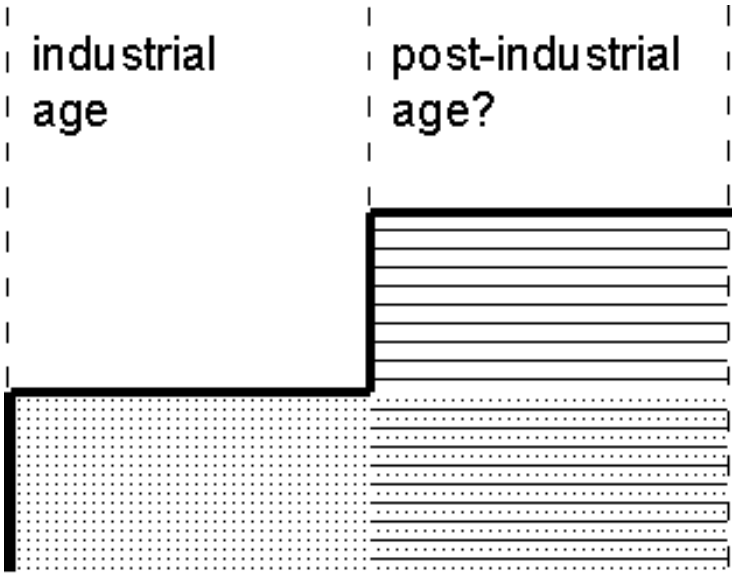
There are in reality empirical and theoretical considerations, which speak of a new phase of industrial society and a new industrial revolution, arising from the computerisation of the technological infrastructure. This is also supposed to signify the end of mass-production technology, i.e. the manufacture in large quantity, but low quality, of goods to be bought en masse by consumers. This combination of mass production and mass consumption is deemed to be a Fordism; the breaking down of the work into individual steps, thus losing the need for qualified workers with a wide range of skills, is a Taylorism. In order to open up new markets, and produce in a more customer-orientated fashion, new technology is said to be needed, to replace the old, inflexible production system. This should be based on computer technology and allow flexible automation. It would need a certain requalification of the workforce, restoring a number of skills (previously thought to be forgotten), thus allowing one individual to carry out a number of tasks in an integrated manner. This would mean at least a partial end to the Taylorian division of work. The individual responsibility of each worker would increase, and so new ways of working together would be required. The

new technology would also mean a more flexible coupling of work and workers, indeed even a step-by-step decoupling, in that teleworking would become more widespread, thus separating geographically the workers from their source of work.

From this viewpoint the question must be discussed, as to whether the conversion to computerised technology in industrial society breaks through to the level of technological organisation, so that we could speak of a post-Fordist phase of industrialisation (however we may choose to describe this).

3.2. The case of a post-industrial age of economic civilisation

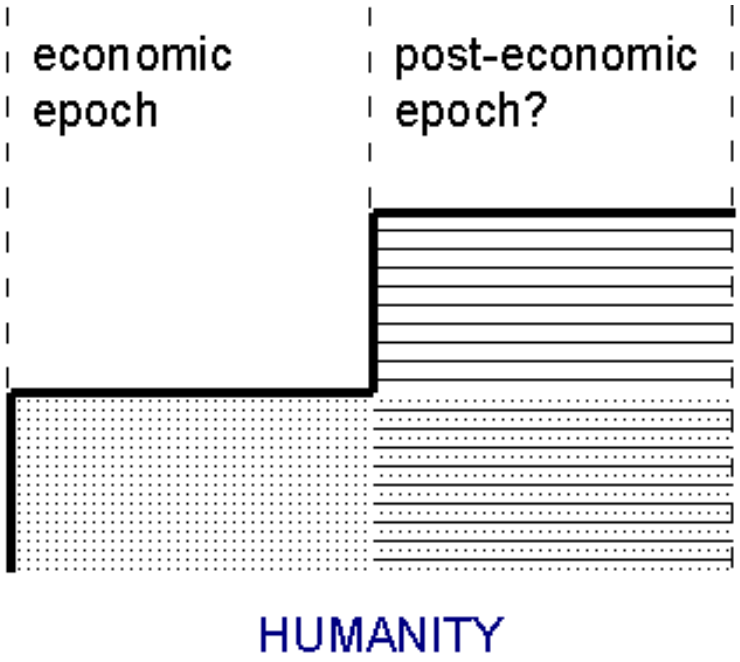
The question may now be posed as to whether changes in the technological base stimulate changes to the next level up. Is there evidence that, on the level of material reproduction of society, changes are being (or may be) brought about, which herald a new age? Can it be true that the widespread use of computer-supported information and communication technologies is overtaking and replacing the industrial age (see fig. 3.2)?



