HUMANISTIC VIEWS ON MAN AND COMPUTER

Among the problems that bother contemporary humanists, the computer impact on personal life and society is more and more shifting from interesting theoretical questions toward a cluster of intriguing practical issues. Most citizens of developed countries come regularly, if not daily into contact with the alleged benefits of modern microelectronics. The question whether computers 'can' think and, if so, *should* think, so characteristic of the early years of automatic information processing, is superseded by Benson's question whether human beings have already become 'mindless' in environments where computers, robots and other forms of high technology do the 'thinking'.[1] Automation has advanced to such a degree that Michie and Johnson argued that 'the greatest social urgency attaches not to extending automation, but to humanizing it'.[2]

For humanists, general discussions whether there are really such things as the 'information revolution', the 'computer revolution', or the 'microelectronics revolution' have become less interesting than specific problems in a world in which more and more tasks are computerized. It is easy to point out how many vital activities still exist that have not (yet) been automatized, such as eating and drinking, when at the same time human activities in the production of food and drinks have been reduced, to a great extent, to 'residual' tasks which have not been deliberately designed, but appeared as balancing items. Some humanists are eager to demonstrate that it is 'inhuman' to regard people who are commissioned to accomplish these tasks as balancing items themselves. It is less the economic effects of lack of job satisfaction, such as absenteeism and alcoholism, than the violation of a human value, to wit respect for other human beings on the part of the designers, that is a central issue of technology assessment from a humanist point of view.

There are more human values at stake in the coming computer age. To Benson's four forms of technological alienation – powerlessness, meaninglessness, normlessness and mindlessness – that might result from innovations of production processes, as many values correspond that should be strived after: responsibility for the work, meaningful labor, value consciousness and the use of typical human capacities. Not only these, but also other human values are in danger of being neglected by people who are engaged in extending automation. Within certain computerized information processing systems, human subjects are not

[1] George Benson, Mindlessness. In. K. Noro (ed.), *Occupational Health and Safety in Automation and Robotics*. London: Taylor & Francis, 1987.
[2] Donald Michie and Rory Johnston, *The Creative Computer: Machine Intelligence and Human Knowledge*. Harmondsworth: Peilican Books, 1985.

treated as individual persons: instead their so-called 'shadows' are dealt with, in which their individuality and personality are ignored.

On the other hand, new technological developments make possible new patterns of behavior, in the sense that labor circumstances, conditions of health, consumptive patterns, means of communication, ways of transport, and recreational possibilities are changing. In the new 'human condition', people can create new ideals, and human values may acquire different content in the different context. There is nothing spectacular about that: what is new, is that, in Arbib's words, 'the computer is going to change the way in which we think and solve problems'.[3] That is why 'the problem of being human in the computer age' is such an intriguing one: part of the intellectual activities that gave people satisfaction, because they had to use their minds, because they felt themselves to be clever specialists, and not 'systems', has been already computerized. Will they be consoled with the thought that they will develop new skills tot learn about how best to organize information within a computer network?

What humanists are missing in these developments is an analysis of the possible consequences of a computerization movement for computerizing as many tasks as possible. Some have expressed fears about decisions that have already been taken without paying attention to human aspects. Could we end up in the situation of Goethe's sorcerer's apprentice in which there is no way back?

A comparison with the pollution threat, already present in 'world models' of 1970, seems useful. Then it was argued that continuing the industrial process meant 'a population collapse from failure of the technical support of the society'. This was a reason for Forrester to predict that, faced with this dilemma, 'the most probable course of action is to wait and hope that the production threat has been exaggerated'.[4] In his 'black or white' line of argument, he did not even consider the alternative of piecemeal engineering and correcting. But nowadays it is generally realized that 'to wait and hope' is not the obvious means of reacting to a steadily increasing pollution rate. First of all, highly technological instruments are developed for measuring different established forms of pollution. Secondly, scenarios for influencing at least some of these forms are designed. Thirdly, the insight that such scenarios should be carried out, already led to some prohibitions of the pollution processes.

Is it not high time we developed means for measuring effects of computerization on people, designing scenarios for influencing the

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[3] Michael A. Arbib, On being human in the computer age. In: R. Trappl (ed.), *Impacts of Artificial Intelligence. Scientific, Technological, Military, Economic, Societal, Cultural, and Political.* Amsterdam etc.: North-Holland, 1986.

