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## COMPUTERS FROM THE PERSPECTIVE OF SOCIAL PHILOSOPHY

GRAY L. DORSEY\*

Two years ago the International Association for Philosophy of Law and Social Philosophy held its quadrennial World Congress in St. Louis on the general theme, Equality and Freedom. One of the sub-themes was the possible impact of computers upon social structures and legal systems. A young legal philosopher from Poland, Leszek Nowak, strikingly indicated the magnitude of that impact.<sup>1</sup>

Every epoch of human history is characterized, according to Nowak, by a set of "significance factors." In a given epoch, one significance factor is dominant. The characteristic relations of societies do not arise from causal laws of social development. Instead relations that permit an optimal response to the dominant significance factor emerge and are then given an appropriate label. Therefore, according to Nowak, social laws are not causal, but adaptive. "Historical materialism" refers to the adaptive laws responding to the dominant significance factor (Production) in the present human epoch. There was a prior human epoch, Nowak says, in which the dominant significance factor was Reproduction. The relations that responded to that factor were those of kinship. The laws of historical materialism, therefore, are not universal because they hold only for the present epoch. It is Nowak's view that we are entering a new epoch, in which relations will be established that will most effectively respond to a new dominant significance factor, which may be Information. If so, computers will replace production machinery as the key technology in the epoch of Information.<sup>2</sup>

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1. L. Nowak, *Computerization from the Viewpoint of an Interpretation of Historical Materialism*, in 1 EQUALITY AND FREEDOM: INTERNATIONAL AND COMPARATIVE JURISPRUDENCE 513 (G. Dorsey ed. 1977).

2. Others have made similar suggestions about the importance of information, its control, and processing in the post-industrial society. See D. BELL, *THE COMING OF POST-INDUSTRIAL SOCIETY* 165-265 (1973); A. TOURAINE, *THE POST-INDUSTRIAL SOCIETY* 3-26 (1971).

Nowak's paper is extremely interesting in relation to Marxist orthodoxy, but is mentioned here because it indicates the magnitude of the impact of computers on social organization as seen from the perspective of an ideology that gives central importance to historical development. Something more than magnitude, however, is needed in order to put computers in perspective. Assuming computers to be an extremely important technology in a post-industrial society, we need a sense of what society is, and of the basic interrelationships between society, technology, law, science, and ethics. A functional, evolutionary context will serve the purpose.

The general direction of evolution has been towards more complex organization and more effective exploitation of the life opportunities presented by the environments of the earth. Life on earth began some one to five thousand million years ago with one-cell organisms floating in a warm, protein-rich, saline solution. These organisms could take nourishment by chemical processes and could reproduce by cell division. By the time insects made their appearance, some two hundred million years ago, organization had become immensely more complex. Insects are characterized by a hard exoskeleton; a body divided into head, thorax, and abdomen; eyes, simple or compound; antennae; tracheae, or air tubes, opening from the exterior and branching among the tissues; and a highly developed central nervous system.

The insects are an extremely successful life form. They are able to feed, repel enemies, and reproduce in every imaginable habitat on earth, with the one exception of the ocean. Insects can live in the ground; in leaves, roots, and branches of plants; in fresh water; in tropical rain forests, arctic tundra, arid deserts, mountain slopes, and the seashore; and parasitically in animals and larger insects. Insects can walk, run, jump, fly, and burrow. They can eat plants, animals, and dead organic matter, or they can live parasitically.

Of course, the same insect cannot live in all of these habitats. Obviously, a grasshopper cannot live inside a leaf; but creatures having the basic characteristics of insects do live inside leaves. Other morphological modifications adapted creatures with insect characteristics to all the other habitats, providing wings for movement through the air to gather food or escape danger, and digging appendages for burrowing when the soil provided the only secure shelter. The insects, therefore, are not a single species, but a large class (about 450,000 species) within a phylum.

The above discussion is concerned with effectiveness in the exploitation of life opportunities arising from increasingly complex organization and structural adaptation. These are changes in the organisms themselves. Society is the extension of organization beyond organisms to the relationships between organisms.

In a society, individuals, or sets of individuals, perform activities that are auxiliary and complementary. Each of the activities is performed by some of the members but benefits all the members, thus increasing the effectiveness of the social group above the cumulative result attainable by independent individual efforts. Among the social insects, sets of individuals are specialized to activities either structurally or behaviorally. Instances of structural specialization are the immense ovaries of queen honey bees, the gonads of drone honey bees who exist only to mate with the queen, the poison-equipped squirt-gun heads of soldier termites, the trail-marking pheromone glands of the worker ants. Several instances of behavioral specialization are found at successive stages in the life of the worker honey bee. For the first three days of adulthood, they groom themselves, loiter, and are fed; from the third to the twelfth day they nurse the immature bees in the hive; from the twelfth to the eighteenth day they produce wax as needed for the comb, and from the nineteenth to the twenty-first day they guard the entrance of the hive. After the third week of adulthood, worker honey bees join the field force for the rest of their lives—gathering water, pollen, and nectar.

