

# The Foundation of Computer Ethics\*

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**N**orbert Wiener's monumental computer ethics book *The Human Use of Human Beings*, first published in 1950,<sup>1</sup> makes important use of ideas that can be traced as far back into history as Aristotle. Combining Aristotelian ideas about animal physiology, behavior and the purpose of a human life with the new science of "cybernetics" (the science of "information feedback" which Wiener and others had recently created), Wiener laid down in 1950 a comprehensive foundation that remains today — half a century later — a powerful basis for practicing computer ethics. Wiener's ethical approach, however, is significantly different from Aristotle's, since he adopts as ethically central three "great principles of justice", rather than using virtues and vices like Aristotle. The present essay lays out the major components of Wiener's computer ethics foundation in order to initiate among philosophers a long-overdue discussion and examination of Wiener's computer ethics accomplishments. Presented here is an exegesis of Wiener's main ideas, rather than a philosophical defense or critique of them. Such a project would be a very ambitious undertaking that would require a book instead of an article. (Philosophers will nevertheless find, in the present essay, a variety of ideas to debate and explore.<sup>2</sup>)

## Aristotle and Wiener on Animal Behavior

Aristotle, of course, did not use 20<sup>th</sup>-century terms like *cybernetics*, *feedback*, *input*, *output* or *information processing*. Nevertheless, his explanations of animal behavior and of human action, as well as his account of the purpose of a human life, include a number of ideas that are remarkably similar to those used by Wiener to develop a foundation for computer ethics. Aristotle, for example, described animals as *information-processing entities*. Indeed, Aristotle's way of distinguishing animals from plants is by the ability of animals, unlike plants, to perceive. Every animal, he said, has at least the sense of touch, and so every animal receives information from the external world into its body.

On Aristotle's view, once perceptual information is received inside an animal's body, it is processed in ways that depend upon the animal's specific physiology. The processing of such information typically triggers behavior that is characteristic of the kind of animal in question. Aristotle explores this "triggering" process in his explanation of what

later scholars called "the practical syllogism", which functions within an animal's body very much like a conditional *if... then* operator functions in a modern computer. In non-human animals, this triggering is an automatic function of the physiology and does not require the kind of conscious reasoning that human animals perform. (For details see Aristotle's *On the Movement of Animals* and *On the Soul*; see also Bynum 1986 where these ideas are examined at great length.)

In summary, the physiology of an animal, according to Aristotle, determines: (1) the kinds of perceptual information that the animal can acquire, (2) how this information is processed within its body, and (3) what the resulting animal behavior will be. For the simplest animals, according to Aristotle, the internal processing of perceptual information is itself rather simple. In such animals, perceptual information is not retained for later use, but merely triggers appropriate reflexes at the time — a "withdraw" reflex for harmful entities, an "ingest" reflex for food, and a "mate" reflex for potential reproductive partners.

In all but the simplest animals, however, the processing of perceptual information, according to Aristotle, is more complicated. In particular, most animals retain within their bodies information from *prior* perceptions and then use the retained information in various ways to shape and monitor their responses to *new* perceptions and circumstances. In this way, they are able to respond quickly and appropriately to changes in their environments. Most animals, therefore, learn from their past experiences by means of retained perceptual information and apply this learning to new situations. In very sophisticated animals, says Aristotle, the retained perceptual information explains the possibility of memories, dreams, recognition of complex patterns, and the making of sophisticated decisions.

Aristotle, to be sure, knew nothing of today's computerized automata; but it is most striking to see how closely such automata resemble "Aristotelian" animals — they have "sense organs" that provide information from the external world, they have internal information storing and processing mechanisms that manipulate the received information, and they have output devices that interact with the external world in ways which depend upon received, stored and processed information. For these and related reasons, Aristotle's accounts

of animal behavior and human action provide a rich and suggestive foundation for automata theory and artificial intelligence.<sup>3</sup>

In *The Human Use of Human Beings*, Wiener presents an account of animal behavior that is, in all relevant respects, the same as Aristotle's. In addition, with passages like the following, Wiener's book could be viewed as laying foundations for Aristotelian artificial intelligence theory.<sup>4</sup>

While it is impossible to make any universal statements concerning life-imitating automata in a field which is growing as rapidly as that of automatization, there are some general features of these machines that I should like to emphasize. One is that they are machines to perform some definite task or tasks, and therefore must possess effector organs (analogous to arms and legs in human beings) with which such tasks can be performed. The second point is that they must be *en rapport* with the outer world by sense organs, such a photoelectric cells and thermometers, which not only tell them what the existing circumstances are, but enable them to record the performance or nonperformance of their own tasks. This last function, as we have seen, is called *feedback*, the property of being able to adjust future conduct by past performance. . . .

