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WISDOM AND MACHINES

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Joseph Weizenbaum, *Computer Power and Human Reason: From Judgement to Calculation,* San Francisco: W.H. Freeman, 1976, pp. 300.

Joseph Weizenbaum is the author of ELIZA, a computer program that simulates the role of a Rogerian therapist in a patient's initial interview. This project was directed toward solving some problems in computer understanding of natural language. While he viewed ELIZA as a solution to a limited problem and argued that no general solution was possible due to the contextual embeddedness of everyday discourse, his results were widely interpreted as embodying just such a general solution. Further, his choice of non-directive therapy to demonstrate the technique aimed to avoid the necessity of building a data base of real-world knowledge; in other words, context and relevant knowledge would be provided by the patient. This application of his ELIZA program was hailed as laying the foundation for providing efficient electronic psychotherapy to a much larger group of patients, unhampered by a scarcity of professionals. Weizenbaum was astounded. Uncovering the source of the power of the computer in contemporary life became necessary in order to explicate his own understanding of his work and the forces behind its distortion — a search that has culminated in this book. While it is nominally about computers it is also a chronicle of self-understanding, a journey by someone working within one of the prophetic oracles of a technical civilization — M.I.T.

Computer Power and Human Reason probes the limitations of instrumental modes of activity and thought through a clear comprehension of their presuppositions and procedure. In such an inquiry related aspects of a problem which initially seemed identical require distinction. For example, the utilization of machines in social action does not imply, of itself, that society be conceived of as a machine. The recognition that thought makes use of techniques does not require viewing all of thought as technical. Consciousness of the structure of the models that one is using makes it possible to delineate their applicability and criticize their false universalization. Consequently, once

one has penetrated the ideological generalization of mechanical methods it becomes apparent that the process whereby a model or metaphor becomes determinative for performing or understanding an activity is not attributable to the metaphor itself. It is a scientistic ideology that makes all uses of the mechanical metaphor seem equivalent.

> But the point is precisely that the pervasion — we might say perversion — of everyday thought by the computer metaphor has turned every problem into a technical problem to which the methods discussed here are thought to be appropriate.

Weizenbaum therefore finds it necessary to approach his problem in a multi-layered manner. The book moves from a discussion of tools to a consideration of reason. The transition between these rests on the special nature of the computer and its symbolic power. I will discuss the two major concerns separately and return later to the problem of their connection.

Tools are means whereby human purposes can be pursued more effectively than with unaided bodily resources. However, in their functioning within an organized social framework, tools are not merely means. Decisions to further selected means over others transform the human world and thereby those who inhabit it. Consequently, the integration of individual tools into a social complex involves a symbolic and perceptual construction of the world.[2] The organization of this world is such that additional possibilities are suggested for the utilization of a tool; a correlative result is that development of certain tools limits alternative possibilities for social action.[3] As well as functioning symbolically, tools are a "language of social action."[4] They permit and encourage social action while simultaneously discouraging or making impossible incompatible alternatives.

Computers are highly developed tools. Basically they are information processing machines which transfer one state of the machine into another state by means of rules. An "effective procedure" is a set of rules which, when followed, guarantee that the successive states of the computer conform to the desired process. In order to be comprehensible to the computer, linguistic instructions must carry within themselves all information. They cannot rely on pre-understood and assumed contexts and relevances to make the program understood. Computers work with a formal language that uses only two symbols. The transformation rules by which one expression in a language can be transformed into another can be written in the language as well as the ex-

pressions themselves. Therefore the machine which uses this language embodies not only a set of expressions but also rules for interpreting the expressions and thereby following the desired procedures. This means that a procedure can be communicated to a machine and is at the same time a set of instructions for carrying-out the procedure. "A theory written in the form of a computer program is thus both a theory and, when placed on a computer and run, a model to which the theory applies." Consequently, a computer program requires no reference to a real-world context for its interpretation and interpretation is equivalent to the carrying-out of a procedure. It is the completed idea of a tool, a self-enclosed machine which embodies the orders it executes.

In this light one can see the necessity for proceeding to a discussion of theory and reason — the computer embodies a concept of reason. Weizenbaum's persistent search for the origin of the displacement of human capacities by artificial intelligence has taken him from a consideration of tools to the mode of reason they employ. In the sophisticated form of the computer the effects of tools on human life take on a new urgency. These effects are ultimately dependent on the human purposes externalized in tools which have developed to this crucial point. I will turn to the discussion of reason before returning to this problem.

Computer understanding of natural language is a central problem for artificial intelligence since it raises the question of the extent to which human discourse can be comprehended as effective procedures. Computer languages are functional in the sense that they consist of directives for processing data; data is not embodied in the language but is supplied separately. Thus, the context of the problem that is written as a computer program is excluded by the computer. Data is processed by invariant formal rules that are taken to be applicable to the data but are contained within it.