The success of the insects in surviving and multiplying in nearly every habitat on earth is due to natural processes, *i.e.*, processes that are independent of direction and control by the organisms involved. First came the evolutionary emergence of the characteristic structure of the insects—separate housings for the central nervous system, the respiratory system, and the digestive system, all protected by an external chitinous covering. Next came morphological adaptation (modifications of the structure) to the exigencies of different habitats, or environments. The basic structure proved capable of functioning effectively in a great many sizes, ranging from nearly microscopic to about two inches in length (which approaches the limits of mass that a chitinous exoskeleton can contain), and with a great variety of modifications. Then came morphological and behavioral specialization of sets of individuals to specific, auxiliary, and complementary activities. Morphological specialization develops the structure needed to perform an

activity and suppresses structures not needed for that activity. Behavioral specialization reinforces a specific activity at a given time and inhibits other activities at that time.

In insect society, the performance of socially beneficial activities and the prevention of non-beneficial activities are a function of necessity. This necessity is the result of the specificity of qualifications of each activity. Sets of individuals are naturally adapted and specialized to perform a specific activity throughout their lives or during a period in their lives. A set is so prepared for each of the auxiliary and complementary activities that, when simultaneously or serially performed, a society will result. No sets of individuals are prepared for activities that would be harmful to the society, or unnecessary. Because of the specificity of qualification, harmful or unneeded activities cannot be performed. The individuals do not participate in the direction and control of the activities. They have no part in determining their own qualification. If an insect individual is to participate in society, indeed in life, it must do so by performing, at a given time, the specific activity for which it is qualified by processes beyond its understanding and control. Further, it has no choice between performing and not performing the activity for which it is qualified, because the natural control of reproduction provides an abundance of fungible individuals for any given activity. When one drops out another takes over.

When the life form *homo sapiens* appeared on the earth, just a few thousands years ago, organization had again increased tremendously in actuality, but even more in potentiality. Adaption is not fixed, beyond human control, by natural processes. There are no human beings structurally adapted to specific foods or habitats; none provided with fangs and claws to serve an appetite for meat; none with a ruminant's set of stomachs for grazing quickly in dangerous places and digesting slowly in safe places; none with lungs, mouth, and stomach suitable for living on plankton strained out of the sea as do the baleen whales; and none with winged, miniaturized bodies for catching insects in flight. There are no human subspecies of meat eaters, plant eaters, plankton eaters, or insect eaters.

Similarly, specialization is not fixed, beyond human control, by morphology and mechanized behavior. There are no human beings with natural weapons to slash, puncture, or poison enemies; no natural scouts, equipped with special glands to emit a trail-marking substance; no natural workers equipped with pouches to carry food back to other

members of the social unit, or compelled by stimuli beyond their control to sweep the city streets for the first three days of each full moon during the twenty-first through the twenty-fifth years of their lives. Even with respect to reproduction, structural specialization is not specific to the point of excluding other activities, and performance is not dominantly controlled by natural stimuli which are timed to produce breeding and births in naturally determined seasons.

In *homo sapiens*, structure is generalized, the brain is greatly enlarged, and adaptation and specialization are dependent upon cultural processes.<sup>3</sup> Human beings learn to accumulate information, to verify or disprove it, and to transmit it in space and time. We learn about the various environments and alternative responses to problems of existence in each; how to make various responses, and how to teach others to do so; how to make and use sophisticated tools; how to distribute auxiliary and complementary functions by voluntary assumption or compulsory assignment; how to organize and direct cooperative projects; and how to regulate and govern interpersonal relationships.

In short, human beings are not directed to ends, and to means for achieving those ends, by natural processes beyond our own direction and control. Given general, cumulative intelligence and great plasticity of behavior, human beings, to a high degree, have taken over from nature the direction and control of events external to our own organisms. This area of external responsibility includes searching out life opportunities, identifying them as ends to be sought, and devising means to achieve them. The means are both material and nonmaterial. The material means is technology. The nonmaterial means is society. When a new life opportunity presents itself, such as turning shafts, cams, and wheels by compression energy released from oxidizing fuels, successful exploitation depends upon devising new tools and procedures, and new sets of auxiliary and complementary activities. One has only to think of the machines and the changes in society that resulted from industrialization to understand that technology and society are means to the exploitation of new life opportunities for human beings.

