

CHAPTER 14

Ethics in Scientific Research

Learning Objectives:

- What is ethics, and what are the three guiding “ethical directives” in scientific research?
- What are some reasons for scientific researchers to act ethically?
- What are some guidelines for treating the natural and cultural world ethically when doing research?
- What basic rights do human research subjects have?
- What are institutional review boards, and how do they function?

We conclude this book with a discussion of ethics in scientific research. **Ethics** can be defined as the study of moral or proper action. Like all domains of human activity, scientific research involves a variety of ethical considerations. Ethical issues in research express themselves as an ongoing, dynamic attempt to achieve balance among three basic sets of rights or “ethical directives”:

1. The right of scientists to pursue knowledge, using methods of scientific inquiry
2. The right of people and other sentient beings to be free from harm
3. The right of society to gain benefit from research while avoiding harm.

Each of these directives must be understood as contingent upon the other two; each must be exercised while maintaining respect for the rights specified in the other two. This leads us to realize that scientific ethics involves *responsibilities* as

well as rights.¹ That is, the right of society to avoid harm means that scientists have a responsibility not to do net harm with their research. Similarly, the right of scientists to pursue knowledge is a responsibility on the part of society to allow open scientific inquiry and communication.

These directives essentially provide a principled basis for determining what you *may* and may not do, as well as what you *should* and should not do. Why should you, as a research scientist, follow ethical principles? From a utilitarian point of view, you need to realize that principles like the ethical directives provide the basis for a variety of specific legal and professional standards of conduct that you must follow if you want to avoid losing your license or your job, being sued or jailed, and so on. Aside from the utilitarian, however, most people who are not psychopaths find that acting ethically provides positive emotional benefits—it feels good. At the same time, we do not deny that acting ethically may be justified for spiritual or religious reasons. However, although many people may see these various justifications for ethical behavior as self-evident or natural, we recognize there is a certain amount of cultural variation in what is considered ethical. Certainly the philosophical literature on ethics is not filled with great consensus on exactly what is ethical and why. Nonetheless, we do believe that roughly common ethical considerations are universally part of human nature and human society under nonpathological conditions. We think doing the right thing will resonate in similar ways with most of you, even if, like us, you sometimes fail to meet the highest ethical standards you normally endorse.

Let's consider the right of scientists to pursue knowledge. This suggests that scientists are to be motivated by honesty, sincerity, and an open search for truth. They should be free to share data and other information with each other and with society. They have the right to make a living as researchers, as long as some entity is willing to pay for it; there is no ethical guarantee per se that someone has to pay you for any particular job or career. Given that a person works as a scientist, he or she should be allowed to freely investigate any topic desired; censorship of research topics or methods is not legitimate. We also believe this directive suggests that scientists should pursue what interests them, what excites them, what inspires them to get out of bed and get to work. Scientists should not simply “follow the money” by choosing to focus their research on whatever someone is willing to fund. By the same token, research institutions should not become inappropriately beholden to corporate funders who are willing to “donate” large amounts of money in return for new buildings, endowed positions, and so on.

Our second directive concerns the right of people and other sentient beings to be free from harm. As we mentioned in Chapter 1, sentient beings think and feel—they can recognize the consequences of acts, they can feel pain, and so on. It's not obvious or universally agreed who or what this includes. The two of us do not

¹Ethical responsibilities, as opposed to rights, may be seen to stem in part from the fact that humans are creatures who have agency, mentioned in Chapter 3. Nothing can “do the right thing” unless it has the power to choose to do the wrong thing.

entirely agree with each other. It's safe to say that humans are sentient. Clearly some nonhuman animals are sentient to a degree. This definitely includes "higher" mammals, perhaps all mammals. It likely includes many or all vertebrates. How about crustaceans, insects, and viruses? It seems unlikely that unicellular entities, especially those without cellular nuclei, have adequately complex physiologies to produce sentience. It is not clear that plants, no matter their complexity or evolutionary heritage, are sentient. Surely the material world of rocks and water and air is not sentient. Or is it? As we consider further below, the argument is increasingly made that entities deserve ethical consideration even if they are not sentient in our mental or experiential sense.

