

Selected Internet resources

The website for the USPHS Office of Research Integrity may be found online at

<http://ori.dhhs.gov/>

The Professional Ethics Report published by the American Association for the Advancement of Science, which runs articles dealing with professional ethics in science, may be accessed online at

<http://www.aaas.org/spp/dspp/sfii/peer/peer.htm>

The monograph *On Being a Scientist: Responsible Conduct in Research* can be accessed online by clicking on the Science and Ethics link at the website of the National Academy Press Reading Room:

<http://www.nap.edu/readingroom/>

Chapter 2

Ethics and the Scientist

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Overview

MANY OF THE DECISIONS THAT SCIENTISTS MAKE in their day-to-day activities are pragmatic ones. Scientists make observations, study facts, and then interpret them on the basis of established knowledge and accepted principles. For example, when planning a surgical procedure involving a rabbit, one must decide on the type and dose of anesthetic to be used. This decision is determined by professional judgment, published recommendations, and consultation with the appropriate animal experts. It is also strongly influenced by the formal rules and policies that govern the use of animals in research. On the other hand, the decision to use a rabbit in the first place has both pragmatic and moral components. Most scientists conduct a particular medical experiment on animals because the risk to humans is unacceptably high. Although some members of our society question whether this decision is an ethical one, the majority accept the necessity of animal research but insist that it be conducted in a humane manner. Here we have entered the realm of moral reasoning. These decisions are based on our judgment of what we ought to do—and we want to do the right thing. But determining what is *morally* (as opposed to *legally*) right and wrong in such cases is not always assisted by guidelines or a policy manual. There are a number of past research studies that, while conducted in accordance with acceptable practices at the time, are widely viewed today as having been unethical. To avoid repeating such errors, we must all strive to carefully examine the moral dimensions of our current research practices.

Ethics and the Scientist

Today, we commonly encounter codes and policies that guide scientists in decision making. Institutional standards of conduct, codes of ethical behavior adopted by scientific societies, and instructions to authors published in scholarly journals are but a few examples of the kinds of written guidance available to scientists. On the other hand, there are many examples of decision making in science that are not underpinned by clear-cut accepted standards. For example, which of our data do we publish? In this connection a National Academy of Sciences panel report (6) asserts that “the selective use of research data is another area where the boundary between fabrication and creative insight may not be obvious.” With whom and under what circumstances do we share our research data? When is it acceptable not to share research data? Guidelines and policies about sharing publication-related data are becoming increasingly available, but this is not the case for the sharing of unpublished data. Another area where no clear-cut standards exist involves the responsibilities of mentoring trainees. If a mentor provides little guidance to a floundering trainee, claiming that the trainee must “sink or swim,” is the mentor neglecting his or her responsibility?

In contrast to the pragmatic decisions about the choice of anesthetic in an experiment, these are ethical decisions. Ethics is typically defined as the study of moral values. What do we mean by moral values? These are expectations about beliefs and behaviors that we judge ourselves and others by; they provide the framework for guiding us toward what we ought to do. When we talk about ethics as the study of moral values, we are describing the critical consideration and clarification of such values, integrating and prioritizing them as needed so we make a decision we consider to be “right.” This is ethical decision making. The words “ethics” and “morals” are frequently used interchangeably. But we are better served to maintain the distinction between the two. Ethics is about analyzing our values in seeking a decision on how to act. Morals, specifically moral values, emanate from our inner convictions; they provide the substrate that our conscience uses to distinguish right from wrong. In common use, morality often implies conformity with a behavioral code that is generally accepted in some defined setting or culture. Ethical behavior in the workplace implies the adherence to a collection of moral principles that underlie some specific context or profession and is commonly referred to as applied ethics.

The case studies included throughout this book will give rise to discussions that will help students reason through problems that require ethical decision making. In this chapter we shall briefly discuss some aspects of ethical decision making, focusing first on two general ethical theories. We shall also discuss elements of moral reasoning and critical thinking that are likely to facilitate the analysis and resolution of the cases.

In his book *A Practical Companion to Ethics*, Anthony Weston (9) rhetorically asks, “Who needs ethics?” Why isn’t it enough to follow our feelings or “fly by instinct when we are thinking about what we should do or how we should live?” Here we pose another question: Why do we appear to need special ethical guidance for scientists? After all, at the core of most definitions are three clear indicators of scientific misconduct: fabrication, falsification, and plagiarism. In other words, scientists should not lie, cheat, or steal in the course of doing their work. These are moral values that apply to society in general. However, the specialization and complexities of scientific research create a novel context in which scientists must apply moral judgments. Scientists face dilemmas and are challenged by problems that require them to make decisions and take actions based on their own morals. But this decision-making process demands the use of knowledge and experience, which, in many cases, are unique to the scientific endeavor and thus generally not appreciated or understood by those outside the profession.