For all these forms of behavior, and particularly for the more complicated ones, we must have central decision organs which determine what the machine is to do next on the basis of information fed back to it, which is stored by means analogous to the memory of a living organism. (1954, pp. 32-33)

### Aristotle and Wiener on Human Nature

According to Aristotle, the most sophisticated information processing in the animal kingdom occurs within human beings. In particular, the kinds of information processing that Aristotle called "theoretical reasoning" and "practical reasoning" include what we, today, call "comparison", "pattern recognition", "concept formation", "inductive reasoning", "deductive reasoning", "evaluating" and "decision making". Such information processing, according to Aristotle, yields concepts, beliefs and hypotheses; and these, in turn, endow humans with the ability to consider alternative possibilities, evaluate them in various ways, and choose some over others. By this means, humans are able to set goals and manipulate nature in an endless variety of ways to serve their own needs and desires.<sup>5</sup> For Aristotle, then, it is sophisticated *reasoning* — both theoretical and practical reasoning — that distinguishes humans from other animals, and it is reasoning that yields knowledge, virtue, wisdom and other intellectual achievements, making possible the existence of ethics, law, government and society.

Like Aristotle before him, Wiener also considers human beings to be the most sophisticated information processors in the animal kingdom. Humans are animals that are especially capable of reasoning and learning, said Wiener, and (unlike Aristotle?) he explicitly attributed these abilities to the physiology of humans compared to the physiology of

other animals. In *The Human Use of Human Beings*, as if to emphasize this point, Wiener often compares human physiology to that of insects like ants:

*Cybernetics takes the view that the structure of the machine or of the organism is an index of the performance that may be expected from it. The fact that the mechanical rigidity of the insect is such as to limit its intelligence while the mechanical fluidity of the human being provides for his almost indefinite intellectual expansion is highly relevant to the point of view of this book. (1954, p. 57, italics in the original)*

Man thus spends what may amount to forty percent of his normal life as a learner, again for reasons that have to do with his physical structure. It is as completely natural for a human society to be based on learning as for an ant society to be based on an inherited pattern. . . . man's advantage over the rest of nature is that he has the physiological and hence the intellectual equipment to adapt himself to radical changes in his environment. The human species is strong only insofar as it takes advantage of the innate, adaptive, learning faculties that its physiological structure makes possible. (1954, p.58)

### Ethics and the Purpose of a Human Life

For both Aristotle and Wiener, the sophisticated information-processing capabilities of human beings provide a basis for the overall purpose of a human life. This, in turn, leads readily to an account of the nature of ethics.<sup>6</sup>

What, according to Aristotle, is the purpose or overall goal of a human life? Nature, he says, has assigned to every kind of animal, including humans, *the very same general purpose* or goal in life; namely, to *flourish* as an animal of that type — to do excellently whatever that kind of animal is especially equipped to do. Because humans are especially equipped to reason theoretically and practically, an *excellent* human being, according to Aristotle, is someone who acquires knowledge excellently via theoretical reasoning and habitually performs actions excellently via practical reasoning. Given this overall goal in life, a person can fulfil it in a wide diversity of ways — as a statesman or soldier, as a teacher or philosopher, as a tradesman or builder, and so on.

Aristotle's account of *excellent action* is, essentially, his ethics — his theory of virtue and vice; and the sophisticated information processing that he calls "practical reasoning" is the very *source* of human action. So Aristotle's ethical theory emerges naturally from his account of human information processing.

In addition, on Aristotle's view, human beings are fundamentally *social* beings; the virtues and vices of Aristotle can only develop in a *community* context — knowledge and science, ethics and law are all social achievements requiring communication and interaction among communities of reasoning, decision-making beings. Sophisticated information processing, then — both *within* human beings as individuals and *among* them as members of society — constitutes for Aristotle the wellspring of ethics and of the purpose of a

human life. (See the works of Aristotle listed in the references below, and see especially Bynum 1986.)