[4] Jay W. Forrester, *World Dynamics*. Cambridge, Mass.: Wright-Allen Press, 1971.

negative effects, and propagating the insight that such scenarios should be carried out? It is true that the world models of 1970 already contained an aggregate under the name of 'quality of life', composed of material standards of living, crowding, food and pollution. But the point is that the computer impact on people and society creates new 'immaterial' components of an overall concept of quality of life for which new criteria should be established in order to carry out programs of controlling less palpable variables of technological developments.

In fact, humanists are still divided about the question how to assess the relatively new technology. Some of them, mainly those who base themselves on common sense, are skeptical; other, the neo-intuitionists, are pessimistic; the neo-mechanicists, on the other hand, are optimistic, yet there are also so-called 'scientific humanists' who, in analogy with the pollution threat, propagate scientific investigation into the possible consequences of decisions toward computerization, not only in order to solve the controversies between the other groups of humanists, but also to make proposals for steering the processes.

For the development of humanism it is interesting to see that different humanists can have different attitudes towards technological developments. An overview of the four positions might be helpful for the advancements of humanism, because it would be amazing if the differences were restricted to humanistic attitudes toward computerization.

Neo-intuitionist humanism

In the beginning of the twentieth century, some thinkers resisted an attempt to bring science, to begin with mathematics, 'under control' by formalizing its results. The so-called intuitionists, lead by Poincaré, argued that the essence of mathematics lies in mathematical discovery, an activity that is not rule-governed, but requires intuition and creativity. It would be impossible to 'reconstruct' these human virtues in any formalization.

Neo-intuitionist humanists take a comparable stance toward attempts to computerize intellectual activities. They argue that computers can never exhibit the kind of creativity, for which human beings are excellently equipped. But this time they are not discussing theoretical matters – we live in a world in which it is argued that computers could make more consistent, more justified, in short 'better' *decisions* than human decision makers.

Against this claim, neo-intuitionist humanists bring to the fore that computers can never exhibit the kind of creativity human beings display when confronted with unexpected situations. Since by leaving decisions to computers one runs the risk of wrong actions being undertaken in situations for which they have not been programmed, one should be very careful in using computers. As a matter of fact, the neo-intuitionists argue that, roughly speaking, there are only two tasks for computers in decision making: the first being facilitating accessibility of the information human beings consider relevant to taking their decisions, and the second helping them to carry out 'formal' procedures on informational structures so that human beings themselves can 'interpret' the outcomes of information processes in actual situations.

There are several attempts to justify the above view. Of course, the general outlook is that only human beings would have the *knowledge* about situations needed for making decisions that are relevant within a *human* network. But more specific arguments are based on an analysis of the notions of creativity and intuition. In this, neo-intuitionist humanists keep close to the traditional intuitionist view: 'intuition' is considered a name for the phenomenon of anticipating something in a way that cannot be rationally justified: the resulting behavior, or better, 'conduct', is simply *not* rule-based. 'Creativity' is a name for a phenomenon of producing *new* outcomes of conduct which are partly the result of intuition. It follows that the question whether computer programs can run ahead of possible problem solutions without rule governed behavior. According to the neo-intuitionists this is not possible, the argument that computer programs can have random procedures is not considered a valid counterargument: random procedures, though they might contribute to find remarkable solutions for problems, do not 'point away from themselves', in other words do not have anticipatory properties.

A difficulty with this view is that an explanation of why human beings have the possibility for intuition is absent. Opponents can point out that without an explanation the argument has no force whatsoever, whereas each *explanation* would destroy the argument, since it would pave the way for computer programs that do exhibit the possibility of intuition and creativity.

Recently, however, neo-intuitionists have tried to overcome this difficulty by concentrating on a difference between human beings and computers: the latter are bounded by an explicit articulation of the possible objects, properties and relations among them, involved in the task to be performed. According to Winograd and Flores, a computer program is always based upon a *representation* which 'makes it blind' to things outside the representation, whereas they have no possibility of 'transcending' the representations.[5] Human beings, on the other hand, do have an – albeit uncontrolled – possibility of transcending provisionally accepted characterizations of a problem situation. This is the case because they have so-called 'background knowledge' by which they, first,

[5] Terry Winograd and Fernando Flores, *Understanding Computers and Cognition: A New Foundation for Design*. Norwood, N.J.: Ablex, 1986.

can discover that a chosen system of representation must be rejected, and, secondly, can switch to another system. Because this background knowledge cannot be made fully explicit by human beings, it is impossible to represent it adequately. Moreover, this explains why the insight that a certain representation does not fit the assumptions of the problem environment can arise 'independently of the will'.