Let’s consider for a moment the concept of “profession” in terms of scientific research. Scholars have described the characteristics of professions, albeit the definition of a profession can be elusive (4, 8). The key is what some have called strong differentiation (3, 4). As an example, Johnson (4) uses law enforcement officers as being in a profession that grants them special rights and responsibilities. A police officer may decide to use a firearm against someone who, in his judgment, is threatening the life of an innocent hostage. This use of force and deliberate infliction of harm on the part of the officer involves a morality unique to the profession of law enforcement. The special morals that the police officer uses in this situation translate to powers and privileges that do not apply to anyone outside the profession of law enforcement.

The characteristics of professions described by Johnson (4) are more or less found in scientific research. The first is mastery of an esoteric body of knowledge, typically obtained through formal higher education and marked by continued learning and training. Clearly, education and training are critical to the practice of science. Many, if not most, scientists hold terminal degrees (e.g., Ph.D.s), regularly read the scientific literature, attend scientific meetings, take specialized courses, and periodically go on educational leaves (e.g., sabbaticals). The second is autonomy, both at the individual and the collective levels. Scientists usually enjoy a great deal of autonomy in their work, making decisions on what problems to study and how to study them. At the collective level, there are professional societies representing scientific disciplines that have considerable impact on the organization and the practice of the profession. Publishing codes of ethics

and establishing criteria and standards for practice of the discipline are activities that emanate from societies. The third characteristic is that professions have formal organization. Here Johnson (4) is explicit in mentioning the kind of organization that may control admission to the profession (e.g., the American Bar Association for lawyers) or be involved in licensing and standard setting (e.g., the American Medical Association for physicians). Such practices are not typically in the realm of the activities of scientific societies, but they may be. Some scientific societies have registration and certification programs for both individuals (attaining status as a certified clinical technician or counselor) and for education and training programs. Fourth, professions generally have ethics codes or documents that prescribe standards of conduct. And most scientific societies publish such codes and standards. Lastly, professions are characterized as providing some social function. Broadly applying this notion across all types of scientific research might be debatable. But taking the view that creation of new knowledge is a good thing, a generalizable and defensible argument can be made. Certainly, in the case of any research that has implications for the betterment of humankind (most notably medical research), the argument for social function is compelling.

Its general congruence with these characteristics makes scientific research much more a profession than a simple, undifferentiated occupation. On the issue of formal organization (the third characteristic cited above), we note that scientists don't have to belong to any scientific society to do their research or to be considered members of the profession. And certainly there is no single organization that administers an "admissions test" and grants a license to practice science. So the case for fulfillment of this characteristic at the global level is arguably weak. Nonetheless, there is an overriding consideration that involves the context in which scientists practice their profession. Specifically, Johnson (4) points out that in the case of computer professionals, the special powers and privileges that accrue to these individuals do so because they use their skills and knowledge in a specific position within an organization. In the context of employment, the computer professional or the research scientist can use knowledge and skills to create and interpret new information, which in turn may be translated into applications that have an effect (positive or negative, expected or not) on society. To quote Johnson: "Because professionals have this efficacy, they bear special responsibility. This is, precisely because professionalism has the ability and opportunity to affect the world in ways that others cannot, they have greater responsibility to ensure their actions do not harm individuals or public safety and welfare."

There are clear examples of special rights and powers that scientists use in the course of their work. Maintaining confidentiality over patients' records, properly treating humans and animals undergoing medical exper-

imentation, and doing research that involves the handling of biohazardous substances are but a few activities in which scientists must use judgment based on standards and morals that are not generally applicable to society. Recognizing and understanding how to work through dilemmas that crop up in the course of scientific research requires knowledge about the laws, policies, and guidelines that come into play in the conduct of research. Making the right ethical decisions will ensure that we carry out our research in a responsible and accountable fashion.

Underlying Philosophical Issues

It is unfortunate that many of those working in the biomedical sciences have had little formal introduction to the field of ethics, because they may as a consequence have little appreciation for its power as a discipline. Occasionally, scientists are suspicious that "soft" disciplines such as moral philosophy lack the same type of academic rigor displayed by their own fields. It is not uncommon for scientists to criticize animal rights activists for being excessively emotional and insufficiently rational. Yet scholars like the animal rights activists Peter Singer and Tom Regan are respected for their rational, not emotional, arguments in favor of granting animals far more moral weight than society currently allows them.

