

## Computer Ethics

DEBORAH G. JOHNSON

Computer technology has raised a variety of important ethical concerns and questions. Is personal privacy being eroded because of the use of computer technology? What aspects of computer technology should be owned? Who is morally responsible for errors in software when the software is so complex that no individual human can fully understand it and when the errors lead to catastrophic effects? Will the use of encryption technology make crime detection impossible? Will virtual reality technology lead to a populace of individuals addicted to fantasy worlds? Can democracy work on the global scale of the Internet? These questions lead ultimately to deeper moral questions about what is good for human beings, what risks are worth taking to achieve what benefits, how to balance liberty and equality, and so on.

Among ethicists concerned with the issues raised by computer technology one question has been particularly contentious. Are the ethical issues surrounding computer technology unique? Some claim that the issues are so different from other ethical issues that a “new ethics” is required. Others claim that the ethical issues around computer technology are, implicitly and at their core, issues that have arisen before and can, for the most part at least, be addressed with familiar moral concepts and theories.

The uniqueness issue is intertwined with several other important and persistent questions. What is it about computer technology, and not bicycles, toasters, and light bulbs, that creates ethical issues? Is a new field of study, with its own academic courses, needed to address the ethical issues surrounding computer technology? Is a special methodology required for resolving computer ethical issues? While these issues are intertwined, the uniqueness issue seems pivotal. If we could identify something unique about the issues surrounding computer technology, it might explain why computer technology, unlike many other technologies, gives rise to ethical issues; it might provide the justification for the creation of a special field of study; and it might illuminate the question about methodology.

In what follows I am going to argue for a position that falls between the claim that computer ethical issues are unique and the claim that computer ethical issues are not unique. My argument is grounded in meta-ethical insights. I will argue that computer technology provides the *instrumentation* for human action and thereby makes it possible for human beings to do what they could not do before and do in

new ways what they could do before. When fleshed out, this account reveals computer ethical issues to be *new species of familiar ethical issues*. The new species have properties that ultimately change the meaning of ethical concepts and theories, but not so much as to justify the claim that entirely new ethical concepts or systems have been created.

The second section provides the backdrop for taking up the question of whether computer ethical issues are unique. In the first section my focus is on technology in general. I use computer examples where appropriate but my concern is with technology, not just computer technology. In subsequent sections I focus exclusively on computer technology.

## Technology, Ethics, and the Instrumentation of Human Action

It will be helpful to begin by asking about the connection between technology and ethics. How can technology be of significance to ethics? The answer involves two steps. First, technology often makes it possible for human beings to do what they could not do without it – think of nuclear bombs that can obliterate the human race, spaceships that take human beings to the moon, and cloning. Technology can create new possibilities for collective and institutional arrangements as well as for individual action. Individually, we can do what we could not do before – traveling vast distances via airplanes, accessing library materials from home, giving our organs for transplantation. As well, organizations and corporations can grow in scale and arrange themselves in complex ways, less dependent on geographical space, with fewer employees, and able to produce new kinds of products.

In addition to making it possible for human beings to do what they could not do without it, technology allows human beings to do what they could do before, but in new ways. We can engage in roughly the same activities – traveling, working, keeping records, being entertained, communicating, making war – and perform roughly the same action-types – buying something, writing words, supervising employees, making calculations, studying natural phenomena. However, when we engage in these activities and action-types with new technologies, the activities and action-types have different properties, properties that change the character of the activity or action-type. Consider the act of writing with various technologies. When I write with paper and pencil, the pencil moves over paper; when I write using a typewriter, levers and gears move; when I write using a computer, electronic impulses change configurations in microchips. So, the physical events that take place when I write are very different when I use different technologies.

Consider now the differences in the action-type “purchasing an item from a store” when the purchase is made by paying cash as compared with paying by credit card. Not only are the physical events that occur different, but the action has different properties. When I pay with a credit card, a record is automatically created, a record that can be coordinated with other records. Of course, a record could have been created when I paid with cash but not easily. The change in the physical features of the action-type facilitates and constrains various aspects of the action-type. Before credit cards, when cash purchases were the norm, the

salesperson would receive paper and coin money, and *could* create a record of the transaction by writing-up a paper receipt, keeping one copy, and giving another to the buyer. The buyer's name and address might or might not appear on the receipt. With credit-card technology, while the buyer may or may not get a paper receipt, there is no possibility of a record not being created. Records are automatically and effortlessly produced, records that are tied to the buyer's identity and easily correlated with other transactions by the purchaser.