Wiener's account, in *The Human Use of Human Beings*, of the overall purpose of a human life

is fundamentally Aristotelian. Of course, rather than being shaped by Aristotle's biology and physics, Wiener's views are informed and influenced by late-19<sup>th</sup> and early-20<sup>th</sup> century science — thermodynamics, statistical mechanics, Darwinian biology, etc. And unlike Aristotle, Wiener does not make virtues and vices the core of his ethical theory, but opts instead for a set of justice principles (see the details below).

Of special note is Wiener's discussion of entropy and the related Second Law of Thermo-dynamics. According to that Law, the universe, considered as a whole, is "running down" — changing continuously from a state of order and structure into a state of disorder and chaos. Eventually, according to the Second Law of Thermodynamics, everything in the universe will be the same:

As entropy increases, the universe, and all closed systems in the universe, tend naturally to deteriorate and lose their distinctiveness, to move from the least to the most probable state, from a state of organization and differentiation in which distinctions and forms exist, to a state of chaos and sameness. (Wiener 1954, p. 12)

Viewed from the aspect of eternity, therefore, all specific human achievements within the present universe — no matter how "permanent" — must eventually be destroyed as they blend into homogeneity:

Sooner or later we shall die, and it is highly probable that the whole universe around us will die the heat death, in which the world shall be reduced to one vast temperature equilibrium in which nothing really new ever happens. (Wiener 1954, p. 31)

Fortunately, according to Wiener, this very pessimistic view of the future of the universe and of human achievements should not trouble us. The final end of the universe, after all, is a very long way off — billions of years hence. So even though living things, their achievements and societies, represent a tiny exception in a "deteriorating" universe, they apparently can continue for thousands, if not millions, of years to come. In the foreseeable future, therefore, structure, order, life and purpose will all have an important place in the world as we know and understand it.

Wiener, therefore, finds it appropriate, and indeed most helpful from the point of view of ethics, to consider the purpose of a human life. Like Aristotle before him, Wiener concludes that the purpose of a human life is to *flourish* as the kind of information-processing beings that humans naturally are:

I wish to show that the human individual, capable of vast learning and study, which may occupy almost half of his life, is physically equipped, as the ant is not, for this capacity.

Variety and possibility are inherent in the human sensorium — and are indeed the key to man's most noble flights — because variety and possibility belong to the very structure of the human organism.

While it is possible to throw away this enormous advantage that we have over the ants [and the rest of the animal kingdom], and to organize . . . [an] ant-state with human material, I certainly believe this is a degradation of man's very nature, and . . . a waste of the great human values which man possesses. . . . if the human being is condemned and restricted to perform the same functions over and over again, he will not even be a good ant, not to mention a good human being. (1954, pp. 51-52)

A good human life, according to Wiener, is one in which "the great human values" are realized — one in which the creative and flexible information-processing potential of "the human sensorium" enables humans to reach their full promise in variety and possibility of action. Human information processing, at its best, leads to "man's most noble flights". Of course, different humans have differing levels of talent and possibility, so one person's achievements will differ from another's; and it is possible to lead a good human life in an indefinitely large number of ways — as a public servant or statesman, a teacher or scholar, a scientist or engineer, a musician, an artist, a tradesman, an artisan, and so on.

## Principles of Justice

Wiener's account of the purpose of a human life leads him (unlike Aristotle with his virtue theory) to adopt what he calls "great principles of justice" upon which a society should be built — principles that, in his view, would maximize a person's ability to flourish through variety and flexibility in human action. To highlight Wiener's "great principles of justice", let us call them "The Principle of Freedom", "The Principle of Equality" and "The Principle of Benevolence". (Wiener himself does not assign names beyond using the slogan of the French Revolution.) Using Wiener's own definitions for these key ethical concepts yields the following list (1954, pp. 105-106):

- *The Principle of Freedom* — Justice requires "the liberty of each human being to develop in his freedom the full measure of the human possibilities embodied in him".
- *The Principle of Equality* — Justice requires "the equality by which what is just for A and B remains just when the positions of A and B are interchanged".
- *The Principle of Benevolence* — Justice requires "a good will between man and man that knows no limits short of those of humanity itself".