Some people believe that ethical opinions are mere preferences akin to expressing a taste for a flavor of ice cream or a type of music. For these people there is little basis (or reason) for differentiating between ethical positions. However, few philosophers would seriously argue for such a strongly subjective view of ethics. We make rational decisions about our ethical positions in a way that we do not make decisions about ice cream. If a friend expressed a preference for strawberry, none of us would feel compelled to argue the merits of chocolate. This would not be the case for a friend expressing intent to commit murder. However, ethics are also not strongly objective in the manner of many scientific principles. Scientists anywhere around the world, or at any time throughout history, who seek to measure the density of pure gold will find, within the error of their instruments, the same result. Yet there is no comparable experiment that we could perform to assess the morality of a practice, such as polygamy, that is acceptable in some cultures and taboo in others. Ethics falls in between these extreme positions. Ethical issues are neither matters of taste nor immutable physical constants that can be objectively determined irrespective of time and culture.

Ethics is usually subdivided into two areas known as normative ethics and metaethics. Normative ethics seeks to establish which behavior is morally right or wrong; that is, it seeks to establish norms for our behavior. Normative ethics is persuasive in that it attempts to set out a moral theory

that can be used to determine which views are acceptable and ought to be adopted. This differs from metaethics, which concerns itself with an analysis of fundamental moral concepts, for example, concepts of right and wrong or of duty. We will not discuss metaethics but will focus instead on some of the normative ethical theories that attempt to persuade us to redefine our behavior.

While not all philosophers advance identical ethical theories, this fact should not be attributed to any inherent weakness in the discipline. It is not at all uncommon for two biomedical scientists to disagree on the implications of a certain data set. It is quite possible that the two scientists are approaching the problem with different hypotheses in mind. Likewise, given an ethical dilemma, one will often find ethicists who reach differing conclusions as to the best course of action. The difference of opinion may be attributable to the fact that each ethicist has tried to solve the dilemma using a different normative ethical theory. Alternatively, each may have used a similar ethical theory and yet differed greatly in the amount of weight each ascribed to the various components of the problem. In addition, there can be disagreements over the empirical facts of a case (for example, whether an animal feels pain during a given procedure). The point is that moral problem solving, like biological problem solving, is an extremely complex process, and we should not be surprised to find that different people do not always arrive at the same conclusion.

However, it is equally important to realize that while many ethical dilemmas may not have a single "right" answer, there are answers that are clearly wrong. Who would seriously argue that a coin toss should decide ethical questions, or that abortions should be considered moral on Mondays and immoral on Tuesdays? Ethical positions can be evaluated and compared using techniques that are not entirely foreign to those in the sciences. Ethical theories can be evaluated on their rationality, their consistency, and even on their usefulness.

While the evaluation of competing ethical theories is a difficult task, there are areas of general agreement where we might begin (5). Ethical theories, like any other, are expected to be internally consistent. No theory should be allowed to contradict itself. Similarly, theories that are unclear or incomplete are clearly less valuable than theories that do not suffer from these flaws. Simplicity could also be considered an advantage. If all else were equal, it would be preferable to employ a simple theory over one that is complex or difficult to apply. We should also expect an ethical theory to provide us with assistance in those dilemmas where intuition fails to give us a clear answer. Most real-life ethical dilemmas are considered as such precisely because compelling moral arguments can be made in support of each side of the issue. These types of situations are those in which we most

require the guidance of a moral theory. Additionally, ethical theories should generally agree with our sense of moral intuition. Who would wish to adopt an ethic that, although consistent, complete, and simple, advocated murder for profit? However, it is more difficult to decide about a theory that runs counter to our moral intuition in an area less clear-cut than murder, or in a number of minor areas. This is where the evaluation process becomes extremely difficult (2). How are we to decide whether it is the theory or our intuition that is out of line? We may decide that if a theory is rational, is well designed, and gives answers that correspond to our moral intuition on a large range of issues, then in a particular instance it is our intuition that is in error.