Admittedly, in the days of cash transactions, the sales personnel *could* have asked for the name and address of each customer. The store-owner *could* have asked employees to go through sales records and identify the buying patterns of individual customers or figure out patterns with regard to where their customers resided and how often and when they purchased what items. However, the amount of labor involved was a disincentive to this (so much so that the idea probably never occurred to most store-owners). Today, data-mining tools make this activity possible and so easy that it is a potential in any credit-card purchase. The point is that technology changes activities and action-types so that various aspects of the action-type are facilitated and constrained.

The distinction I am making here is similar to the distinction that action theorists make between act-types and act-tokens. An act-type is a kind of action, for example, reading a book, walking, and an act-token is a particular instance of the act-type. An act-token is an instance of the act-type performed by a particular person, at a particular time and place; for example, Smith reads *A Tale of Two Cities* while sitting in the red chair in his home today. My point is that when technology is involved in the performance of an act-type, a new set of act-tokens becomes possible. It is now possible, for example, to "play chess" while sitting in front of a computer screen plugged into a computer. Instead of manually moving three-dimensional pieces, one presses keys on a keyboard or clicks on a "mouse." One's competitor in the game may or may not be a human being. So, when human beings perform an act-type with technology, a new set of tokens (of an act-type) becomes possible and these act-tokens have properties that are distinct from other tokens of the same act-type. Later, I will argue that our understanding of an act-type may change as a technology becomes more and more commonplace.

The first step, then, in understanding the connection between technology and ethics is to acknowledge the connection between technology and human action. Technology creates new possibilities for individual and collective human action and it changes the properties of many act-tokens. The change in properties may facilitate and/or constrain various aspects of an action-type, and as a result, human beings make different choices.

To avoid misunderstanding, it should be noted that this relationship between technology and human action is seamless. Technology provides the *instrumentation* for human action. It is not enough to say that technology "impacts" upon human action or human beings, nor is it enough (going in the other direction) to say that human beings "act on, make, or use" technology. Technology provides the apparatus for human action much like our bodies do. Human beings act by moving their bodies in certain ways, and technology allows us to do more and different things from those that we can do with our bodies alone. It is illuminating to think here

about the disabled. The bodies of those we call “disabled” are instrumented in ways that differ from those who we call “able-bodied.” The disabled often use technology to get their bodies to do what the able-bodied can do without it, for example, to move around, produce audible sounds, make marks on paper.

Technology changes the instrumentation of human action, not just for the disabled, but for the able-bodied as well. Indeed, computer technology instruments human action in ways that turn very simple movements into very powerful actions. Consider hardly visible finger movements on a keyboard. When the keyboard is connected to a computer and the computer is connected to the Internet, and when the simple finger movements create and launch a computer virus, those simple finger movements can wreak havoc in the lives of thousands (even millions) of people. The technology has instrumented an action not possible without it. To be sure, individuals could wreak havoc on the lives of others before computer technology, but not in this way and, perhaps, not quite so easily.

Recognizing the intimate connection between technology and human action is important for stopping the deflection of human responsibility in technology-instrumented activities, especially when something goes wrong. Hence, the hacker cannot avoid responsibility for launching a virus on grounds that he simply moved his fingers while sitting in his home study. Technology does nothing independent of human initiative, though, of course, sometimes human beings cannot foresee what it is they are doing with technology. This intimate connection between technology and human action is also important for understanding the uniqueness issue in computer ethics, but that will become clearer later on.

So, the first step in understanding the connection between technology and ethics is to understand the intimate connection between technology and human action. The next step must get us from human action to ethics. This step may seem too obvious to be worthy of mention since ethics is about human action. Nevertheless, the connection is worth asking about in this way: does the fact that technology instruments human action have any moral significance? Does the instrumentation of human action affect the character of ethical issues or the nature of ethical decision-making?

Generally, moral philosophers have *not* explicitly focused on the instrumentation of human action. They seem to have presumed able-bodied humans and a physical world with a fixed nature. For the most part, moral philosophers have not thought of new technologies as morally significant. (There are, of course, exceptions to this both historically and more recently. For example, Hans Jonas [1984] recognized the connection between technology and human action and went so far as to argue that the powers of technology change human action to such an extent that a change in ethics is called for.) Yet, airplanes, guns, bombs, computers, and a wide variety of medical devices, to mention some of the most powerful inventions, have all changed what human beings can do with movements of their bodies and, in particular, have changed what human beings can do to and with one another. I am not claiming that the laws of nature or laws of physics have changed, only that technology has changed the capacities of human beings to act.