There are considerations that tend in this direction. The information revolution, expressed in its most concrete form as electronic networking, is said to be merely the latest in a line of revolutions, including the agricultural revolution in the Neolithic period and the industrial revolution two hundred years ago. Each of these revolutions heralded a transformation of the social reproduction mechanism. The earliest of them represented the change from a hunter-gatherer society to an agricultural one with a fixed abode, living by planting crops and tending herds of animals. The next revolution took this one step further by the reproduction basis from an agricultural to an industrial one; agriculture was not disposed of, but rather converted into a type of industrial process. Each age is characterised by its own technostructure and way of dealing with the natural world. An equally far-reaching transformation is now about to happen. In the industrial age it was the machine, which either replaced human manual work or provided the energy necessary for this, and so took over more and more areas of human life; now it is the computer, with its mechanisation of human thought processes, that heralds the dawn of the post-industrial information society. The reproduction of society no longer centres on the transformation of materials or energy, but is based on the creation, storage, processing, distribution and use of information. This supposedly justifies the assumption that the informational transformation of the industrial society will be just as far-reaching as the mechanisation of the long-unchanged agricultural society.

3.3. The case of a post-economic epoch of anthropogenesis

There is one more question to be answers, relating to the level formation of society. Are there signs of technological changes affecting economic civilisation (see fig. 3.3)?



The latter term is taken to mean the fact that we are living in an epoch of human history in which the ways and means of doing business, of producing, distributing and consuming, determine how society is structured and in which ways it can develop. This is according to Marx, the epoch of economic formation of society, because of the three elements economy, politics and culture, it is the first which dominates and leaves its mark on the others. It is an epoch which follows a period of more natural growth of society, in which family relationships, and others which illustrate the development of humans from their animal origins, were most important. Is it now possible that such economic factors as the typically capitalist drive to make profit no longer dictate what happens in politics and culture where power and knowledge are servants to acquiring property? Could it be that the organisation of society in its entirety is not now driven by the economic criteria and norms which since the beginning of civilisation have excluded certain members of society from the societal living process, and thus the control over their own living circumstances? Might we be on the brink of a transformation of this old, inhumane epoch of human history into a new era, based on electronic and other technologies, which respects the value of individual people? This is the question which has to be posed when considering the entire history of humanity.

4. Which qualitative leap?

I would like to draw this discussion to an end now. The question now is as follows. On which level of societal dialectic (that of technological organisation, and/or material reproduction, and/or that of overall formation of society) is a change, brought about by the development of electronic networks, so great that it counts as a qualitative transformation, and so ushers in a new period of cultural development?

The lowest level contains the means, the tools, with which societies live their own lives and go their own ways; on the middle level societies fulfil purposes arising from maintaining their existence; the highest level is reserved for the goals relating to cultural self-realisation.

There can be no doubt that with the telematisation on the lowest level, changes are already visible which affect technology and the people applying it. Economically and militarily driven diffusion of electronic information and communication technologies is setting the stage for extending human collective intelligence into novel socio-technical forms, which might transcend the intelligence of both humans and machines of today, even more than human information-processing systems transcend pre-human ones. A metaphor would be to liken the spread of computer-linked telecommunications to the hardware of an emerging global nervous system and brain. The introduction of each of the series of information technologies hitherto created closer and closer links between the individuals as elements, and groups of individuals as subsystems of the social systems. The same is done by the introduction of electromagnetic communication technology and computerisation. However, they create interdependence at a planetary level, which is also between different societies existing as nation states. Telephone statistics is one of the often-referred-to indicators of growing worldwide interdependence. Computers are applied not only to transform the machine of the industrial age into an automaton, but also to extend the individual's intelligence by coupling people to their personal computers and – beyond that – by linking these human-machine intelligence nodes with each other, thus forming a global network. This merging of humans, computers and telecommunications