Uncertainties about who or what deserves ethical protection aside, let's return to some specific principles that follow from the second ethical directive that people (and others) have the right to be free from harm. As we discuss in more detail below, this directive guides scientists in their treatment of research **subjects**, the human and nonhuman animals who are measured by geographers and other scientists working in particular topical areas. However, this directive has much broader implications. It also suggests that research assistants and other colleagues should be treated ethically. They should not be harassed, overworked, undercompensated, and so on. Attribution of credit for work and for ideas should go to the people who have earned it. People who deserve credit as authors should be so credited, and those deserving first authorship should get that. If you take ideas or data from someone, you need to cite them or recognize them in footnotes (we discussed authorship and citation in Chapter 13). **Don't plagiarize.** If you treat data fraudulently (**data cooking**), your unethical behavior compromises the rights of other individuals, and society at large, to honest communications. If, because of past personal experiences, you have a positive or negative assumption about someone or their work that would significantly hurt your ability to judge their work impartially, you have a **conflict of interest** and should not review that person's article or grant application. We refuse to review manuscripts by colleagues in our departments, for instance. You also have a conflict of interest if the success or failure of another person stands to benefit or impair your publishing success, reputation, or finances.

Finally, let's consider the ethical directive concerning the right of society to gain benefit from research while avoiding harm. That implies society has the right to be told the truth about what scientists believe their research actually means. Society has the right to choose whether to pay for research and which research to pay for. But society also has a responsibility in this respect—the responsibility to fund scientific work in proportion to what scientists as a whole believe is most appropriate for understanding and controlling a particular problem, rather than what is politically expedient. Scientists have a responsibility not to pursue research they could reasonably anticipate will cause more harm than good. And as far as this directive goes, scientists should choose research topics that will potentially benefit society, and they should disseminate their research to society in a beneficial way, although one might argue that society has a right to beneficial research only if it specifically pays for the research. Various principles we have already noted, such as avoiding data cooking and conflicts of interest, also follow from the directive to benefit society, not harm it.

Treating the Natural and Cultural World Ethically

In 1964, a graduate student in geography traveled to Wheeler Peak in the eastern Great Basin of Nevada, near Utah, to study glaciers of the last Ice Age. Near the upper tree line, he came upon a scattering of bristlecone pine trees. The great age of some of these trees in the western Great Basin had only been discovered about a decade before by the dendrochronologist Edmund Schulman. The student took tree cores (Chapter 4) and saw that some of the trees appeared to be at least 4,000 years old, making them among the oldest living things known at that time. Unfortunately, his coring tool broke, and with summer coming to a close, the student felt he could not wait until next spring to return for more cores. So he asked U.S. Forest Service Rangers for permission to cut down a tree that had been named “Prometheus.” They granted permission and down came the ancient one. The student discovered that Prometheus was even older than he had expected—it had over 4,800 rings. The young geographer had just killed what was then believed to be the oldest living creature on earth. Eventually it was determined that Prometheus had actually died at the age of 4,950 years.²

We noted above the argument that entities deserve ethical consideration even if they are not sentient. Was the felling of Prometheus an unethical act, and if so, why was it unethical and who was primarily responsible for it? One could argue about whether the student or the Forest Service ranger bore more ethical responsibility for the felling; possibly the student’s advisors or Forest Service policy bore some responsibility too. One can also recognize that the ethical harm of this act was committed against Prometheus itself, against the scientific community, and against society at large, including future generations who had not yet been born in 1964. But whoever we decide was to blame and whoever (or whatever) we decide was harmed, we find that this episode points to some of the ethical issues geographers must consider when collecting data in the field.