The instrumentation of human action has moral significance for several reasons. First, the new possibilities for human action created by technology pose ethical

questions that humans have never faced before. Should we develop nuclear weapons and risk a nuclear war? Should I give my organs for transplantation? Is it wrong to make a copy of software? Is there anything wrong with placing a cookie on a computer when the computer is used to visit a web site? (A cookie is a mechanism that allows a web site to keep track of who is accessing the site. The mechanism can be used without the knowledge or consent of the visitor.) Should we allow intelligent highways to be built? (Intelligent highways are highways that can record when an automobile enters and leaves, how fast the automobile goes, and this information can be connected to the owner of the automobile.)

Second, when technology changes the properties of action-tokens, the moral character of the action-type may change. Thus, computerized environments call upon us to rethink and re-evaluate our moral understanding of various activities and action-types. Yes, generally, it is morally acceptable for employers to keep track of the work of employees, but is it morally acceptable for an employer to use software that allows the employer to record and analyze every keystroke an employee makes and to examine an employee's e-mail or web browsing? When I kept grades in a metal filing cabinet, I had to do certain things to protect the confidentiality of those records. When I switch to storing grades on a computer, I have to consider what is required to ensure the same level of confidentiality. While telephone surveys might have been morally neutral before, they may not be now given how easy it is to correlate the information obtained with other information about individuals.

Finally, the facilitating and constraining features of technology-instrumented activities and action-types mean that individuals and organizations may make different choices from those they made before. The effects of these changes need to be evaluated morally. For example, the Internet facilitates globalization of the world economy. This may change the loyalties, alliances, and obligations that individuals see themselves as having. Is the change for the good or does it diminish human well-being? Can democratic institutions exist on the scale made possible by the Internet, especially when they are less dependent on geographical space?

So, technology and ethics are connected in so far as technology instruments human action and the new instrumentation may create ethical questions that had not arisen before. Technology also changes the properties of activities and action-types in ways that require a moral reconsideration of those activities and action-types. With this understanding of the connection between technology and ethics, we can now address the question that has been contentious among computer ethicists: are the ethical issues surrounding computer technology unique?

### The Genus-Species Account

The account that I have just given of the connection between technology and ethics affirms that computer technology can pose new ethical questions, but it is neutral with regard to the uniqueness of computer ethical issues. *New* and *unique* are different. Generally those who deny the uniqueness of computer ethical issues do not deny the newness *at a certain level* of analysis of many computer ethical issues.

Those who deny uniqueness make the case by drawing parallels between computer ethical issues and other ethical issues, i.e., ethical issues prior to or independent of computers. Issues of privacy, property, accountability, and access have been around, they argue, for centuries. Familiar concepts and principles seem to be at the core of computer ethical issues. Moreover, computer technology is not the first technology to challenge ethical notions. Think of historical concerns about privacy occasioned by the publication of photographs in newspapers, wiretapping, hidden cameras, and, more recently, genetic testing. So, the fact that computer technology creates many privacy concerns is not unusual, though, of course, computer technology raises privacy issues in new ways. Something similar can be said about intellectual property issues. Think of all the technologies that historically have challenged Western notions of property, for example, electro-magnetism, audio and video recording. Consider also the complex issues of accountability that have arisen around harms caused by various technologies, for example, environmental pollution, and the effects of television on children. So, the argument against the uniqueness of computer ethical issues emphasizes that we can use familiar moral concepts and categories to understand them, and that other technologies have challenged moral notions in the same way that computer technology does. (This was the position I took in my early work on computer ethics, see Johnson, 1985.)

On the other hand, those who believe that computer ethical issues are unique have pointed to distinctive features of computer technology. Computer technology has brought about the creation of *entities* that never existed before: software, microchips, the Internet, cookies, virtual reality, video games. Computer ethical issues are unique if for no other reason than that they deal with entities that have never been dealt with before.

Many of these new entities are made possible because of the scale of information processing; so, even if we reject the claim of new entities, the uniqueness argument can be made in terms of scale. The scale of communication, data collection, calculations, and statistical analysis made possible by computer technology is unprecedented. The increased scale of information-processing and statistical analysis has also made possible *new kinds of knowledge*. We have been able to acquire information about the solar system and the global economy that would have been impossible without computer technology. Similarly, transaction-generated information was not possible before. Yet other arguments for the uniqueness of computer technology have emphasized the technology's malleability, its inherent unreliability, and its power and pervasiveness (Johnson, 2001).