Human societies, formed and preserved by cultural processes, are not characterized by necessity of performance as are societies directed

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3. Processes within the direction and control of the organisms involved, *i.e.*, human

and controlled by the natural processes of structural adaptation and structural and behavioral specialization. The generalized structure, high and cumulative intelligence, and plasticity of behavior of human beings carry potentialities of more complex, flexible, and effective organization of auxiliary and complementary sets of human actions. But they also carry alternative potentialities—for obstructive or destructive actions, nonperformance of assigned actions, and simultaneous incompatible actions.

The absence of necessity in human societies was not a problem, however, until it was consciously adverted to and the consequences considered. Alternative potentialities can be shut out by belief that one has no choice, as well as by absence of choice in fact. Taboo, custom, totemism, and naturalistic religions supplied the beliefs of early human societies that made assigned actions and restraints seem to be part of an immutable order, beyond human understanding or control. The low level of accumulated knowledge and experience lent credibility to a belief in the inevitability of social roles. In the bronze age it must have been starkly evident that survival of the social group depended upon performance of the relatively few auxiliary and complementary activities that would assure a secure supply of bronze tools and weapons and their effective utilization.

The Greek natural philosophers created the need for law, as a process to establish and preserve social order, when they insisted that the unexamined life is not worth living; the study of ontology and epistemology led to self-consciousness about the human role in constructing the reality in which we live. The distinction between human and natural "laws" had to be faced. Natural laws describe the necessary relationship between physical or biological cause and effect. Human laws prescribe the actions and restraints that are required if a human society is to function effectively. Along with an awareness that the performance of actions and restraints essential to society were merely required, not necessary, came the need for credible justification of that which is required. That is the function of legal and social philosophy.

Greek rationality made the ancient Mediterranean world only partially, and briefly, self-conscious about the human origin of social order. The assent of rational beings became the basis of the Roman private law, the law between one person and another with respect to commercial transactions, property ownership and use, status of persons, con-

tractual and delictual obligations, domestic relations, and inheritance. But the assent of rational beings did not replace the long-held belief in the "will of the gods" as the source of governing authority, the structure of government, and the relations between governor and the governed. The acceptance of Christianity modified but reinvigorated the belief in a divine source of governing authority. The Holy Roman Empire expressed this belief into the modern era.

When the source of governing authority is believed to be divine, the order of politically organized society is thought to be *ordained*, not constituted by human choice and assent. Constitutions—of governing institutions, of the relations between governors and the governed, and of relations *inter se* between self-governing beings—are the work of the modern era. With the spread of constitutionalism and the rise of mass education, it became more clearly and generally recognized that socially beneficial actions and restraints were required. Therefore, law has become increasingly important in the modern era. On the detriment side, the increasing self-consciousness of human social organization and action puts tremendous strain on the law, which is almost continuously in a crisis of effectiveness. On the benefit side, we are increasingly aware that social change need not be viewed as the destruction of universal values, but as the means for the realization of new values through exploitation of new life opportunities. Law authorizes and seeks to establish and maintain the order of society. When a new order of society is needed so as to enable human beings to respond effectively to a new life opportunity, law must authorize and seek to establish the appropriate new social order.

I have spoken of society, technology, and law. What of science? Science is the name we give to the modern, highly systematic mode and function of thought by which human beings know the world in which we live. Science discovers new life opportunities. Human science is not limited to discovering life opportunities in the various environments of the earth as they existed prior to the advent of the human life form. Human beings can create new environments.

Human beings have become a geologic force. The realm of inert matter is the geosphere, its basic building block is the atom, and its process of change is geogenesis. The realm of living matter is the biosphere, its basic building block is the cell, and its process of change is biogenesis. Much of the crust of the earth, now part of the geosphere, was once part of the biosphere as plants and animals which came into



the geosphere by decomposition and fossilization. Therefore, the inert materials of the earth that are produced by natural processes are the products of geogenesis or of both biogenesis and geogenesis. Most of the strategic materials of modern industrial production, however, are not natural materials. They are the result of cultural processes, produced by physical, chemical, or electrical processes and reactions initiated and directed by human beings. Iron and aluminum are examples of cultural materials that have long been essential to industrial production. Plastics, polymers, and the new metals of supersonic aircraft and rocket-powered spacecraft are more recent examples.

Human beings have become a biologic force; indeed, to a frightening extent. Nuclear and thermonuclear devices with enough explosive power and radioactivity to wipe out human and many other forms of life are already in underground silos and in cruising submarines, awaiting a set of signals to send them towards their targets. Ecologists warn that our exploitation of life opportunities is so powerful and heedless that we may exhaust the life support capacity of the earth—the capacity to make oxygen, to purify water, to grow food, to supply energy. We are on the threshold of controlling human life and behavior by cloning, genetic engineering, operant conditioning, and changing the electrochemical brain system by drugs, electrode implants, and surgical procedures.