Our list of ethical directives states that people and other sentient beings have a right to avoid harm from research; increasingly, this ethical philosophy has been expanded to include all aspects of the natural world, whether sentient or not. This provides a rationale for the ethical treatment of the natural world and of local cultures, in addition to society at large. At the same time, scientists have an ethical right to pursue knowledge, and society has a right to benefit from research. The research and expertise of geographers has often helped make the world a better place—in a myriad of ways—and certainly will continue to do so in the future. If it is ethically directed, geographic knowledge can produce economic prosperity, medical breakthroughs, cleaner

²This incident attracted worldwide attention. The bristlecones on Wheeler Peak were eventually protected when their territory was included in the Great Basin National Park in 1986. The current titleholder of oldest bristlecone tree is “Methuselah,” about 4,700 or 4,800 years old. This is not necessarily considered the oldest living thing anymore, as “clonal” trees, shrubs, and ferns have been found that are tens of thousands of years old. Bacteria that have been in suspended animation for millions of years have been reanimated.

environments, increased food production and energy efficiency, more livable cities, and greater peace and security. It can also entertain us, stimulate our curiosity and sense of beauty, increase justice in the world, and bring us closer to our spiritual ideals in any number of ways. Just one important example is the fact that the continued existence of ecologically valuable and vulnerable habitats probably depends in part on research by geographers and other scientists. Geographers catalog and document characteristics of places, they explain their creation and their continued development, they relate characteristics of places at particular locales to those at other locales, they educate the public and policy makers, and more.

Geographers often collect data in field settings that have sensitive natural or cultural characteristics deserving (and requiring) ethical treatment. These places and their characteristics deserve to be preserved, because people have the right to experience the benefits of these places, because cultures have the right to their traditional ways of existence, and because the natural world has the right to exist. Actually, a good argument can be made that any place deserves this respect, not just unusual, unspoiled, or “exotic” places. These ethical considerations suggest that researchers should strive to make a minimal impact on the places they study. Leave them as you find them—or better. But our existence on the planet makes these ethical goals challenging, even impossible in the strictest sense. There is no way to avoid all impact when visiting a place. The very existence of humans on the planet cannot help but change it, and that includes humans who are members of technologically undeveloped cultures as well as members of the mechanized world, the information world, and the world of consumerism. This applies not just to research, of course, but to all human activities and modes of existence.

However, our impact varies a great deal depending on the choices we make and the choices we urge others to make. Impact is a matter of degree. Killing two of the oldest trees around is worse than killing one of them. Geographers collecting data in the field can make a great many choices that minimize their impact on the natural and cultural environments in which they do their work. Making such choices is the ethical thing to do. Table 14.1 presents a list of guidelines for treating the natural and cultural environment ethically.³ Of course, these guidelines apply to all people who are members of a research team; everyone must take responsibility for their actions, not just project leaders. The guidelines speak to all three of our ethical directives and include the nonhuman and inanimate parts of the environment as deserving of ethical consideration. During field research, geographers should strive to minimize the impact of their movement and access to sites; for example, to the extent possible, stay on established trails instead of walking over untrodden ground. Geographers should minimize the impact of their campsites; for example, locate and construct latrine sites carefully. Geographers should promote good community relations; for example, inform local peoples thoroughly about your project and involve them as much as possible. Finally, geographers must conduct responsible fieldwork; for example, conduct important and nonredundant research and disseminate it to others in an effective way.

³Table 14.2 is adapted from Smith (2002).

Table 14.1 Guidelines for Treating the Natural and Cultural Environment Ethically (adapted from Smith, 2002)

1. Reducing the impact of movement and access
<ul style="list-style-type: none">• traveling on foot or with pack animals• traveling by vehicles• traveling by boats
2. Reducing the impact of campsites
<ul style="list-style-type: none">• choosing a location• siting the camp and its facilities• using fires and firewood• using other fuels• reducing and disposing waste• performing actions at departure
3. Promoting good community relations
<ul style="list-style-type: none">• establishing and maintaining social relationships with the local community• establishing and maintaining awareness and respect for cultural differences• administering medical treatment to community members• taking photographs• carrying out economic exchanges with the local community• carrying out community projects
4. Responsible fieldwork
<ul style="list-style-type: none">• choosing locations• establishing liaisons with local community, scientists, and government• obtaining permissions and permits• carrying out valuable projects with competence and care• publishing, disseminating, crediting sources and contributors

