CHAPTER 3

MORAL FRAMEWORKS

Moral judgements . . . are, like other judgements, always accountable. We can reasonably be asked—sometimes by others and always by ourselves—to give reasons for them. We can then be expected to give those reasons from a system, however rough and incomplete, with which the rest of our lives coheres, and which is understandable both to outward and inward questioners.
Mary Midgley

An ethical theory is a comprehensive perspective on morality that clarifies, organizes, and guides moral reflection. If successful, it provides a framework for making moral choices and resolving moral dilemmas—not a simple formula, but rather a comprehensive way to identify, structure, and integrate moral reasons. Ethical theories also ground the requirements in engineering codes of ethics by reference to broader moral principles. In doing so, they illuminate connections between engineering codes of ethics and "ordinary" morality—that is, the justified moral values that play a role in all areas of life.

We discuss five types of ethical theories (and traditions) that have been especially influential: utilitarianism, rights ethics and duty ethics (discussed together), virtue ethics, and self-realization ethics. *Utilitarianism* says that we ought to maximize the overall good, taking into equal account all those affected by our actions. *Rights ethics* says we ought to respect human rights, and *duty ethics* says we ought to respect individuals' autonomy. *Virtue ethics* says that good character is central to morality. *Self-realization ethics* emphasizes the moral significance of self-fulfillment. None of these theories has won a consensus, and each has

different versions. Nevertheless, suitably modified, the theories complement and enrich each other to the extent that they usually agree with respect to the right action in particular situations. Taken individually and together, they provide illuminating perspectives on engineering ethics.

3.1 UTILITARIANISM

3.1.1 Utilitarianism versus Cost-Benefit Analysis

Utilitarianism is the view that we ought always to produce the most good for the most people, giving equal consideration to everyone affected. The standard of right conduct is maximization of good consequences. "Utility" is sometimes used to refer to these consequences, and other times it is used to refer to the balance of good over bad consequences.

At first glance, the utilitarian standard seems simple and plausible. Surely morality involves producing good consequences—especially in engineering! Utilitarianism even seems a straightforward way to interpret the central principle in most engineering codes: "Engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties." After all, "welfare" is a rough synonym for "overall good" (utility), and safety and health might be viewed as especially important aspects of that good. But what exactly is the good to be maximized? And should we maximize the good effects of individual actions or the good effects of general rules (policies, laws, principles in codes of ethics)? Depending on how these questions are answered, utilitarianism takes different forms.

Before discussing these different forms, let us compare and contrast utilitarianism with cost-benefit analyses familiar in engineering.[1] A typical cost-benefit analysis identifies the good and bad consequences of some action or policy, usually in terms of dollars. It weighs the total goods against the total bads, and then compares the results to similar tallies of the consequences of alternative actions or rules. This sounds just like utilitarianism, but often it is not. To see this, we need to look closely at whose good and bad is considered and promoted, as well as how good and bad are measured. Usually the answers center around the good of a corporation, rather than the good of everyone affected, considered impartially.

Consider the cost-benefit analysis performed by Ford Corporation in developing its Pinto automobile, which for years was the largest-selling subcompact car in America. During the early stages of its development, crashworthiness tests revealed that the Pinto could not sustain a front-end collision without the windshield breaking. A quick-fix solution was adopted: The drive train was moved backward. As a result, the differential was moved very close to the gas tank.[2] Thus many gas tanks collapsed and exploded upon rear-end collisions at low speeds.

In 1977, Mark Dowie published an article in *Mother Jones* magazine that divulged the cost-benefit analysis developed by Ford Motor Company in 1971 to decide whether to add an $11 part per car that would greatly reduce injuries by protecting the vulnerable fuel tank—a tank that exploded in rear-end collisions under 5 miles per hour.[3] The $11 seems an insignificant expense, even adjusting

to current dollars, but in fact it would make it far more difficult to market a car that was to be sold for no more than $2000. Moreover, the costs of installing the part on 11 million cars and another 1.5 million light trucks added up. The cost of not installing the part, and instead paying out costs for death and injuries from accidents, was projected using a cost-benefit analysis. The analysis estimated the worth of a human life at about $200,000, a figure borrowed from the National Highway Traffic Safety Administration. The cost per non-death injury was $67,000. These figures were arrived at by adding together such costs as a typical worker's future earnings, hospital and mortuary costs, and legal fees. In addition, it was estimated that about 180 burn deaths and another 180 serious burn injuries would occur each year. Multiplying these numbers together, the annual costs for death and injury was $49.5 million, far less than the estimated $137 million for adding the part, let alone the lost revenue from trying to advertise a car for the uninviting figure of $2,011, or else reducing profit margins.