To recapitulate: Human beings, the same as any other life form, seek to effectively exploit life opportunities, but human beings must use cultural processes whereas other life forms are under the direction and control of natural processes. Science is the name we give to the modern systematic thought by which human beings know the world in which we live. Science discovers life opportunities arising from natural processes and from human intervention in the geosphere and biosphere. Perceived life opportunities are exploited by the material means of technologies and by the nonmaterial means of organizing sets of auxiliary and complementary activities which, when serially or simultaneously performed, will result in the benefits of specialized division of efforts, or society. Human society is not characterized by necessity because human beings are not morphologically but culturally specialized to social roles. As we become increasingly aware of this lack of necessity, it becomes correspondingly more important to utilize law to require the actions and restraints necessary for a given society to function effectively.

Ethics remains to be discussed. I have included ethics as a part of the perspective for understanding the significance of computers because I think we need to make a new, and profoundly important, use of ethics. Ethics has always meant the study of the good way of life, or good behavior. It is a discipline within the cultural processes of establishing and maintaining societies, supplementing the law by inducing voluntary acceptance of and compliance with the obligations of a social order.

The new suggested use of ethics arises from the fact that the power of human beings over the geosphere and the biosphere, and of environments not restricted to the earth, has become so great that we need to distinguish between the good and bad potentialities of these environments. The overwhelming proliferation of species within genera and phylla indicates that the natural processes of evolution are neutral as to life opportunities within these environments. A specialized insect is evolved for every food source, every condition, every foe. I suspect that to date human beings have been equally unselective. Doubtless some voices were raised against using fire, the wheel, the combustion engine, but the possible dangers were imagined, and therefore unper-suasive, when compared with the benefits which were concrete and demonstrable.

At present, human beings have the capability to do immense and irreversible damage to life forms and ecosystems. Fortunately, we also have the capacity to anticipate and avoid such disastrous courses of action. In recent years we have been warned of the dangers of non-biodegradable insecticides, mercury, and PCB's in water supplies; of radioactive wastes in any environment; of degradation of the lower-stratosphere ozone shield by nitrogen oxides from supersonic planes or fluorocarbon sprays. The computer is a special kind of technology because it enables us to anticipate the future effects of developing technologies and societies in order to exploit perceived potentialities. For instance, computers enabled Harold Johnston to construct mathematical model ecosystems of the lower stratosphere in order to test the effects of the introduction of nitrogen oxides.<sup>4</sup> Computers can be used to

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4. H. JOHNSTON, CATALYTIC REDUCTION OF STRATOSPHERIC OZONE BY NITROGEN OXIDES (1971). This is the pioneering study that first alerted the scientific world to the danger of depletion of the ozone layer by nitrogen oxides emitted in the exhaust gases of supersonic planes. Subsequently, it was discovered that the fluorocarbons used in some aerosol sprays also threaten depletion of the ozone layer.

simulate the kinds of values, obligations, institutions, and procedures that would be appropriate in a society that relied upon specified types of genetic engineering, thus facilitating the anticipation and avoidance of courses of action that would devastatingly damage the human spirit.

Surely the time has come when technical capability and economic feasibility are not sufficient reasons to exploit any and every potentiality of scientific discoveries. We need to interpose the ethical determination of whether each potentiality is an opportunity for more satisfying lives and more decent communities, or an evil to be avoided. It may well be that enabling human beings to anticipate the future effects—on ecosystems and on the human spirit—of scientifically discovered potentialities, so that we can distinguish between opportunities to be pursued and evils to be avoided, will be the principal benefit of computers.<sup>5</sup>

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5. The ideas summarized herein have been discussed more fully in Dorsey, *A Proposed International Agreement To Anticipate and Avoid Environmental Damage*, 6 IND. L. J. 190 (1972); Dorsey, *The Impact of Scientific and Technical Progress on the Development of Law*, in LAW IN THE UNITED STATES OF AMERICA IN SOCIAL AND TECHNOLOGICAL REVOLUTION 31 (J. Hazard & W. Wagner eds. 1974); Dorsey, *A Proposal for a New Division of the Curriculum*, in THE PHILOSOPHY OF THE CURRICULUM 247 (S. Hook, P. Kurtz, & M. Todorovich eds. 1975); Dorsey, *Notes on Philosophy of Law from an Evolutionary Perspective*, in FESTSCHRIFT FOR LUIS RECASÉNS-SICHES (F. Rodriguez ed., forthcoming).