In how far is the appeal to intuition by the neo-intuitionists an advance on positions taken by some notorious intuitionists at the beginning of this century? There were authors such as the mathematician Brouwer, who believed that at least some human beings were still sensitive enough 'to read everyone's character from his [or her] face or hands'.[6] Is it not a bad sign when neo-intuitionists also express their mistrusts of what they call 'the rationalistic tradition', which would nowadays be 'directly reflected' in computer science, including artificial intelligence and robotics? Whatever this may be, it is understandable that the neo-intuitionist humanists evoked strong reactions from the side of the humanists who still emphasize that 'rationality' is what distinguishes human beings from other animals. It is, therefore, not a surprise that a humanistic view on man an computer was defended in which similarities are stressed between human beings and computers *in cognitive respect* – not unlike the first part of Pascal's 68th Thought that 'a calculating machine does things which are closer to thinking than what animals do'.

Neo-mechanicist humanism

In a strong form, the neo-mechanicist view of man and computer implies that human beings have the possibility of constructing computers which surpass human intellectual possibilities. The significance of the notorious chess computer of the future that beats the world champion would consist in the confirmation of the hypothesis that 'intellectual functions' can be artificially installed into machines to such a level that even rare talents are outplayed. Though it is true that these intellectual functions are designed by human computer programmers, it is significant that this can be done without foregoing psychological research. The artificial chess players are not imitations of human grandmasters; they have an 'intelligence of their own'. The programs do not rest solely on brute force, but contain procedures that can be seen as mechanical counterparts of all sorts of activities which human beings can perform, such as deductive and inductive forms of reasoning, means-ends analysis and making plausible guesses.

By extension, neo-mechanicists believe that it is possible tot develop counterparts of *abductive* forms of reasoning in which explanatory hypotheses are formulated with the help of concept formation. It is stated

[6] Luitzen E. J. Brouwer, *Leven, kunst en mystiek*. Delft: J. Waltman Jr., 1905.

that there already exist computer programs that draw conclusions by association and analogy.

The neo-mechanicist view emphasizes the similarities in intellectual respects between the new kind of machines called computers and human beings. But it does more: in designing computers for problem solving activities, a situation may be reached in which computers take over labor, previously done by human beings, for the simple reason that thereby failures connected with emotionally colored beliefs or prejudices can be avoided. Though neo-mechanicists have a high esteem of human capacities for inventing artificially intelligent computer programs, they do not trust human performers in difficult, risky and dangerous situations. Either human beings tend to forget in complicated circumstances what they have learned, or they perform badly because they are closer to animals with respect to volition, as the second part of Pascal's 68th Thought states. Therefore neo-mechanicists see more tasks reserved for computers (such as decision making) than neo-intuitionist humanists. The so-called expert systems should not only operate in situations in which no human expert is available, but also in cases in which experts appeal to their 'experience' or 'intuition'.

Of course, there is always a risk of a computer program making or suggesting a wrong decision, but experiences with advanced expert systems have taught the neo-mechanicists that both users and clients are more satisfied with the results than they were in the traditional procedures. Nevertheless, they recommend the use of computers for well-defined tasks; it would be very imprudent tot trust expert systems outside the domains for which they are designed. But this urges the designers only more strongly to use their inventiveness and creativity, if necessary helped by computers, for building more expert systems or expert systems with a wider scope.

The theoretical foundation of the neo-mechanicist view is different from the point of departure of the earlier mechanicists. Whereas the latter based themselves on a rather naïve philosophy of mind, the former can point to an allegedly successful interdisciplinary cognitive science. Computer simulations of cognitive tasks are considered close enough to human performances for considering the analogies between the new machines and men philosophically relevant. Computers have surpassed pure calculators: the behavior of the latter can already be understood by reference to the rules of arithmetic: the behavior of the former has to be explained in intentional terms. 'The insidiously dehumanizing effects of mechanism', Margaret Boden argued, 'can thus be counteracted in a scientifically acceptable manner.' 'By providing a richer image of *machines* that suggests how it is that subjectivity, purpose, and freedom can be characterize parts of the material world, current science helps us to understand how human values can be embodied in a mechanistic universe.'[7]