Treating Human Research Subjects Ethically

Dismaying details of Nazi medical experiments revealed at the Nuremberg Trials of the late 1940s provided an early impetus to develop ethical principles for the treatment of human research subjects participating in medical and behavioral research. The principles that emerged were codified over subsequent decades into formal standards and rules that today guide and enforce the ethical conduct of research with human subjects. These rules have been formulated to prevent ethical transgressions against human subjects, whether minor or major. During the 1950s, for example, consternation was generated over a fascinating and important series of studies conducted by the psychologist Stanley Milgram. In these studies of obedience to authority, Milgram insisted that research subjects assigned to the role of “teacher” administer electric shocks to a “learner” who sat in another room (later variations of the study put the teacher and learner in the same room). The learner was actually a confederate of Milgram’s, and no electric shocks were actually administered. However, the subjects didn’t know this; a tape recording of the

learner screaming and complaining about his heart made the situation sound shockingly realistic. In spite of the sounds and an ersatz “shock generator” that indicated the subjects were administering dangerous shocks over 300 volts did not stop many of them from eventually pushing the levers all the way to the highest voltage level.⁴ Its contribution to our understanding of social influence aside, critics objected to the experience this study forced subjects to go through in their role as teacher and expressed concerns about its long-term effects, even given that the confederate came out after the study and met each subject with a reassuring smile.

In 1974, the federal government of the United States first published regulations to protect human subjects, basing them on recommendations that had been developed during the 1960s. There have been a variety of revisions over the years to these regulations, including the addition of regulations for research on nonhuman animal subjects, but the basic guiding ethical principles upon which they are based have remained fairly constant. These principles were explicitly stated in detail in 1979, in a publication put out by the U.S. Department of Health, Education, and Welfare, specifically the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. This is the **Belmont Report**, a key document outlining the philosophical basis for the ethical treatment of human research subjects. Its full text can be found at the Web site of the Office of Human Subjects Research of the U.S. National Institutes of Health at <http://ohsr.od.nih.gov/index.html>.

The Belmont Report outlines three ethical principles that express aspects of the general ethical directives we discussed above as they apply to research with human subjects, especially the second one, which requires respect for the right of people and other beings to be free from harm. The three principles of the Report are

- **Respect for persons.** Individual people should be treated as autonomous agents capable of deliberating about personal goals and acting according to those deliberations. Special protection is to be accorded to individuals with diminished autonomy.
- **Beneficence.** Benefits to individuals should be maximized while potential harm is minimized.
- **Justice.** The benefits and burdens of research should be distributed fairly.

Several specific rules for the treatment of human research subjects follow from the principles of the Belmont Report. The first is **confidentiality** or **anonymity**, which express aspects of a person’s right to privacy. Notice that the two don’t mean exactly the same thing. Confidentiality means researchers know who the subjects are and what their measured data values are, but they will not give that information to anyone and will take steps to make sure no one gets a hold of it (like using a locked file cabinet or computer). Anonymity means researchers do not even record

⁴The irony is that Milgram’s research began within the context of establishing that Nazi atrocities were committed because of some “inherent” flaw in the German character that made them exceptionally malleable to authoritarian control. His studies in the United States were so “successful” that he never bothered to take them overseas.

subjects' names or any other personally identifying information. From an ethical standpoint, anonymity is preferable to confidentiality and should be used whenever viable. Another specific rule is the requirement to provide **informed consent** to subjects before they agree to participate in a study. There are three components to informed consent: information, comprehension, and voluntariness. Potential subjects have to be informed up front about the procedures, purpose, and so on, of the study. They must also be informed about risks, both physical and psychological. Risks include injuries or diseases, negative moods (anger, sadness, fear, embarrassment), boredom or exhaustion, invasion of privacy and social harm, and litigation or criminal penalties. To balance this, subjects should also be informed about potential benefits. Comprehension and consent must be obtained via a communication between researcher and subject, a process that is often documented with a signed consent form. Finally, participation must be voluntary, not mandatory or coerced, and subjects must always be free to stop participation in any study at any time without penalty.⁵ To repeat: *Subjects are free to quit your study at any time for any reason with absolutely no penalty.* If they want, subjects can also request that their data be removed from the study and/or destroyed.