We in the natural sciences have something of an advantage over moral philosophers. Usually, we can design an experiment to discern which of two competing hypotheses is more correct. Philosophers do not have the luxury of performing an experiment and letting the data decide between the competing theories. However, ethicists do continually subject their own philosophies, and those of their colleagues, to "thought experiments" involving real or hypothetical ethical dilemmas. This process involves using a particular ethical theory to perform the moral calculus needed to answer a problem. It is sometimes found that the rigorous application of an ethical theory will lead to an outcome that is unacceptable, either to the philosopher or to the larger society. The philosopher may then decide to modify the theory in hopes of increasing its acceptability or choose to stick with the theory and instead suggest that society itself ought to be modified.

Utilitarianism

Ethical theories are generally divided into two major categories. The first of these is called either teleological or consequentialist, and the second is referred to as deontological. Teleological theories focus exclusively on the consequences of an action in order to determine the morality of that action. Thus, to determine if a particular act is moral or immoral, one determines whether the consequences of that act are considered good or bad. Those theories that do not exclusively evaluate the consequences of an act to determine its morality are called deontological. Deontological theories, considered in the next section, are commonly referred to as "duty-based," in contrast to the "outcome-based" nature of teleological-consequentialist theories.

The best-known example of a teleological theory is utilitarianism. Jeremy Bentham (1748–1832) was the first person to articulate the theory under that name, and John Stuart Mill (1806–1873) was also influential in its development. Utilitarianism acknowledges the fact that many acts do

Utilitarianism, like all other ethical theories, has its critics. One criticism is that it is excessively burdensome to employ. Utilitarianism requires that we all evaluate how each of our actions will impact everyone. How is it possible to actually do this? How is it possible to predict the consequences of even a fairly simple action on everyone? If we are required to do this for each of our actions, how will we be able to get anything accomplished? The advice to use our common sense does not seem to be very helpful. Another criticism of utilitarianism is that it would appear to be done, or even mandate, some actions that most of us would find horrendous. Suppose we find a patient who has a lymphoma that is producing a substance of tremendous use in the treatment of AIDS. However, the patient is totally uncooperative, refusing either to accept treatment for his illness or to allow samples of his cells to be taken for research purposes. Utilitarianism might allow us to kill this person and divide his cells among the interested research labs. While one person would die, many AIDS patients would live. Utilitarianism is potentially at odds with our concept of individual human rights.

Deontology

The second of the two major categories of ethical thought, deontology, does not depend exclusively on the consequences of an action to determine its morality. This does not necessarily mean that consequences play no role whatsoever in deontological theories. Those theories that admit to the relevance of consequences, in addition to other considerations, have been referred to as "moderate" theories, while theories that maintain that consequences must not be considered at all are called "extreme." The best-known deontological theory is that developed by the German philosopher Immanuel Kant (1724–1804). His theory is an example of an extreme deontological position in that the consequences of an action are not considered in establishing its morality. Kant believed that using the utility of an act to determine whether it is right or wrong is a terrible mistake. He realized, as we have already seen, that such a standard compels the moral person to perform a particular act in one situation, while forbidding it in another. This changing standard of morality was unacceptable to Kant, and so he developed a theory based on a principle that, unlike utility, would not change from one situation to another.

The principle that Kant developed to accomplish this purpose is called the categorical imperative. Kant formulated this principle in a number of different ways that he maintained were all equivalent (5). One of these formulations advises us to "act only on that maxim through which you can at the same time will that it should become a universal law." How does this principle guide and constrain our actions? To determine if a particular act

not produce purely good consequences or purely bad consequences, but some combination of the two. To decide whether a particular act is moral, a person must sum up all of the consequences, both good and bad, and assess the net outcome. Moral actions are those that cause the best balance of good versus bad consequences.

In addition, utilitarianism requires a person to consider the interests of everyone. It is not permissible to merely consider what is best for you personally. Suppose that you are considering lying about the results of an experiment that you have performed. You reason that lying about the experiment will greatly increase the chance of your paper's being accepted into a prestigious journal. This will, in turn, enhance your career, your salary, and your family's security. However, utilitarianism requires that you also consider the impact of your decision on other people. You must consider the fact that the scientists who read your paper and are misled by its fabricated results may be harmed by your decision. Some of them may decide to initiate a new series of experiments or to cease a line of investigation based on your fabricated data. If your research has direct clinical relevance, it is possible that patients may be directly injured or killed by your deceit. If you are caught in your lie, still more harm will accrue both to you directly and to the public's confidence in science. If you consider the cumulative negative impact of your lying, and not just the positive benefits that you are seeking, it will become apparent that the net outcome is a bad one. According to utilitarian theory, this act of deceit is immoral and you ought not to carry it out.