In how far is the appeal to 'current science' by the neo-mechanicists an improvement on the positions taken by some classical mechanicists, who thought that human behavior can be explained in mechanical terms? The new argument that some machine behavior can only be explained in intentional terms seems to 'forget' an important feature: just like the installment of the rules of arithmetic in calculators, the implementation of intentional procedures in computers is done by human designers. Machine intentionality is *derived* intentionality. Moreover it can be argued that the 'intentional procedures' of the simulating computers are still of the calculator type: for each of these procedures there is a corresponding description in 'arithmetical' procedures of a kind. Computers do not show any other 'intentional' behavior than Schlick's calculator which 'works towards' the outcome of 12×13.[8]

The argument that computer simulations in cognitive science are on the same level as human performances is based on *interpretations* by human beings, supported by the knowledge that the simulations are expressly designed by human scientists. If therefore computers can accomplish complicated tasks, formerly only done by human beings, their performances remain embedded in human activities. An assessment of advanced technology is still an assessment of the human use of human-made instruments. It follows that what matters is the analysis of the assumptions that are built into the way computers are designed. That this can be done without philosophical claims about what computers can or cannot do, is the working hypothesis of the scientific humanistic view on man and computer. But before entering into that now, a short discussion of the common-sense humanistic view will be given.

Common-sense humanism

Common-sense humanists believe that prospects of scientific or technological developments can and should be evaluated in the light of 'few simple truths', 'authentically human standards', which can be expressed in the language of common sense. The phrases are Weizenbaum's, who argued that the relevant issues of computerization are neither technological nor even mathematical: they are ethical: 'the limits of the applicability of computers are ultimately statable only in terms of oughts'.[9]

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[7] Margaret A. Boden, Human Values in a Mechanistic Universe. In: G. Vesey (ed.), *Human Values*. Sussex: The Harvester Press; New Jersey: Humanities Press, 1978.
[8] Moritz Schlick, *Allgemeine Erkenntnislehre*. Berlin: Julius Springer, 1918.
[9] Joseph Weizenbaum, *Computer Power and Human Reason. From Judgment to Calculation*. San Francisco: W. H. Freeman, 1976.

The underlying image of man is the view that being human is having the possibility of a common-sense understanding of other human beings, their problems, and the situations in which they find themselves; this common-sense understanding manifests itself in the ability of making things clear to oneself and to other people in terms of plain, ordinary language. In natural or – better – historical languages, the experiences of hundreds of generations are accumulated and therefore it is the obvious tool for explanation and understanding. Thanks to its flexibility, it also enables man to get grip on situations that seem to be quite new.

According to common-sense humanists, one of the dangers of a highly technological culture is that the relevant issues are only those that can be discussed in scientific terms. They emphasize that such 'scientism' not only ignores that the fundamental problems of mankind are not scientific ones, but is also unable to discuss the ethical problems. No scientific principle is a moral principle in the sense that it says what ought to be done. The debate among citizens (including scientists) about desirable and undesirable consequences of computer technology must be based on non-technical formulations of the moral principles behind the norms and values that permeate our society.

This sounds all very plausible, but in practice the appeal to common sense seems not to have worked very well. For example Weizenbaum himself did not do very much more than utter his fears about the effects of computer use – including 'game' playing and computer education with young children: it would create a kind of naïve simplemindedness which would lead to an abdication of responsibility.[10] (Responsibility is the key notion of Weizenbaum's humanism; his moral imperative says that every individual must act as if the whole future of the world, of humanity itself, depends on him or her.)

The problem with the common-sense humanistic view on man and computer is that it is not enough to show that scientists and technologists fall short in their trust in the possibilities of computers and their technological assessment. It is possible that the common-sense view can evaluate consequences of computer use for individual people – after all they can express their attitudes in their own language: but the preliminary considerations in designing computer systems cannot be seen apart from technical problems. Moreover, the possible consequences of certain specific systems for social relationships can hardly be traced out by common-sense reasonings alone. So it seems that a constructive scientific humanistic view is needed, albeit without loosening the links with the common-sense view.

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[10] Joseph Weizenbaum, *Computer Power and Human Reason. From Judgment to Calculation.* Second edition, Harmondsworth: Pelican Books, 1984.

Scientific humanism

'If we are not to exterminate ourselves on this planet by the immoral and stupid use of our scientific and technological power; if we are to use this power for the betterment of the human condition – surely, a new age of enlightenment, scientific as well as ethical, is our most imperative need.'