constitutes what BUGLIARELLO (1988) calls a "hyperbrain". "In principle, this process does not differ from the evolution of primitive nervous systems into advanced mammalian brains", says Tom STONIER (1992, 105). "Relatively few nerve cells, relatively poorly co-ordinated, evolving into an organ consisting of trillions of cells, so exquisitely co-ordinated that our understanding of how it works still eludes us. With the evolution of the global brain we are dealing with a parallel process, but at a much higher level of complexity...each node, rather than being a neuron, is a person comprising trillions of neurons...coupled...to their personal computers....We are now dealing with the very top end of the known spectrum of intelligence." Peter RUSSELL (93-94) in his book "The Awakening Earth, The Global Brain" (first published in 1982) lays emphasis on the fact that an increase in quantity is necessary for evolution to allow the emergence of a new quality. According to him there is a magic number in the order of magnitude of 10^{10}, a number characteristic for neurons building a human brain, as well as a number applying to the world population, which at the turn of the millennium, by means of telecommunication, will reach a state of interconnectivity comparable to that of human brain cells. However, it is right to state that change in quantity is only a necessary precondition, but not a sufficient one, for change in quality. Interdependence is but a step, if that, towards integration, not integration itself. Like the qualitative leap dividing phenomena at the physiological level (that is brain phenomena like electrical and chemical neuronal activity) from those at the psychological level (mind phenomena like mental states of consciousness and conscience), there is a jump required from the interconnectivity of intelligent nodes in the global network, to the software of something like a mind of global society. Furthermore, the software to be run by the super-organism of future world society, in order to be able to sense, interpret, and respond (STOCK 80-91), lacks reason, more than ever before. Societal development in this phase of transition is marked by a sharp discrepancy between the practice of technically unifying the world, and the social theory of world unity; between the universe of communication of nation states, and the universal community of mankind (postulated time and again in models since the enlightenment); between the reality of globalisation and the ideals of humanity, evolving a global mind including self-awareness, consciousness, and conscience (RICHTER). The noosphere of which Pierre TEILHARD DE CHARDIN, Vladimir VERNADSKY and Edouard LE ROY had been thinking is still only embryonic.

Today, existing society lacks the intelligence which it needs to secure its material reproduction, and to plan and carry out strategies which would set the world on a path towards sustainable development. Such development would go about solving problems such as the use of force for political means, the gap between rich and poor (both nations and individuals), and damage caused by pollution and extraction of raw materials. Societal information circulation systems are, due to the use of modern information and communication technology, capable of observing, recording and transmitting the manifestations of crises in society, but are not so advanced as to enable us to deal with them.

An even more profound change would be the reorganisation of informational reproduction, based on new principles. This would affect society at its ultimate level. Hitherto, the development of societies, the growing complexity and differentiation of the societal system (on its various levels) into endless subsystems and secondary subjects, has been dominated by the logic of externalisation of its effects. Humanity is still divided by the principle of competition, and is developing into secondary subjects which are detrimental to one another. Therefore its technology is in danger of becoming counterproductive, where its apparent effects jeopardise the aims which it originally set out to achieve. This capacity for self-destruction can be seen as a sign that the global development of society has entered a decisive phase, in which the degree of differentiation and increasing complexity which has been reached can be compensated for by the opposite trend of simplification and integration, on the principle that development should not be at the expense of other subsystems and secondary subjects. In order to accomplish this leap, the existing principle of development of society would have to be superseded by one which takes co-operative relationships between humans as its starting point, and which no longer prioritises short-sighted sub-aims and so loses sight of the main aim. However, signs of such a principle existing are few and far between.

Using the metaphor of the global brain again, it can be said that without this networking, modern information and communication technologies will provide mankind with a global nervous system only, not with intelligence or even a global mind.

This means the following. We are witnesses to the start of a new phase of technological organisation in developed societies. Whether it will also be the beginning of a new age of material reproduction in society remains to be seen. This is to say nothing of a new epoch of societal formation. The opportunities, however, are certainly provided, in the form of electronic networking. Today's highly developed industrial society is an information processing system in which the information processing does not function as it should, i.e. it fails to sustain society in the long term and allow the human development potential within it to be realised. The accepted principle is that of obtaining such a quality of information, and shaping it, so that societal development can be triggered in the right direction. The emergence of societies centred around nation states, and the covering of the earth's surface with communication and information technology networks, may be the material preparation for a leap in quality affecting the highest levels of societal organisation, but

will not necessarily bring this about.