Ford's cost-benefit analysis is usually understood to be a utilitarian calculation, and certainly it was much like one. It appealed solely to the sum of good and bad consequences, and it sought to maximize the good over the bad. To be sure, its calculations were seriously flawed. The deaths and injuries turned out to be more than were estimated—Dowie estimated 3000 per year. Also, juries awarded larger damage verdicts once Dowie's article appeared, and the negative publicity Ford received greatly damaged its reputation and adversely affected all of its sales for a decade. Even if it had been accurate, however, the cost-benefit analysis was not strictly a utilitarian calculation. It implicitly focused on the costs and benefits to Ford Motor Company. In particular, it omitted the bad consequences of not informing consumers of known dangers. It also focused on costs that could be quantified in dollars, rather than taking into account additional good consequences such as human happiness, and it calculated costs in the short run, for each year, rather than in the long run.

In contrast, utilitarian analyses consider the costs and benefits to everyone affected by a project or proposal. They weigh the interests of each person affected equally, giving no preference to members of a corporation. They adopt a long-term view, and they usually do not reduce good and bad to dollars. With these observations in mind, let us turn to the main versions of utilitarianism.

3.1.2 Act-Utilitarianism versus Rule-Utilitarianism

Act-utilitarianism focuses on each situation and the alternative actions possible in the situation. A particular action is right if it is likely to produce the most good for the most people in a given situation, compared to alternative choices that might be made. The standard can be applied at any moment, and according to act-utilitarians it should be. Right now, should you continue reading this chapter? You might instead take a break, go to sleep, see a movie, or pursue any number of other options. Each option would have both immediate and long-term consequences that can be estimated. The right action is the one that produces the most overall good, taking into account everyone affected.

Of course, even the time spent in making such calculations needs to be considered, and usually we operate according to rules of thumb, such as "complete assignments on time." Such rules, however, provide only rough guidance based on past experience. According to John Stuart Mill (1806–1873), the same is true of everyday moral rules such as "do not deceive" and "keep your promises." These are rules of thumb that summarize past human experience about the types of actions that usually maximize utility.[4] The rules should be broken whenever doing so will produce the most good in a specific situation. The same is true regarding rules stated in engineering codes of ethics.

An alternative version of utilitarianism says we should take rules, rather than isolated actions, much more seriously. Justified rules are morally authoritative, rather than loose guidelines. According to this view, called *rule-utilitarianism,* right actions are those required by rules that produce the most good for the most people. Because rules interact with each other, we need to consider a set of rules. Thus, Richard Brandt (1910–1997), who introduced the term *rule-utilitarianism,* argued that individual actions are morally justified when they are required by an *optimal moral code*—that set of rules which maximizes the public good more than alternative codes would (or at least as much as alternatives).[5] Brandt had in mind society-wide standards, but the same idea applies to engineering codes of ethics. In particular, an engineering code of ethics is justified in terms of its overall good consequences (compared to alternative codes), and so engineers should abide by it even when an exception might happen to be beneficial. For example, if codified rules forbidding bribes and deception are justified, then even if a particular bribe or deception is beneficial in some situations, one should still refrain from them.