In addition to these three "great principles of justice", Wiener adds a fourth principle in order to establish a significant limitation on government and society. Let us call it "The Principle of Minimum Infringement of Freedom":

- *The Principle of Minimum Infringement of Freedom* — “What compulsion the very existence of the community and the state may demand must be exercised in such a way as to produce no unnecessary infringement of freedom”. (1954, p.106)

Given Wiener’s account of the purpose of a human life — to realize one’s full human potential in variety and possibility of action — it is not surprising that he chose the Principle of Freedom as the first principle of ethics. In addition, since Wiener considered the purpose of a human life to be the same for everyone, his Principle of Equality follows logically from his view of human nature. And clearly Wiener believed that human freedom would be served best if everyone sympathetically and helpfully looked out for the well-being of all. That is why he included the Principle of Benevolence among his “great principles of justice”.

Wiener (like Aristotle) considered humans to be fundamentally *social* beings who can reach their full potential only by actively participating in communities of similar beings. Society, therefore, is essential to a good human life. By applying ideas from cybernetics, Wiener construed human societies as very much like “organisms” whose internal communications and information feedback mechanisms constitute the “cement” that binds society together. But society can be despotic and oppressive, and thereby limit or even stifle freedom; so Wiener introduced his Principle of Minimum Infringement of Freedom to limit as much as possible society’s negative impact upon freedom.

### Wiener on Multiple Societies and Ethical Relativism

Given Wiener’s view of the purpose of a human life, *it is possible to live a good life in a very wide diversity of societies and communities*. Wiener clearly believes that human potential can be fulfilled to various degrees, with some societies providing less infringement upon creative and flexible human action than others. In *The Human Use of Human Beings*, he discusses a number of different societies, such as the Eskimos, India, feudalism, despotism, fascism and American representative democracy. (See, for example, 1954, pp. 50-52.) Wiener reserves his harshest criticism for “communities ruled by despots” like the fascist states of the first half of the 20<sup>th</sup> century; and he expresses his belief that if a democracy like the United States were to live up to its ideals of freedom for all, it would be a model community for achieving human good. Of course, he also made it clear in *The Human Use of Human Beings* (and elsewhere) that he thought the American society of the mid-20<sup>th</sup> century fell far short of an ideal society.

If one accepts Wiener’s account of human nature and the good society, it follows that many different cultures, with a wide diversity of customs, religions, languages and practices, can provide a conducive context for human fulfilment and a good life. Indeed, given Wiener’s view that “variety and possibility belong to the very structure of the human organism”,

he presumably would expect and encourage the existence of a broad diversity of cultures around the world to maximize the possibilities for choice and creative action. The primary restriction that Wiener would impose upon any society would be that it should provide the kind of context in which humans can realize their full potential as sophisticated information-processing agents; and he believed this to be possible only where significant freedom, equality and human compassion hold sway.

So-called “ethical relativists” often point to the wide diversity of cultures in the world — with various religions, laws, codes, values and practices — as evidence that there is no global ethics, no underlying universal ethical foundation. Wiener, on the other hand, has a powerful and creative response to such sceptics. His account of human nature and the purpose of a human life *can embrace and welcome the rich diversity of cultures, laws, norms and practices that relativists are fond of citing*. At the same time, Wiener can advocate *an underlying ethical foundation for all societies and cultures*.<sup>7</sup>

### The Importance of Computer Ethics

Throughout history, until the Second World War, the only information-processing entities on earth, according to Wiener, were living organisms (and perhaps communities of such organisms). Suddenly, in the 1940s, the invention of computerized automata changed this fact and brought with it a monumental ethical challenge to humanity. In 1948, in his book *Cybernetics: or Control and Communication in the Animal and the Machine*, Wiener said this:

It has long been clear to me that the modern ultra-rapid computing machine was in principle an ideal central nervous system to an apparatus for automatic control; and that its input and output need not be in the form of numbers or diagrams but might very well be, respectively, the readings of artificial sense organs, such as photoelectric cells or thermometers, and the performance of motors or solenoids. . . . we are already in a position to construct artificial machines of almost any degree of elaborateness of performance. Long before Nagasaki and the public awareness of the atomic bomb, it had occurred to me that we were here in the presence of another social potentiality of unheard-of importance for good and for evil. (Wiener, 1948, p.27)

According to Wiener, computerized automata have the potential to radically transform a society by altering the internal communications and information processing that shape the fabric of society and constitute the ties that bind society together.