It may be difficult to meet all standards of the rules of informed consent with certain groups of people. In particular, certain groups may have difficulty comprehending or volunteering without explicitly or implicitly being coerced. In fact, there are specific groups who have special ethical rights, according to the implications of the Belmont Report. Minors—people under 18—cannot be studied unless their parents permit it; the minor must assent too (they cannot give legal *consent*). People with certain disabilities that might decrease their capacity to comprehend have extra ethical protection. Prisoners are thought to be at greater risk of coercion. Interestingly, because of the special benefit to society that is thought to follow from the accountability of elected officials, they are given less stringent ethical protections than other groups.

A particularly intriguing issue when it comes to the ethical treatment of human subjects is the issue of **deception in research**. Deception is sometimes used in research, most commonly deception about the purpose of a study or about all details of what will happen in it. Deceiving subjects in these ways is less common in geographic research than in some other behavioral sciences, but it definitely happens. The reason to deceive subjects is that you don't want their responses to change as a result of knowing they are in a study, or knowing exactly what the study is about. In many studies, if you are too forthcoming in informing subjects ahead of time, you run the risk of giving them information that would help them respond to your questions or direct their attention to things they would not otherwise think about. In other words, deception is used to reduce the biasing effects of reactance and other forms of interactional artifacts (Chapter 11). The principles of the Belmont Report in fact allow deception if it is necessary to the successful conduct of the research, and the research is otherwise seen to have value. That is, ethical

⁵Given this voluntariness, it is sometimes considered more correct to refer to human research subjects as "participants."

decisions about research are to be based on a balance between risks and benefits, as we stated above, and deception is considered a risk factor. Its use has to be justified by evidence of its need. If deception is used, however, a careful **debriefing** of subjects must occur as soon as possible after data collection is complete (typically at the end of each data collection session). Debriefing should (a) remove the deception, (b) express regret and explain why the deception was necessary, and (c) inform and educate the subject about the purpose and anticipated value of the research. In fact, all research studies with human subjects should at least provide the final component of debriefing, that of explaining the purpose of the research. The debriefing is also a good opportunity to learn more from research subjects about their experience of the study, any further thoughts they might have, and so on. This “empirical debriefing,” a less systematic inquiry than the study proper, is a bit like a pilot study (Chapter 6) done after the fact.

Institutional Human Subjects Review

In response to the ethical principles of the Belmont Report and related documents, institutions such as universities and private research labs created **institutional review boards (IRBs)** to oversee the ethical treatment of humans and other animals that serve as subjects in research conducted at that institution. IRB committees at these institutions are charged with protecting the ethical rights of subjects. These committees typically consist of researchers from departments that commonly conduct research with human subjects (primarily medical and behavioral science). Students, staff, and individuals from the community are also represented. Research projects utilizing human subjects must receive approval from this committee before data are collected. To be more precise, federal regulations require that all human-subjects research “conducted, funded, or otherwise subject to regulation by any federal department or agency” must be reviewed and approved by an IRB before data are collected. Research institutions generally have **Federal Wide Assurance** with the federal government, so that *all* research involving human subjects done at that institution needs to be formally reviewed by an IRB, even unfunded research. The repercussions of skipping this can be quite severe, including loss of grant funding to the specific researcher or the institution as a whole. If skipping review is seen to be willful or continuing, it can be considered scientific misconduct.