Weizenbaum correctly asserts that the fundamental issue is the applicability of formalized structures to human experience[3]. However, this point could be developed in more detail to become sufficiently coinvincing. A paradigmatic case of formalizing is in numbers such as when we consider "three" apples without respect to their colour, size or taste. This type of formalizing is most complete in algebra in which one even abstracts from the specific number to any specifiable (but not specified) number. On the other hand, there are syntactic rules of language which provide the framework within which meaningful assertions can be made. The developed form of this type is formal logic in which structures of inference of predicated variables are elaborated for application to any desired material. The connection of these two types of formalizing, mathematics and logic, is not readily apparent. Yet it is needed for the critique of formal reason to have sufficient generality. Their relationship has been explicated by Edmund Husserl in *Formal and Transcendental Logic.*

There it is made clear that formal ontology (mathematics) is a science of the objects predicated in judging; logic refers to the pure form of judging — predication is itself formalized. Thereby the nature of formalizing, in which, "each individual must be emptied to become anything whatever",[6] can be isolated and the essential similarity of the mathematical and syntactic cases demonstrated. (Had Weizenbaum clarified this point the connection between his account of the computer and his critique of quantification and statistics in the social sciences would have been clearer.) Formalizing designates its objects apart from content; however, in its application formal reason must be brought to bear upon a non-formal content. Thus when your teacher claimed that you couldn't add apples and oranges because they "just aren't the same" non-formal considerations had to be introduced to determine the applicability of formal techniques. If they were designated as "pieces of fruit" they could indeed be added. Formalizing rests on "presuppositions of sense" (Husserl) in which objects are taken to be capable of being judged about in a single meaningful judgement — but they cannot formally be shown to be so.

The fact that an advanced work in modern philosophy can be brought to Weizenbaum's argument says a great deal for his penetration through computer science to more fundamental problems. His insistence on the importance of context in natural language is based on the fact that it normally provides implicitly the range of applicability of formal techniques. Consequently, he has given up the attempt to find an "upper bound" for machine intelligence and has focussed instead on that from which machines must abstract — human experience. The problem is not to find a quantitative limit but rather a limit to quantification. Artificial intelligence must necessarily be alien to the presuppositions embodied in the contexts of everyday language. While computers can come to decisions on any subject-matter, they will do so without reference to the multi-faceted concerns of human experience which are rooted in the human body and history.

> What I conclude here is that the relevant issues are neither technological nor even mathematical; they are ethical. They cannot be settled by asking questions beginning with "can". The limits of the applicability of computers are ultimately statable only in terms of oughts. What emerges as the most elementary insight is that, since we do not now have any ways of making computers wise, we ought not now to give computers tasks that demand wisdom.

The link between the discussions of tools and reason is scientism. Weizenbaum's contribution to the critique of instrumental reason is his concentration on the computer metaphor. He has made an excellent case for its importance by describing the computer as both theory and model, as a physical embodiment of instrumental reason. In this case the connection of reason and action strongly reinforces the tendency to view the computer model as exhaustive for thought. However, while this account can clarify the seductiveness of computer analogies as a reformulation and enrichment of the machine analogies of the seventeenth century, it cannot grasp the roots of scientism. Having penetrated the ideology of instrumental reason, it is clear to Weizenbaum that its power is not explained simply by the existence of tools however impressive they may be. At bottom the metaphoric over-evaluation of computers is rooted in human decisions that choose to apply a means that "eschews substantive change" and denies the existence of social conflict.[8] But why are these decisions made? To this Weizenbaum has no answer; his critique of scientism does not explain why it prevails but limits itself to effects. This by no means invalidates his contribution. Indeed, to my knowledge, there is only one hypothesis concerning the relationship of social decisions to instrumental reason. The philosophers of the Frankfurt School have argued that it is the dominance of exchange in society — in which commodities are equalized by an abstract quantitative standard — that accounts for the dominance of universalized formal reason in thought.

> "Bourgeois society is ruled by equivalence. It makes the dissimilar comparable by reducing it to abstract quantities. To the Enlightenment, that which does not reduce to numbers, and ultimately to the one, becomes illusion; modern positivism writes it off as literature."[9]

Whatever the merits of this analysis, it does attempt to provide the missing link between the accounts of tools and of reason. Weizenbaum explicitly rejects the scientistic view that tools incarnate reason. However, the consequences of this rejection have not penetrated into the structure of his analysis. Though he points to social organization, he gives no account of the type of society that provides the basis for the equation of instruments and thought. That the human purposes externalized in tools have come to dominate reason can only be comprehended through the specific social context by which they are harmonized with the rest of society. The failure to provide the mediating link of a social analysis divides his argument into two parts; they are held together only

by the scientistic ideology that the book criticizes.