The arguments on each side of this issue seem to miss each other. On the one hand, those who argue against the uniqueness of computer ethical issues focus on what makes an issue an *ethical* issue; they focus on understanding and classifying issues in moral terms. On the other hand, those who argue for uniqueness seem to focus on features of computer *technology*. They point to something special about computer technology and they presume that since the technology is unique, the ethical issues must be unique. Notice that what one side claims does not exactly contradict what the other side claims.

I have argued elsewhere (Johnson, 1994, 2001) that there seems to be a kernel of truth in claims on both sides of this issue, and I have proposed an understanding

of computer ethical issues that synthesizes the two sides. I argue that computer ethical issues should be understood as new species of familiar (generic) ethical issues. While this account captures something claimed on each side of the issue, it gives priority to the ethical character of computer ethical issues.

I developed this account by noticing what happens when ethicists are presented with situations involving computer technology. In order to determine whether there is an ethical issue and what it is, an attempt is made to connect the computer situation with a familiar situation and with a familiar moral concept or principle. This often involves reasoning by analogy. For example, when confronted with a case of computer hackers breaking into computer systems, we ask whether the behavior is unethical. Here we may make an analogy with breaking into someone's home, and since breaking into someone's home is unethical, it seems that breaking into a computer system is also unethical. Of course, this is just a starting place. We may still want to know whether the analogy is appropriate and why exactly breaking into a computer system is unethical. We continue by playing out the analogy further and classifying the behavior in familiar moral terms. Like breaking into homes, breaking into computer systems involves violations of property and privacy. So, we understand breaking into computer systems as an ethical matter by connecting the behavior to familiar moral concepts and principles. This helps us understand the ethical nature of the act.

Similarly, in trying to understand whether the use of cookies to identify who has visited a web site is morally problematic, we may reason by analogy in order to identify the relevant moral concepts and principles. The use of cookies is somewhat like the use of hidden surveillance cameras in buildings or parks. Your presence is being recorded but the cameras/cookies are invisible so you do not know your behavior is being observed and recorded. When web sites tell you that they use cookies, their use is closer to surveillance cameras in stores where, if you look around, you can see the cameras. Of course, cameras record your physical identity in a way that cookies do not.

The process here involves using what we know about a familiar situation to understand another, less familiar, situation, and we do this by connecting the new situation to a familiar moral concept or principle. It seems that human beings would not be able to recognize a new situation as having ethical implications unless the situation connected in some way or another to what we already understood to be an ethical matter. Imagine creatures from outer space suddenly appearing. They look somewhat similar to human beings. They walk and talk like us, but every once in a while they behave in strange ways: say, they put their fingers on their noses whenever they speak. How would we think about this behavior? Of course, our response would be culturally shaped, but the point is that we would not consider the behavior unethical unless it had characteristics that connected to one of our moral notions. Nose touching while speaking would probably not connect, but suppose that the aliens behaved in ways that resulted in harm to human beings or suppose they behaved in ways that fit our definition of lying, then we would think of the behavior as unethical. Such a judgment would raise all the issues of ethical relativism, but those issues are not of importance here. Here the important point is that behaviors and issues cannot be recognized as having moral significance unless they connect to a moral notion that we already have.

The outer space case may seem far-fetched, but it is related to computer ethics in the sense that computer technology gives human beings the capacity to do things they could not do before. What we can do today with computer technology is not far from what human beings living a few centuries ago might have imagined of creatures from other planets. We have x-ray vision; that is, we can see detailed images of internal organs. We can sit in our offices with the door closed and watch every movement of our employees in other rooms. We can play games (in real time) with people thousands of miles away. Still, whether the behavior of aliens or the behavior of human beings, behavior will not be recognized as ethical/unethical unless it is connected to familiar moral concepts and principles – do no harm, tell the truth, respect property and privacy.

My claim is, then, that we cannot recognize an ethical issue as such unless we can see something in the situation that connects to a familiar moral notion. This is a meta-ethical claim. The genus-species account makes a claim about how we identify, classify, and understand. An implication of this claim is that technology cannot suddenly thrust us into wholly unique moral territory, though later I will discuss how moral concepts and categories may significantly change (over time) due to technology – recognizing new species over time changes our understanding of the genus.