It is the thesis of this book that society can only be understood through a study of the messages and the communication facilities which belong to it; and that in the future development of these messages and communication facilities, messages between man and machines, between machines and man, and between

machine and machine, are destined to play an ever-increasing part. (1954, p. 16)

[The presence and nature of feedback within society] is ignored by the average man, and in particular does not play the role that it should in our habitual analysis of society; for just as individual physical responses may be seen from this point of view, so may the organic responses of society itself. I do not mean that the sociologist is unaware of the existence and complex nature of communications in society, but until recently he has tended to overlook the extent to which they are the cement which binds its fabric together. (1954, p.27)

In the future, as a result of the invention of “life-imitating” machines, there will be dramatic changes in social policies and practices, the law, the economy and human relationships. Consider, for example, some of the economic implications of computerized automata. The development of such machines “gives the human race a new and most effective collection of mechanical slaves to perform its labor”. (1948, p. 27) But slave labor effectively eliminates many human jobs, making people with average skills and abilities worthless in the job market. Even the intellectual labor of a human brain is not immune to replacement by machines. Wiener noted:

Perhaps I may clarify the historical background of the present situation if I say that the first industrial revolution, the revolution of the ‘dark satanic mills,’ was the devaluation of the human arm by the competition of machinery. There is no rate of pay at which a . . . pick-and-shovel laborer can live which is low enough to compete with the work of a steam shovel as an excavator. The modern industrial revolution [ i.e., the computer revolution] is similarly bound to devalue the human brain, at least in its simpler and more routine decisions. . . . The answer, of course, is to have a society based on human values other than buying and selling. To arrive at this society, we need a good deal of planning and a good deal of struggle. . . . (1948, pp. 26-27)

At least theoretically, according to Wiener, computerized machines might someday rival human intellectual capacities. In *The Human Use of Human Beings*, he notes that

Theoretically, if we could build a machine whose mechanical structure duplicated human physiology, we could have a machine whose intellectual capacities would duplicate those of human beings. (1954, p. 57)

If we build machines “whose intellectual capacities duplicate those of human beings”, what will be the social and ethical consequences? Will such machines have a purpose of their own that rivals that of humans? Will they have the right to “flourish” and have “principles of justice” like humans? Will machines whose intellectual capacities even *exceed* those of human beings have rights that thereby *override* human rights? These are only a few of the obvious ethical issues that would emerge from the existence of such automata.

Perhaps some philosophers or religious thinkers in the future will attempt to answer these questions by stating that humans are *alive* while machines are *not alive*. In this way, they might argue that human purposes and human justice must prevail over those of “mere machines”. But Wiener, if he were here today, would need clear practical reasons for adopting such a view, in light of passages like the following:

such words as life, purpose and soul are grossly inadequate to precise scientific thinking. These terms have gained their significance through our recognition of the unity of a certain group of phenomena, and do not in fact furnish us with any adequate basis to characterize this unity. Whenever we find a new phenomenon which partakes to some degree of the nature of those which we have already termed ‘living phenomena,’ but does not conform to all the associated aspects which define the term ‘life,’ we are faced with the problem of whether to enlarge the word ‘life’ so as to include them, or to define it in a more restrictive way so as to exclude them. . . . Now that certain analogies of behavior are being observed between the machine and the living organism, the problem as to whether the machine is alive or not is, for our purposes, semantic and we are at liberty to answer it one way or the other as best suits our convenience. (1954, pp. 31-32)

With “machines of almost any degree of elaborateness of performance” — machines that can even replace intellectual powers of the human brain — society will be simultaneously blessed and cursed by a nearly universal tool:

Thus the new industrial revolution is a two-edged sword. It may be used for the benefit of humanity, but only if humanity survives long enough to enter a period in which such a benefit is possible. It may also be used to destroy humanity, and if it is not used intelligently it can go very far in that direction. (1954, p. 162)

In summary, then, it was Wiener’s view that computerized machines are destined to transform the messages and communications that constitute the “cement” that maintains and shapes human society. The “slave labor” and intellectual capacities of a nearly universal tool — the computerized machine— will radically transform society and challenge our ability to preserve and defend human values. To achieve this crucial goal will require “a good deal of planning and a good deal of struggle”.