The extent of the review process varies quite a bit, however, depending on the ethical issues a particular study invokes. It also varies somewhat across institutions. Research involving considerable risk to subjects, or involving minors or other especially protected groups, must be subjected to **full review** by the entire IRB committee. If full review is required, the researcher must submit a detailed application of at least several pages in length to the committee. In contrast, research involving anonymous or confidential surveys of adults about topics that are not personally controversial (for example, not about a person’s criminal activities, sexual behavior, or suicidal intentions) might qualify as **exempt from review**. This status means the research can be certified as ethically acceptable even though it might qualify as human-subjects research (some institutions do not exempt any human-subjects

research). Research qualifying as exempt is typically reviewed by one or two people, such as the chair of the IRB committee or an IRB administrator, instead of the entire committee. In between these two extremes is an **expedited review** that requires the full application form but can be reviewed by fewer people than the entire IRB committee. When researchers require subjects to do something like walk around a neighborhood, expedited review would probably be called for. Most human-subjects research in geography probably qualifies for exempt status; for example, most research using surveys or publicly available archival records would be exempt. Full review is quite rare, perhaps common only when research is conducted with children or considerable deception is employed.

However, most research conducted by geographers does not qualify as human-subjects research to begin with. Federal regulations technically define **human-subjects research** as “any systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge that uses (1) data collected through intervention or interaction with a living human subject, or (2) identifiable private information about a human subject.” A variety of types of data collection employed by geographers, even human geographers, would not be considered human-subjects research in this technical sense, including the secondary analysis of aggregate data that are completely stripped of identifiers such as names, social security numbers, residential addresses, and so on. Thus, using census data does not require IRB review because the Census Bureau does not release data at the individual level. Any activities that are not intended to contribute to generalizable knowledge do not count as human-subjects research. Teachers may administer exams in class without permission, for example. Finally, anonymous public observation is also permissible, “anonymous” and “public” being the keys to deciding that techniques like counting cars with automatic traffic counters do not require review.

A Case Study for Geographic Research: The Ethics of Tracking People

Geographers who incorporate the study of human subjects in their research usually have only minor concerns regarding their ethical treatment to worry about. This is not always true, however. A new technique of geographic data collection emerging in the 21st century raises some fascinating and substantial ethical issues. That technique is the use of GPS transmitters to track people’s travel activities, whether the transmitters are built into cell phones or installed as separate devices. Scientists have tracked the travel of nonhuman animals with radio transmitters and other technologies for decades, of course, but that has never been thought to raise ethical concerns. As we suggested above, however, people are considered ethically special; they are granted status as autonomous beings with rights of privacy over what other people may know about their activities, especially when they could suffer harm from that knowledge.

It has been recognized for some time that measurements of people’s activities in space and place, a form of behavioral observation, can provide a rich source of data for geographic researchers working in a variety of topical areas. But these data have

not been easy to collect. Even the most ardent researchers realize that stalking people without their permission is probably inappropriate, although we learned above that “anonymous public observation” is considered exempt human-subjects research for ethical review purposes. Archival records, such as those based on credit card, cell phone, or hotel use, could provide useful information in some contexts. But it’s difficult or impossible to get permission to use these records, and they do not necessarily provide the most useful data for a given researcher’s needs (presumably people travel quite a bit in between uses of their plastic). We have mentioned the use of activity diaries, transportation surveys, and other explicit reports in Chapter 6. Their administration requires informed consent by respondents, of course. They are quite expensive to administer and analyze, however, and suffer from the problems of explicit reports, such as memory fallibility and intentional deception by respondents. Attaching a GPS transmitter to a person, or having the person carry one around, could produce a source of activity data of unprecedented completeness, validity, and precision.

Thus, the possibility of acquiring a large number of continuous space-time records via an automatic technology has great appeal to geographic researchers—but it raises serious ethical concerns. How much could a researcher actually infer about a person’s activities on the basis of partial or complete tracking records of their movements? After all, such a record would indicate, perhaps rather precisely, where a person is located at any time of the day or night, at least the street address of their location. Matching these addresses with the identities of places could be quite compromising, to say the least. You could reasonably infer if someone was visiting a paramour, which you might want to do if the person’s spouse paid you enough. Consider how interested law enforcement agents would be to get a hold of your tracking data if they suspected one of your subjects was involved in a crime or even just a material witness to a crime. Research records could be subpoenaed for civil suits or child-custody cases. The threat to privacy this raises applies not just to committing criminal or clandestine activities, however. People have a basic right to control information about their activities, including *where* the activities occur.