The import of this book is summed up in its subtitle, "From Judgement to Calculation". The pervasion of thought and everyday life by mechanical analogies has produced self-enclosed clockwork systems that function without reference to the wider realm of human experience. Abstract mechanisms whose structure is concretely evident in the computer have supplanted the contextually and historically informed concerns of human judgement. Weizenbaum has concentrated on calculation and its defects. Yet, on finishing the book, one wonders what concept of judgement would be able to overcome instrumental reason. Unless some content can be given to the concept of reason besides the insufficiency of instrumentalism, reason will remain with techniques — in recoil from an empty faith in an undefined other.

In criticizing the formalizing universalizations of instrumental reason Weizenbaum has come to emphasize the contextual and experiential richness of everyday discourse and understanding. It would appear from this emphasis that thought and action must remain within given contexts in order to avoid degenerating into calculation. Does this not deny the ability of thought to transcend traditional contexts and action to alter the received concatenation of contexts? He recognizes that invention is precisely a transfer of symbols from one frame of reference to another[10] yet his critique fails to provide any basis for comparing contexts. This point can be approached from another angle. Weizenbaum is justly critical of the metaphorical use of scientific concepts in everyday discourse; such use usually fails to consider the specific scientific realm within which a concept such as "relatively" gains its meaning. Yet he uses the example of relativity of motion to illustrate his argument that intelligence is relative to a frame of reference.[11] How can one distinguish a vulgar or misleading metaphor from an illuminating one? At times it seems that it is being argued that metaphors should be abandoned altogether.[12] However, it should be apparent that this would deny any inventiveness to thought. It would chain thought within the organization of contexts sanctified by tradition; Weizenbaum's own efforts would be nullified in this case.

Consequently, one must recognize the necessity for trans-contextual thought and develop a concept of critique that would allow one to distinguish false transfers of context. Judgement, in this case, would have to unearth the relevant aspects of context and include them in the discussion of a metaphoric usage. The meaning of thought developed within specialized contexts would need to be evaluated within a framework of common concerns. That is, specialized sciences derive their justification from a political theory.[13] Weizenbaum's analysis leans in this direction; his discussion uses an insider's knowledge to focus on the meaning of computer science in a public light.

None of the above criticisms are intended to detract from the achievements

of *Computer Power.* Indeed, the fact that its thesis can be linked to important developments in social and political philosophy testifies to its perspicacity. Moreover, due to his grounding in computer science, the author enriches and "concretizes" the critique of instrumental reason through a specific content. In speaking from the concerns raised by the place of his special knowledge in contemporary society to his fellow specialists and simultaneously to us all, Joseph Weizenbaum has given us an example of intellectual responsibility all too rare in this age of self-enclosed experts.

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Notes

1. Joseph Weizenbaum, *Computer Power and Human Reason: From Judgement to Calculation,* San Francisco: W.H. Freeman, 1976, p. 180.

2. Max Horkheimer argued in 1937 that the adage that tools are prolongations of human organs could as easily be reversed. "In the higher stages of civilization conscious human action unconsciously determines not only the subjective side of perception but in larger degree the object as well. "Traditional and Critical Theory" in *Critical Theory,* trans. Matthew J. O'Connell and others, New York: 1972, p. 201.

3. Compare Ivan Illich's observation that industralized traffic has lessened possibilities for walking. *Energy and Equity,* New York: 1974, pp. 15-9.

4. *Cf.* David Dickson "Technology and the Construction of Social Reality" in *Radical Science Journal* No. 1, Jan. 74, pp. 29-50. Incorporated into *Alternative Technology,* Glasgow: 1974.

5. Weizenbaum, *op. cit.,* p. 198.

6. Edmund Husserl, *Formal and Transcendental Logic,* trans. Dorion Cairns, The Hague: 1969, pp. 212-3.

7. Weizenbaum, *op. cit.,* p. 227.

8. *Ibid.,* pp. 233, 273.

9. Max Horkheimer and Theodor W. Adorno, *Dialectic of Enlightenment,* trans. John Cumming, New York: 1972, p. 7. *Cf.* Max Horkheimer, *Eclipse of Reason,* New York: 1974, chapter 1.

10. Weizenbaum, *op. cit.,* p. 33.

11. *Ibid.,* p. 204.

12. For example, "It is precisely this unwarranted claim to universality that *demotes* their use of the computer, computing systems, programs, etc., from the status of a scientific theory to that of a metaphor." (p. 176). Emphasis added.

13. *Cf.* Isaiah Berlin, "Does Political Theory Still Exist?" in *Philosophy, Politics and Society* (Second Series) ed. Peter Laslett and W.G. Runciman, Oxford: 1964.