### The Basic Questions of Computer Ethics

As we enter the 21<sup>st</sup> century, many of the terms that we use today to discuss issues in computer ethics are different from the words used by Wiener fifty years ago. Indeed, the very term *computer ethics* itself did not come into common usage until the mid 1970s (a decade after Wiener’s death) when Walter Maner began using it in his writings, his conference presentations, and his university courses. (Maner 1978) Today, in place of Wiener’s terminology — “computerized automata”, “automatization”, “the second industrial revolution”

— we use terms like “information and communications technology” (ICT) and “the information revolution.” Nevertheless, the fundamental questions that Wiener raised in the 1940s and early 1950s about the creation and use of computer technology are the very same questions that are central to computer ethics today:

- A. *Wiener's Question* — What will be the social and ethical consequences of introducing ultra-rapid computing machines into society?  
*Our Comparable Question* — What are the social and ethical implications of creating and using ICT?
- B. *Wiener's Question* — How can human beings anticipate and cope with the social and ethical consequences of automatization in ways that serve and preserve human values?  
*Our Comparable Question* — How can we ethically integrate ICT into society?
- C. *Wiener's Question* — What are the special obligations and responsibilities of people who are engaged in automatization and the creation of computerized automata?  
*Our Comparable Question* — What are the specific social and ethical responsibilities of ICT professionals?

In 1950, in *The Human Use of Human Beings*, Wiener, made these and related questions *the defining issues of computer ethics*; and he thereby became the founder of computer ethics as a field of scholarly research. From Wiener's point of view, though, computer ethics is too important to be left to the academics or to ICT professionals alone. Ethically integrating ICT into society is a challenge for everyone — for public policy makers, teachers and scholars, industrial leaders, workers and shop keepers — everyone! Computer ethics is nothing less than a monumental challenge that all of humanity must face together.

The same basic questions that Wiener raised in the 1950s are being address today — for example, in textbooks like those of Johnson (1985, 1994) or Weckert & Adeney (1997); in codes of ethics and professional guidelines like those of Gotterbarn (1997) and of Rogerson (1997,1998); in the articles and conference presentations of thinkers like Maner (1996), Moor (1985, 1998a, 1998b), Gorniak (1996) and van den Hoven (1996). Indeed, it would be difficult to find a computer ethics publication today that does not fall within the scope that Wiener laid out half a century ago.

Even the *more specific* computer ethics questions that Wiener addressed in the early 1950s are “hot topics” today — questions about unemployment and the impact of computers in the work place; encryption and government secrecy; computerized weapons of war; computing for persons with disabilities; ownership of intellectual property; the replacement of human decision-making by computers. On this last topic, Wiener said, for example,

[A person] will not leap in where angels fear to tread, unless he is prepared to accept the punishment of the fallen angels. Neither will he calmly transfer to the machine made in his own image the responsibility for his choice of good and evil, without continuing to accept a full responsibility for that choice. (1954, p. 184)

Any machine constructed for the purpose of making decisions, if it does not possess the power of learning, will be completely literal-minded. Woe to us if we let it decide our conduct, unless we have previously examined the laws of its action, and know fully that its conduct will be carried out on principles acceptable to us! On the other hand, the machine . . . which can learn and can make decisions on the basis of its learning, will in no way be obliged to make such decisions as we should have made, or as will be acceptable to us. For the man who is not aware of this, to throw the problem of his responsibility on the machine, whether it can learn or not, is to cast his responsibility to the winds, and find it coming back seated on the whirlwind. (1954, pp. 185)

### Ethics and the Law

In Chapter VI of *The Human Use of Human Beings*, Wiener discusses law and ethics in ways that do not distinguish one from the other. Indeed, he defines law as *a particular aspect of ethics*; namely, that part of ethics that is enforced by social sanctions. Law, he says, “is the process of adjusting the ‘couplings’ connecting the behavior of different individuals in such a way that what we call justice may be accomplished”. (1954, p. 105) Presumably, the *rest* of ethics also concerns justice and the adjustment of human behavior; but, instead of formal social sanctions like imprisonment or fines, society employs less formal means, such as persuasion and reproach, for aspects of ethics which are not part of the law.