Excursus. The „Dialectisimilitude" of Popper's „Interactionist Dualism"

At first it may seem strange that I should digress by discussing the ideas of a philosopher who produced neither a cultural nor a technical theory, and whose thoughts thus seem unrelated to our topic. Furthermore, it is not as if I were following the long-established practice of quoting the Austrian-born Popper in one's own works, which for some is good style, and for others is an undesirable habit, depending on one's view of Popper's works as a whole, and those specific thoughts which are readily attributed to him (for an in-depth inquiry into Popper see HOFKIRCHNER 1986).

I do, however, see a connection between the deliberations here on the one hand, and Popper's theory of "objective knowledge" and the "three worlds" on the other hand. It is in fact a twofold connection: firstly in terms of content, i.e. theoretical, where Popper attempts to give the mind an ontological home, of which it can be said that today, after the formulation of his theory, it appears to be taking on its social and technical form in the universally discussed and lauded cyberspace; secondly, methodologically, where Popper tries to include the interrelationship between ontological entities in a model which resembles the emergentist theories accompanying the currently developing self-organisation theories.

In both cases, Popper may have been acclaimed as someone who made astute observations and anticipated perceptions which are taken as standard today, although precisely these thoughts have hardly been credited to him (perhaps this is connected with the fact that Popper, a declared anti-Marxist and opponent of dialectical thinking, formulates his thoughts on these matters in a manner very similar to dialectics, so to say, ìdialectisimilarî, better described in German as dialektiknahe.)

Let us turn to the first case. Unlike the mainstream of mind-body philosophy, Popper draws a distinction between objective knowledge and subjective knowledge (POPPER 1972). He considers subjective knowledge to be that which exists in each of us, and is related to the individual person and his/her particular experiences and intellectual abilities. Objective knowledge, on the other hand, means for Popper knowledge on a super-personal level, which is still built up from an individualís background, but then acquires an independent existence and exists separately from the person; it develops further and then turns the tables, dictating the nature of the personal knowledge from which it arose, in as much as understanding means nothing more than adopting super-personal knowledge for oneself, in effect taking down wisdom from a higher level for oneís own use. Popper never tired of saying that objective knowledge has a characteristic that subjective knowledge lacks: in his view, a new theoretical discovery trails a whole tail of related problems along behind it, which only gradually become apparent to us, and which we may never fully appreciate.

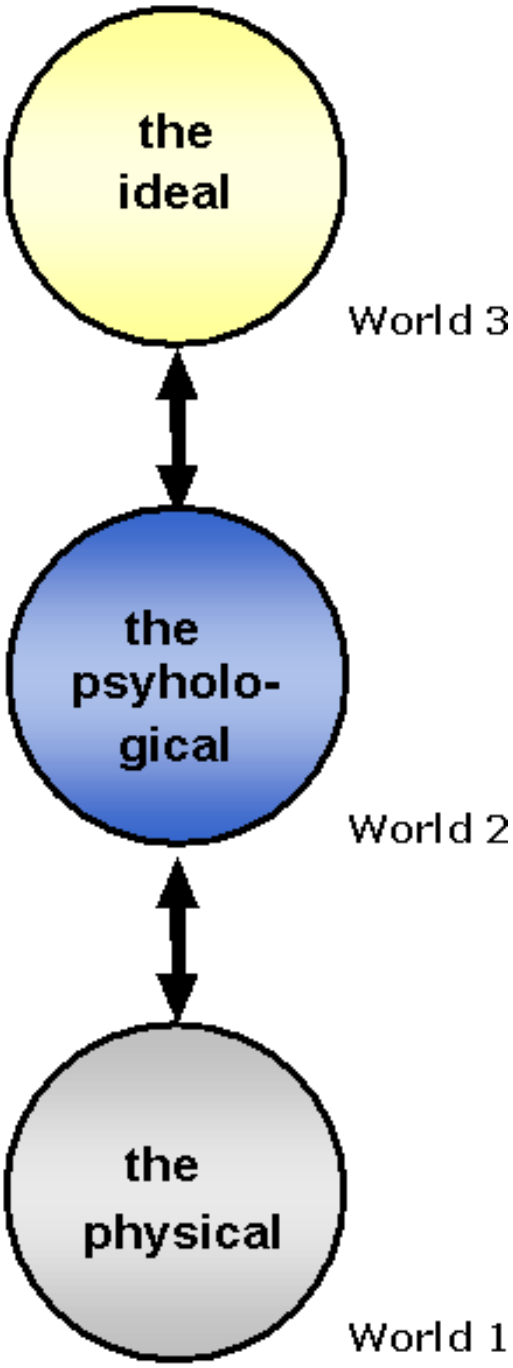
Popper did indeed make a valid point here. He is right that there is a form of super-personal consciousness as well as individual consciousness, and that the first goes beyond the individual character, even though it is composed from it, and that it creates an accord from its components. However, as he is averse to social-scientific thinking, and remains attached to his individualist position, he cannot see the super-individual consciousness as a collective, i.e. social, phenomenon, or attribute a social, rather than an individual, subject to it. Thus he postulates, paradoxically, a theory without a subject, and so lets himself in for the resulting problem of having to defend himself against accusations of neo-Platonism, into which he is threatened with sliding (see HASTEDT 1988). This problem would be solved very simply by recognising the existence of super-individual subjects. The acceptance of families, peoples, classes, companies, churches etc., as units in society which act, and thus must be capable of applying knowledge relevant to their respective course of action, would be far less mystical and abstract than the demand for a realm of ideal units in itself.