### Avoiding the Mistake of Unique Technology

I have already suggested the mistake made by those who emphasize the uniqueness of the technology and then presume that since the technology is unique, the ethical issues around it must be unique. The uniqueness of the technology is not in dispute. While computer technology has features in common with other technologies, and while it may be thought of as an extension of earlier calculating machines, nothing with the capabilities of modern computers has ever existed before. Moreover, it is not in dispute that computer technology creates environments (for human action) with properties that never existed before. Never before have human beings had the ability to pay for purchases via credit card, to launch computer viruses, to experience virtual reality, and so on. However, the question of uniqueness of computer ethical issues has to do with whether the ethical issues are unique, not the technology. To answer the question about the uniqueness of the ethical issues, we have to look at the nature of the ethical issues – not the technology.

Maner (1996) seems to make this mistake of emphasizing the uniqueness of the technology. While he provides a set of examples, and while I believe all the examples are flawed in the same way, I will address only one example. Maner argues that because of the nature of computer technology, we have an obligation to provide computers for the disabled. He claims that this is a unique ethical argument because never before has there been a machine with such general applicability. Hence, never before could there have been an argument of this kind for making computers available to the disabled. According to Maner, we have a unique obligation to provide computers for the disabled. He writes,



My point is that our obligation to provide universal accessibility to computer technology would not have arisen if computers were not universally adaptable. The generality of the obligation is in proportion to the generality of the machine... Even if elevators did provide a comparable case, it would still be true that the availability of a totally malleable machine so transforms our obligations that this transformation itself deserves special study. (Maner, 1996: 145)

So, the claim is that this is a unique ethical issue because of a unique property of computer technology. The problem is that the argument is not unique in kind and it is not unique in the ethical principle to which it appeals. It is not unique in kind in the sense that other arguments can and have been made on behalf of distributing things that have the power to do good. Think of the arguments that can be made for universal access to disease-preventing vaccines, life-saving medical technologies, or food, for that matter.

Maner's argument can be classified as a member of a genus of arguments that appeal to the enormous power of something to do good. The fact that something has enormous power to do good calls upon human beings to make it available to those who can benefit from it. Regardless of whether Maner's argument is valid, the point is that it appeals to a not-unique principle. Maner's argument is new in the sense that he takes a familiar principle and connects it to computer technology. Before the invention of computer technology, this implication of the principle did not exist. Thus, Maner has added a new species to a genus of argument-type that appeals to the power of something to do good as grounds for making it available to those who need it.

The genus-species account acknowledges the uniqueness of computer technology (by acknowledging that computer ethical issues may be unique species) while at the same time acknowledging that computer ethical issues are not unique in kind, only in their particularities. The account acknowledges that the connection between ethics and human action for the classification of issues as ethical issues involves understanding the human action and human relationships involved. Technology alone cannot pose an ethical issue. Computer ethical issues arise because computer technology makes it possible for human beings to do things. These possibilities are understood by identifying and classifying them in familiar moral terms and categories, and as familiar action-types.

### Avoiding the Mistake of the Applied Ethics Model

Since the genus-species account could be seen as supporting the "applied ethics" model, it is worth explaining why this would be a mistake. According to the applied ethics model, when confronted with a new situation involving computer technology, what one should do is find general moral principles or abstract theories and "apply" these to the new situation. This model coupled with the genus-species account would lead to the following kind of methodological recommendation. When one encounters a computer ethical issue, one should: identify the genus of which the issue is a member; identify concepts and principles that are used in

dealing with familiar species of that genus; and, then “apply” these concepts and principles to the new species, the computer ethical issue. At first glance, this may seem to fit what lawyers and judges have done in the case of computer software. When first confronted with ownership issues around computer software, they classified software as a potential form of intellectual property, and, then, tried to use concepts, distinctions, and principles from copyright and patent law.

The problem with this picture of how computer ethical issues are or should be addressed is in the notion of “application.” Application suggests a predetermined, almost mechanical operation. We take an understood principle and apply it to a (fixed and understood) case. This is not, however, what happens with many computer ethical issues. The process of connecting moral concepts and principles to situations involving computer technology is synthetic and indeterminate. Often the moral concepts and principles are ambiguous in their application to a new technology and often the technology is still “in the making” (Cockburn and Omrod, 1993).