Because Wiener considers the law to be an aspect of ethics, his account of how to apply the law can shed some light on the more general issue of *how to apply ethics*. Let us therefore examine Wiener's account of the effective application of law, then carry over the relevant ideas to the more general question of applying ethics. According to Wiener,

The theory and practice of the law involves two sets of problems: those of its general purpose, of its conception of justice; and those of the technique by which these concepts of justice can be made effective. (1954, p. 105)

For Wiener, the ultimate purpose of justice is to organize and run society in such a way that human beings may flourish and reach their full potential. He believed, as discussed in Section 4 above, that human flourishing requires adherence to three “great principles of justice” as well as limitations on society's infringement of freedom. Furthermore, he said, the successful application of law requires clarity of concepts and rules:

Besides the general principles of justice, the law must be so clear and reproducible that the individual citizen can assess his rights

and duties in advance, even where they appear to conflict with those of others. He must be able to ascertain with a reasonable certainty what view a judge or a jury will take of his position. If he cannot do this, the legal code, no matter how well intended, will not enable him to lead a life free from litigation and confusion. . . . Thus it is the first duty of the law to see that the obligations and rights given to an individual in a certain stated situation be unambiguous. (1954, pp. 106-107)

In addition to clarity of obligations and rights, effective application of the law requires strong focus upon *precedent*:

no new legal term has a completely secure meaning until it and its limitations have been determined in practice; and this is a matter of precedent. . . . Every case decided should advance the definition of the legal terms involved in a manner consistent with past decisions, and it should lead naturally on to new ones. Every piece of phraseology should be tested by the custom of the place and of the field of human activity to which it is relevant. (1954, p. 107)

A third requirement for the effective application of law is “a good clear tradition of interpretation”:

The judges, those to whom is confided the task of the interpretation of the law, should perform their function in such a spirit that if Judge A is replaced by Judge B, the exchange cannot be expected to make a material change in the court’s interpretation of customs and of statutes. (1954, p.107)

In summary, then, effective application of law requires three things:

unambiguity, precedent, and a good clear tradition of interpretation are worth more than a theoretical equity, particularly in the assessment of responsibilities. (1954, p. 108)

### How to Do Computer Ethics

Let us now apply the above ideas to the application of ethics in general. Doing so, yields the following guidelines for applying ethics:

- *Human Purpose* — Ethical judgments and practices must be grounded in the overall purpose of a human life: society and the rules which govern its members must make it possible for people to flourish — to reach their full potential in variety and possibility of action.
- *Principles of Justice* — The Principle of Freedom, the Principle of Equality and the Principle of Benevolence should govern every person’s judgments and practices; and society must neither permit nor impose unnecessary limitations upon individual freedom.
- *“Unambiguity”* — The meanings of ethical concepts and rules, in a given situation, should be clear and unambiguous. If they are not, one must undertake to clarify their meanings to the extent possible.
- *Precedent and Tradition* — New ethical judgments and cases should be assimilated into the existing body of cases, rules, laws, policies and practices.

Given this analysis of applying ethics, we are in position to describe how to do computer ethics in keeping with Wiener’s account of justice and law:

- *Step One*: Identify an ethical question or case regarding the integration of ICT into society.
- *Step Two*: Clarify any ambiguous concepts or rules that may apply to the case in question.
- *Step Three*: Apply existing principles, laws, rules, policies and practices which govern human behavior in the given society. Use precedent and traditional interpretation in such a way as to *assimilate the new case or policy into the existing set of social policies and practices*.

For any given society, there will be a “cluster” of existing laws, rules, principles and practices to govern human behavior within that society. These form a complex and extremely rich set of overlapping, crisscrossing policies that constitute a “received policy cluster” (see Bynum and Schubert 1997). This received cluster of policies should be the starting point for developing an answer to any computer ethics question.

If a given case or question does not fit easily into the existing set of rules and policies, then one must either (1) make adjustments in the old policies and rules to accommodate the new case, or else (2) introduce a totally new policy to cover the new kind of case. Presumably, if such a case were to arise, one would have to use the overall purpose of a human life, together with the fundamental principles of justice, to create and justify new laws and policies consistent with the old ones.<sup>8</sup> Such a case would be an example of James Moor’s “policy vacuum” for which one must formulate and justify new policies. (See Moor 1985)

It is important to note that this method of doing of computer ethics need not involve the expertise of a trained philosopher. In any society, a successfully functioning adult will be familiar with the laws, rules, customs, practices and policies that normally govern one’s behavior in that society and enable one to tell whether a proposed action or policy would be considered ethical. If the introduction of ICT creates new possibilities and opportunities that do not fit neatly into the existing policy cluster, those affected and those responsible for implementing the new technology should *use customary means of assimilating new cases to existing precedent and interpretation*. Thus, all those in society who must cope with the introduction of ICT — whether they are public policy makers, ICT professionals, business people, workers, teachers, whatever their role in society — can and should engage in computer ethics by working to ethically integrate ICT into society. Computer ethics, understood in this way, is too vast and too important to be left only to academics or to ICT professionals!