Of course, the principles of the Belmont Report do not become moot just because satellites are involved. Informed consent would still be required of anyone who is tracked. Perhaps the tracked person would have the freedom to “shut off” the tracker whenever he or she wanted privacy. All that is fine, as long as only that individual is being tracked. What about tracking people who are driving or riding in automobiles, something of considerable interest to transportation geographers and others? Someone who has not given informed consent might well ride in the car or even borrow it to make their clandestine trips. What if such a person were a minor? We learned above that youngsters have extra ethical protections, according to IRB rules; for example, the youngster’s parents must also provide permission.

The ethics surrounding the tracking of people with GPS technologies provides just one example of the privacy concerns raised by various geographic information technologies.⁶ From the perspective of researchers, it would be desirable to be able

⁶These are discussed in the book by Monmonier (2002).

to promise people who have signed consent forms that their data will never be released to anyone else in a way that leaves the person identifiable. There is a federal “certificate of confidentiality” that aims to achieve just this; it has held up in court recently, but that could change with new judicial decisions. The future will surely bring more and more situations like this, where compromises will have to be fashioned among the ethical prerogatives of the various stakeholders in geographic research.

Review Questions

- What is ethics, and what are three “ethical directives” that guide ethical considerations?
- What are some reasons, both practical and philosophical, for acting ethically when doing scientific research?
- What are some specific ethical principles in scientific research that follow from each of the ethical directives?

Treating the Natural and Cultural World Ethically

- What are some ethical considerations suggested by the episode of the felling of Prometheus, the ancient bristlecone pine in eastern Nevada, by a graduate student in geography?
- What are some guidelines for treating the natural and cultural environment ethically during field research?

Treating Human Research Subjects Ethically

- What is the Belmont Report, and what are the three ethical principles outlined therein?
- What are institutional review boards (IRBs), how do they generally work, and which institutions are required to have them?
- What are the review categories of “full,” “expedited,” and “exempt,” and what types of research projects in geography generally qualify for each?
- What are some ethical considerations suggested by geographical research in which people’s travel activities are tracked and recorded?

Key Terms

anonymity: means of protecting privacy by not collecting or recording personally identifiable information about a subject

Belmont Report: key government document outlining the philosophical basis for the ethical treatment of human research subjects in the United States.

confidentiality: means of preventing inappropriate disclosure of personally identifiable information collected about a subject by not revealing it to anyone else

conflict of interest: when a reviewer has trouble evaluating a person's work fairly because of prior history with the person, or because the evaluation will have positive or negative implications for the reviewer

data cooking: the fraudulent analysis and/or communication of data

debriefing: informal interaction with subjects after a study session is completed, designed to inform them about the purpose or findings of the study, to remove any deception, and sometimes to collect more information relevant to the interpretation of the study's results

deception in research: any form of dishonesty a researcher intentionally uses in communicating to research subjects about any aspect of a study; an ethical issue that requires justification for its approval by IRBs

ethics: the study of moral or proper action

exempt from review: the least extensive of three IRB human-subjects review categories, required of human-subjects studies that invoke the least severe ethical issues

expedited review: the intermediately extensive of three IRB human-subjects review categories, required of human-subjects studies that invoke some ethical issues but not very severely

Federal Wide Assurance: agreement with U.S. government that all research involving human subjects done at a particular institution will be reviewed by an IRB, even if it is not directly funded by the federal government

full review: the most extensive of three IRB human-subjects review categories, required of human-subjects studies that invoke the most severe ethical issues

human-subjects research: technically defined by federal regulations as "any systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge that uses (1) data collected through intervention or interaction with a living human subject, or (2) identifiable private information about a human subject"

informed consent: IRB requirement that potential subjects be informed of the procedures and purpose of a study, that they indicate they understand this information, and that they participate voluntarily, without coercion

institutional review boards (IRBs): administrative units that oversee the ethical treatment of subjects as at research institutions

plagiarize: to take someone's ideas or work without proper attribution of credit

subjects: humans and other animals who are observed and measured by geographers and other scientists