Moor (1985) grasped the fluid nature of the situation early on when he argued that much of the work of computer ethics involves clearing up the conceptual muddles. Conceptual muddles prevent simple application of familiar concepts and principles. Indeed, even the picture of lawyers and judges applying distinctions and principles from copyright and patent law to software is somewhat misleading. The picture hides the fact that the process is one of defining the technology. In the very early days of computing, it was not clear what software was, let alone whether it was worth owning. Yes, there were things called programs that could be expressed in languages as well as punch cards, but it was not clear from a legal or moral perspective what these were. Judges and lawyers were asking:

- Is a program the expression of an idea?
- Is a program a process for changing the internal structure of a computer?
- Is a program a series of “mental steps” capable, in principle, of being thought through by a human?

They were using concepts from copyright and patent law to try to fit the unknown to the known. Thinking of this as “applying” a principle to a case is misleading because they did not know what “the case” was.

Familiar concepts and principles are useful in such situations but they are not “applied.” Familiar concepts and principles are used to create an understanding of the new situation/case. Remember that there was no predetermined right answer to the question of whether computer programs were expressions of ideas or mental steps or design specifications for machines. Lawyers, judges, and policy-makers were deciding what computer programs were to become. The decisions about how to connect computer programs to copyright and patent law, in a sense, *made* computer software what it is. Indeed, what it is – what it is understood to be – is still being negotiated in the courts today. The process is more accurately described as negotiating a fit between the technology and legal and moral principles (a synthetic process) than as application.

So, while the genus-species account of computer ethical issues lends itself to viewing computer ethical issues as issues of applied ethics, the account should not

be interpreted in this way. The process of drawing on familiar moral concepts and principles to understand and address computer ethical issues is synthetic.

One final caution must be made regarding the genus-species account of computer ethical issues. The account emphasizes the process by which ethical issues are identified and classified, and identification and classification are continuing processes. Over time, as new species are added, the meaning of a genus can change. Our understanding of moral concepts and principles sometimes changes as we use them to understand new situations. Privacy is a good example here: what is meant by privacy has changed and continues to change in response to new technologies and what they make possible. This can be seen, for example, in the notion of "information privacy," a relatively new form of privacy tied to computer technology. Something similar could be said about property. The notion of property has changed over time with the invention of a variety of things. A current example here is digitalized music and how it is forcing judges, lawyers, and ethicists to think of property in new ways.

This means that while the genus-species account denies that computer ethical issues are fundamentally unique, it allows for fundamental change in ethics over time – fundamental changes in concepts and principles. The account explains why such changes come about slowly and gradually. Human beings cannot recognize situations as ethical unless they connect in some way to familiar moral concepts and principles.

## Conclusion

Are the ethical issues surrounding computer technology unique? Computer ethical issues are new species of generic moral problems. Ethical issues are always about human beings and human action. Computer technology, like other technologies, changes the instrumentation of human action and in so doing makes it possible for human beings to do what they could not do before, as well as to do in new ways what they did before. These changes mean that human beings face ethical questions they never faced before but the new questions do not take us into utterly unique moral territory. We understand the new situations by drawing on familiar moral concepts and principles. We make the technology and the ethical issues into things we can understand.

## Acknowledgment

This chapter was developed from chapter 1 "What is Computer Ethics?" of my *Computer Ethics*, 3rd edn (Upper Saddle River, NJ: Prentice-Hall, 2001).

## References

- Cockburn, C. and Omrod, S. (1993) *Gender and Technology in the Making*. London: Sage.  
Johnson, D. G. (1985) *Computer Ethics*. Upper Saddle River, NJ: Prentice-Hall.

- (1994) *Computer Ethics*, 2nd edn. Upper Saddle River, NJ: Prentice-Hall.
- (2001) *Computer Ethics*, 3rd edn. Upper Saddle River, NJ: Prentice-Hall.
- Jonas, H. (1984) *The Imperative of Responsibility*. Chicago: University of Chicago Press.
- Maner, W. (1996) Unique ethical problems in information technology. *Science and Engineering Ethics*, 2 (2): 137–54.
- Moor, J. (1985) What is computer ethics? *Metaphilosophy*, 16 (4): 266–75.

### Further reading

- Baird, R. M., Ramsower, R., and Rosenbaum, S. E. (eds) (2000) *Cyberethics*. Amherst, NY: Prometheus.
- Hester, D. M. and Ford, P. J. (eds) (2001) *Computers and Ethics in the Cyberage*. Upper Saddle River, NJ: Prentice-Hall.
- Johnson, D. G. and Nissenbaum, H. (eds) (1995) *Computers, Ethics, and Social Values*. Englewood Cliffs, NJ: Prentice-Hall.
- Tavani, H. (1996) Bibliography: a computer ethics bibliography. *Computers and Society*.