Wiener makes it clear that, on his view, the integration of computer technology into society will constitute the re-making of society — the “second industrial revolution” — destined to affect every major aspect of life. It will be a multi-faceted, on-going process that will take decades of ef-



fort and will radically change everything. In Wiener's words, we are "here in the presence of another social potentiality of unheard-of importance for good and for evil."

A project so vast will necessarily include a wide diversity of tasks and challenges. Teachers of computer science and informatics must learn and teach new subject-matter; governments must establish new laws and regulations; industry and business must create new policies and practices; professional organizations must develop new codes of conduct for their members; sociologists and psychologists must study and understand new social and psychological phenomena; philosophers must rethink and redefine old social and ethical concepts; workers must adjust to radical changes in the workplace.

In short, everyone must come to terms with a new world. The computer revolution — predicted by Norbert Wiener fifty years ago — is now unfolding world-wide. The "information age" is emerging — "morphing" into existence before our eyes. ♦

### Endnotes

\* An earlier version of this paper was presented in July 1999 as a Keynote Address at the conference AICEC99 (Australian Institute of Computer Ethics) in Melbourne, Australia.

1. See Wiener 1950, 1954. All quotations from *The Human Use of Human Beings* in the present essay are from the 1954 Doubleday Anchor Second Edition Revised, which has significant improvements and additions to the 1950 edition.
2. For details and analyses of Aristotle's accounts of animal behavior and human action, see Aristotle's *Nicomachean Ethics, On the Movement of Animals, On Sense, On the Soul*, plus Bynum 1986, Bynum 1987, Nussbaum 1978, Tracy 1969.
3. It has long been my judgment that leading researchers in AI during the past few decades have made an important mistake by failing to develop an Aristotelian approach to artificial intelligence. Instead of focusing almost entirely on software and the processing of information, AI researchers would do well to pay more attention to the embodied nature of intelligent beings, as well as the crucial roles of context and the specific history of the beings in question. See Bynum 1985.
4. Although Wiener makes important use of a number of ideas dating from Aristotle, it is most unlikely that he intentionally used Aristotle as a source. In the *Human Use of Human Beings*, for example, Aristotle is mentioned only twice, and in neither case is he cited as an originator of any key notions that Wiener employs in his book. Like other 20<sup>th</sup> century artificial intelligence pioneers, Wiener apparently did not realize that Aristotle's accounts of animal behavior and human action can provide a rich and suggestive foundation for automata theory. It is ironic that Wiener himself laid the foundations for an Aristotelian theory of artificial intelligence without even realizing that he was doing so. (For a detailed analysis of Aristotle on animal behavior and human action, see Bynum 1986.)
5. To account for intellectual achievements like knowledge and purposeful actions, some Aristotelian scholars, especially those influenced by religious interpretations of Aristotle (e.g. Thomists), would add a non-physical "spiritual" entity (the "soul") to the physiological information-processing machinery within the human body. The debate about whether such a "soul" must be included in Aristotle's account of human action need not concern us here; although, certainly, answering this question is vital to a proper understanding of Aristotle.
6. Aristotle's ethical theory remains one of the best and most influential achievements in ethics, even after more than two thousand years of Western philosophical developments. In my view, the enormous success of Aristotle's ethics is due, at least in part, to the fact that Aristotle was the first great biologist and the first great physicist, and he rooted his ethical theory in his biological/physical account of what it is to be a human being.
7. For discussions of "global ethics" and the possibility of a worldwide ethical foundation, see Bynum and Rogerson 1996; Gorniak 1996; Moor 1998a and Moor 1998b.
8. The method of adjusting new cases and policies to fit with the old ones may very well involve a process that Rawls called "wide reflective equilibrium". (See Rawls 1971 and van den Hoven 1997.)

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