Now let's imagine a very different situation. A relative of one of your colleagues has escaped from a mental institution and shows up at the lab where you both work. Waving a scalpel and screaming that he wants to kill your friend for "ruining his life," he asks you to tell him where she is working. Although you know exactly where she is, what should you do? After performing the same type of utilitarian calculus as above, it is clear that you should lie to the escaped patient. The good and bad consequences that will flow from this particular act of deceit provide a net outcome that is markedly different from the scenario described above. Thus, in utilitarianism we find ethical decisions that change as circumstances change. An act that is deemed immoral under one set of circumstances can become morally obligatory under another. But exactly what are we to consider when we try to evaluate good and bad consequences? According to Mill, the only good is happiness and the only bad is unhappiness. Bentham thought that pleasure was the only good and that pain was the only bad. These terms are defined somewhat more broadly than you might imagine. Pleasure includes satisfaction of desires, attainment of goals, and enjoyment, while pain includes, in addition to physical discomfort, things such as the frustration of one's goals or desires.

Critical Thinking and the Case Study Approach

Scientists should strive to make certain that each of their professional decisions, whether pragmatic or ethical, is sound. Ideally, ethical decisions will, like strong hypotheses, endure the test of time. But we must also acknowledge that ethical standards are sometimes revised over time as a result of continuing scrutiny and reinterpretation in the face of emerging knowledge. To analyze and deal with the problems that challenge us in our daily activities, we need to be well grounded in the rules and standards of conduct expected of us as scientific professionals. A good start is to find and become familiar with the written codes that govern scientific behavior. Documents on human and animal experimentation, authorship, conflict of interest, and general codes of conduct are critical resources. But knowledge of such resources is only the first step in fostering responsible research practices. An understanding of how to apply the existing codes, as well as an ability to reason beyond their explicit language, is needed for problem solving in the real world. The instructional format of this text affords opportunities to improve these skills by providing short case studies. The discussion of these cases will allow students to practice solving realistic problems by interpreting and correctly applying ethical standards.

These short case studies are designed to get the discussants to think critically as they analyze and problem-solve. "Critical thinking" has become a mantra in some academic circles as the problem-based learning approach has permeated the curricula of undergraduate, graduate, and especially professional programs. But what do we mean by critical thinking? Why is it important that we be critical thinkers?

Critical thinking is a cognitive process that clearly identifies issues and evidence related to a problem, thereby allowing defensible conclusions to be made. When discussing case studies like those found in this book, students should first separate the relevant issues from the nonrelevant ones. Relevant issues must then be analyzed, and the factual matters, backed up by evidence, must be distinguished from nonfactual ones. Students must also decide how to weigh the nonfactual matters, such as statements of opinion or expression of personal values.

Critically thinking about cases means that one must apply both factual knowledge and an understanding of appropriate scientific behavior to the problems encountered. It is important to remember when discussing cases that a consensus answer may not emerge. Nevertheless, several acceptable solutions to the problem may be found. Acceptable solutions must always be in compliance with standards related to global considerations (e.g., issues related to plagiarism or human rights). Solutions to cases always need to be examined to be sure they cannot be misinterpreted. In other words,

is moral, we must first ask ourselves if we would wish that the rule governing our action be made a universal law—that is, if we would wish for everybody to follow the same course of action. If we cannot truthfully desire that anyone else be permitted to perform the action that we are considering, that act is immoral.

Let's, once again, suppose that you are considering lying about the results of certain experiments that you have performed. Before doing this, the categorical imperative requires that you first ask yourself whether or not you can honestly wish that your deed be universalized into a rule. This rule would permit all scientists to submit fraudulent data as genuine. Clearly, such a rule would destroy the credibility of all scientists and preclude the ability of the scientific community to make organized advances (as well as having much broader implications for the general concept of truthfulness). No one could legitimately wish that such a rule be universalized—therefore the act is immoral. Note that there is no consideration of the consequences of your contemplated act of deception. Whether or not you might benefit from your deed never enters into the moral calculus.

A second formulation of Kant's categorical imperative is more frequently encountered in discussions of medical ethics (5). This formulation advises us to "act in such a way that you always treat humanity, whether in your own person or in the person of any other, never simply as a means, but always at the same time as an end." This statement makes it more clear that Kant's principle also requires a certain respect for persons. Note that Kant does not demand that we *never* use a person as a means to an end, just that we do not use a person *solely* as a means. When a physician treats paying patients, she is clearly using them as a means through which she can achieve an end for herself (earning a living). Yet if this is the physician's sole consideration in treating patients, she will be acting immorally toward them. Patients, and all other persons, are to be treated as ends as well as means. Patients have interests independent of those of the physician from whom they have sought treatment. In other words, patients are their own ends. A physician who prescribes "snake oil" is acting immorally because she fails to treat the patient as an end. The physician who provides her patients with the best care available treats them as both a means and an end.