This would additionally dispose of a contradiction which is detrimental to Popperís conception: on the one hand he speaks of objective knowledge growing and being based on the perception of the individual subject, while on the other hand claims that all possible ideas, true and false, conceivable, but perhaps not yet conceived, and maybe never to be conceived, are to be found in the area of objective knowledge. Social consciousness has only existed as long as society. The former changes with the historical development of the latter, and where there is a connection within or between societies, there is also continuity in the social consciousness: tradition.

Electronic networking gives the societal consciousness a technological basis, thus making it more tangible than ever. In the global web, human knowledge can articulate itself faster, more eloquently and with greater diversity than ever before. Popperís objective knowledge is increasingly materialising in cyberspace. Due to his own work (Popper was, in spite of his insistence on the fallibility of research, and his Sisyphus-like picture of the trial-and-error method in a bottomless ocean of unknowing, actually an optimist, and he

believed in the advancement of science), an acceleration in the accumulation of increasing ìverisimilitudeî could be predicted, which has become possible with the advent of modern communication/information technology. However, Popperís view of the emergent world of the mind remains too unwieldy to be able to distinguish between social and scientific/technological factors, as is done in this paper.

And now to the second point. Popperís objective knowledge belongs to World 3, and his subjective knowledge to World 2 of his three-world conception. The physical constituents make up World 1. Worlds 1 and 3 are connected only via World 2. Popper noted an upward causation and a downward causation, thus creating both an evolutionary theory and a layer theory. The creation of the world can be genetically imagined, with the help of upward causation, as the world of physical objects, including living organisms (World 1), which brought about the world of sentience and self-awareness, as well as awareness of death (World 2), which itself led to the world of the products of human thought: language, artefacts, science and technology (World 3). These worlds are built up as layers, one on top of the other, marked by a downward causation (see fig.).



Seen like this, Popper has a good theory, according to emergentist principles, of the appearance of new and the ordering of the old underneath it, taking into account the dialectic of the interrelationships of two entities as opposites and mutual preconditions, with an asymmetrical relationship to each other. However, the question may be asked as to whether the cosmos can be divided into the three parts Popper envisaged; apart from this, the inconsistency mentioned above, namely between World 3 as a human creation and World 3 as the permanent home of the intelligibilia, cannot be overlooked. An analogous inconsistency holds for the relation between Worlds 1 and 2. As a result of this inconsistency, he does not offer any resistance to the view that souls exist and that Godís work is involved in the downward causation; in fact he wrote a book with a proponent of such a theory, the Catholic Eccles (Popper/Eccles 1977). His emergence theory thus has a dualistic shortfall. From traditional dualism, which postulates the separate existence of entities, there is a distinction to his dualism of interactionism only, i.e. the expression of the interrelated possibilities for the entities to influence each other.

If we let this limitation fall, a scheme results which strongly resembles the one in this essay: the world in Phase 1 has macroscopic changes, which appear due to microscopic coherence in thermodynamic systems. The world in Phase 2 shows changes for the purpose of the maintenance of living systems, which use the thermodynamic self-organisation of Phase 1 as a means. The changes in Phase 3 involve changes which orientate around the goal of expressing several values of cultural systems, based on the biotic reproduction of Phase 2. The result is a nested hierarchy of self-organisation processes in which the genesis in the structure is recorded. The world in Phase 3 shows a World 3, which contains the forerunner World 2, which itself contains World 1, each world bearing the marks of the world above it. This process of fitting into each other forms the background to the search for the emergent properties in the introduction of network technology into society.

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