Though the principles of scientific humanism are indeed at least as old as the Enlightenment, it was still in the second half of the twentieth century that Feigl felt urged to propagate the point of view of the scientific humanist in the way quoted above.[11] Apparently, neither Clifford's attempt to bring together 'the facts of our moral feelings' and the scientific method,[12] nor Dewey's appeal to destroy 'the greatest dualism which now weights humanity down, the split between the material and the mechanical, the scientific and the moral and ideal'[13] had been very successful.

Feigl's argument was that the challenges of our day are so tremendous that 'unless mankind develops soon the ability to resolve his moral problems with clarity and intelligence, the consequences of his folly will be too terrible to contemplate'. Now one of the challenges of our time is the computer revolution, so here we have a field in which a scientific humanistic view may be developed fruitfully. Such a view, if well elaborated, might not only support, what Clegg and Corbett called research and development into humanizing advanced manufacturing technology,[14] but also investigations in other areas in which the use of computers is a potential threat to human values.

Globally speaking, the scientific humanistic approach to computer-technological decisions amounts to going through five stages. First, an overview has to be given of the moral values that can be involved in the different phases of computerization – before, during, and after the implementation of computer technology. This stage requires a more general outlook of the ethical side of computerization than a mere psychological point of view in which, for example, 'performance' and 'mental health' are distinguished, but that does no5t explicitly take into consideration 'integrity' and 'responsibility', 'rights' and 'obligations', 'tolerance', 'freedom' and 'individuality'.

Second, each of the discerned values has to be interpreted in such a way that it will be possible to determine, in concrete cases, whether or even how far this value is obeyed. This stage of preliminary operationalization

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[11] Herbert Feigl, Is Science Relevant to Theology? *Zygon: Journal of Religion and Science*, 1, 1966.
[12] William Kingdon Clifford, Right and Wrong: the Scientific Ground of their Distinction. *Fortnightly Review*, 1875.
[13] John Dewey, *Reconstruction in Philosophy*. New York: Henry Holt and Co., 1920.
[14] Chris W. Clegg and M. Corbett, Research and Development into 'Humanizing' Advanced Manufacturing Technology. In: Toby D. Wall, Chris W. Clegg and Nigel J. Kemp (eds.), *The Human Side of Advanced Manufacturing Technology*. Chichester: Wiley and Sons, 1987.

requires a scientific attitude, in the sense that 'ideas are made clear' and 'concepts are formed that are as precise as possible'.

Third, a systematic inventory has to be made of the technological innovations that can be expected to have an impact on existing values. Only then a kind of matrix can be construed in which all different values and all different aspects of computerization are coordinated.

Both the second and the third stage already transcend a common-sense humanistic view which attacks problems more or less ad hoc, without proceeding systematically and without defining its notions thoroughly.

Fourth, the stage of model building starts with 'piecemeal engineering' for the various aspects of computerization: scenarios are designed on the basis of scientifically fixed experiences. These scenarios purport to show how things may stand at different intervals of effectuation – not an easy task of course, but something that has to be done if one wants to have any grasp on the developments. This stage contains, in principle, prospective research, an approach that is becoming more and more part of the scientific attitude, not in the least because of the development of computer simulation methods.

Fifth, for each of the scenarios of the fourth stage it has to be investigated whether it affects one or more of the operationalized values of the second stage. The idea is that, from the earliest design processes on, decisions as to computerization are taken with explicit attention to humanization. It is not enough to pay lip service tot the claim that each technological decision is a moral decision: scientific humanists require that the 'human aspects' of possible technological developments are laid bare and are scientifically analyzed, before the actual decisions are made. In this respect, recent research and development into humanizing advanced manufacturing technology can only be welcomed, even if it is still tentative and only directs to special tasks.

The difficulty with the neo-intuitionist and the neo-mechanicist view on man and computer is that they produce assessments of computer technology that are emotional rather than scientific. One is constantly tempted to ask the adherents of these views: 'what do you mean?' and 'how do you know?' At best they helped to draw attention to possible threads and benefits, but the 'scientific value' of these views is small. The alternative in the scientific age seems a 'synthesis of the scientific attitude with an active interest in the whole scale of human values' as Feigl described scientific humanism.[15] The problem of humanizing automation is too complex to be solved with verbal means only.

[15] H. Feigl, Naturalism and Humanism. *American Quarterly*, 1, 1949.