While it is interesting and useful to understand how moral philosophers approach ethical problems, it is not essential to understand the intricacies of utilitarian or deontological theory to make good moral decisions. Most of the rest of this book will be devoted to considering the types of real-life ethical dilemmas encountered by working scientists. By discussing the issues involved and solving the problems posed in the case studies, students will be better prepared to make positive contributions in their chosen profession.

they should not contain any loopholes. Examples of unacceptable solutions include violations of specific standards, guidelines, or rules and regulations. Solutions that are inconsistent with the written or unwritten ethical standards for scientific conduct generally accepted by the profession are also unacceptable. (See "Notes to Students and Instructors" at the front of this book for a detailed discussion of how to approach case studies.)

Moral Reasoning in the Conduct of Science

The cases in this book will challenge you to analyze situations and make decisions based on information and evidence. Many of them will also require you to employ moral reasoning to reach your decision. In their monograph *Moral Reasoning in Scientific Research* (1), Bebeau and her colleagues suggest four psychological processes that are consistent with behaving morally. These were initially proposed by Rest, Bebeau, and Volker (7) and have been referred to as Rest's Four-Component Model of Morality. These components are:

Moral sensitivity: The individual faced with a situation makes interpretations concerning what actions are possible, who would be affected by these actions, and how these actions would be regarded by the affected parties.

Moral reasoning: The individual makes a judgment about what course of action is morally right (or fair, or just, or good), thus prescribing a potential course of action regarding what ought to be done.

Moral commitment: The individual makes the decision to do what is morally right, giving priority to moral values above other personal values.

Moral perseverance (or moral implementation): The individual implements the moral course of action decided upon, facing up to and overcoming all obstacles.

Bebeau et al. (1) point out that, although these four processes can interact and even influence each other, in practice they also can be independent of one another. For example, a person may be quite adept at interpreting the ethical issues of a situation but unable to develop good arguments for the proposed moral judgment. When discussing cases, we can usually recognize and appreciate the skills involving moral sensitivity, moral reasoning, and moral commitment. In fact, the case discussions can enhance these skills. Because the cases reflect realistic situations, practice will improve the ability to recognize and reason through actual moral dilemmas in scientific research. For example, one can be expected to discover and use

written codes of conduct and to better appreciate and apply normative standards. On the other hand, evaluating moral perseverance (implementation) is usually not possible when discussing case studies. Obviously, the true measure of this crucial component lies in what an individual actually does—something that is very difficult to play out in a case study. Nevertheless, it is sometimes possible to guess what an individual would do in a situation. We have encountered case discussions and write-ups in which a student, acting as the protagonist in the scenario, displays appropriate moral sensitivity, reasoning, and commitment. But then, in bringing the case to closure, the discussant describes some personal action that, in effect, portrays him or her as "walking away" from the situation. In other words, the discussant discloses an action that clearly indicates an unwillingness to implement the plan (and suffer its consequences).

Conclusion

Moral sensitivity, reasoning, commitment, and perseverance will all be needed in addressing the dilemmas raised in the cases found in subsequent chapters. We affirm the guidance provided by the criteria of Bebeau et al. (1) for making well-reasoned moral responses to dilemmas in scientific research. First, your response to the case should address all issues and points of ethical conflict. Move beyond just labeling issues and clearly articulate the conflicts emanating from the various elements of the case. Second, be sure your response considers the legitimate expectations of all interested parties. Keep in mind that parties may be affected who are not specifically invoked in the case narrative. Third, recognize that your proposed actions will have consequences. Clearly describe the probable consequences, their effects, and how they were incorporated into your decision. Fourth, identify and discuss the obligations or duties of the protagonist of the case. What professional duty is at issue, and why does the scientist have that duty?

Discussion Questions

1. What are some moral values that are unique to the conduct of scientific research?
2. Should scientists be accountable for their choice of research pursuits if their published results are used for evil purposes by others?
3. Do you believe that some kinds of scientific research should be forbidden? If you do, provide examples.
4. Do scientists have a moral obligation to explain the implications of their research to society?