There are philosophical debates over precisely how much rule-utilitarianism and act-utilitarianism differ from each other, but at least sometimes they seem to point in different directions. Indeed, rule-utilitarianism was developed during the twentieth century primarily as a way of correcting several problems with act-utilitarianism.[6]

One problem, just noted, is that act-utilitarianism apparently permits some actions that we know (on other grounds) are patently immoral. Suppose that stealing a computer from my employer, an old one scheduled for replacement anyway, benefits me significantly and causes only miniscule harm to the employer and others. We know that the theft is unethical, and hence act-utilitarianism seems to justify wrongdoing. Rule-utilitarians express this moral knowledge by demonstrating the overall good is promoted when engineers heed the principle, "Act as faithful agents or trustees of employers."

A special problem concerns justice. Act-utilitarianism seems to permit injustice by promoting social good at the expense of individuals. Suppose that in a particular situation more good is promoted by keeping the public ignorant about serious dangers, for example, by not informing them about a hidden fault in a car or building. Or suppose it will improve company morale if several disliked engineers are fired after being blamed for mistakes they did not make. Doing so is unfair, but the overall good is promoted. Rule-utilitarians avoid this result by

emphasizing the general good in heeding rules like "corporations should inform the public of dangers," "discipline or punish only the guilty."

Yet another problem, ironically, is that act-utilitarianism seems to require too much of us. Right now, each of us could promote the overall good by foregoing luxuries and redirecting our careers in order to give to worthy causes, such as alleviating world hunger. Our own well-being might be adversely affected, but surely saving people from starvation produces more good than missing a few movies and driving a less expensive car. But, using iterative reasoning, it follows that we should abandon virtually all luxuries and give in a degree that only saints could consider mandatory. To avoid this result, rule-utilitarians agree that relatively wealthy people should increase their philanthropic giving, but they also think the general good is promoted by allowing individuals to act in accord with a rule such as "Give to help others, while keeping sufficient resources for the security and reasonable luxuries for oneself and one's family."

3.1.3 Theories of Good

There is another area of disagreement among utilitarians. Justified actions or rules should maximize good consequences, but what is the standard for "good" consequences? In particular, what is *intrinsic good*—that is, good considered just by itself (apart from its consequences)? All other good things are *instrumental goods* in that they provide means (instruments) for gaining happiness.

Some utilitarians consider pleasure to be the only intrinsic good. But that seems counterintuitive—there is nothing good about the pleasures of rapists and sadistic torturers! More plausibly, Mill believes that happiness is the only intrinsic good, and hence he understands utilitarianism as the requirement to produce the greatest amount of happiness. But what is happiness? Mill thinks of it as (a) a life rich in pleasures, mixed with some inevitable pains, plus (b) a pattern of activities and relationships that one can affirm as valuable overall, as the way one wants one's life to be.

Especially in his book *On Liberty,* Mill emphasized the importance of individual choices in charting a path to happiness. Nevertheless, he also believed that the happiest life is rich in *higher pleasures,* those that are preferable in kind or quality. For example, Mill contended that the pleasures derived from love, friendship, intellectual inquiry, creative accomplishment, and appreciation of beauty are inherently better than the bodily pleasures derived from eating, sex, and exercise. That contention is questionable, however. How, after all, do we determine which pleasures are better than others, apart from their subjective "feel"? Mill suggested that one pleasure is higher than another if it is favored by the majority of people who have experienced both, but why should the majority view matter here? (Mill's Victorian peers supported his view that physical pleasures have less worth than mental ones, but probably most people today would question such a general ranking.) If we rank pleasures, it is probably because we are actually ranking the types of activities and relationships that generate them, thereby shifting to a new theory of good as a list of especially valuable activities and relationships.[7]

In contrast, Brandt argues that things like love and creativity are good because they satisfy rational desires. *Rational desires* are those that we can affirm after fully examining them in light of all relevant information about the world and our own deepest needs. Some self-destructive desires, such as the desire to use dangerous drugs, are not rational since if we saw their full implications we would not approve of them. Desires (and pleasures) such as those of rapists and sadists are also not rational.

Mill and Brandt both try to use an objective standard on what counts as good. Other utilitarians, especially economists, adopt a "preference theory": What is good is what individuals prefer, as manifested in their choices in the marketplace. Economists base their cost-benefit analyses on the preferences that people express through their buying habits. In this version, utilitarianism becomes the view that right actions produce the greatest satisfaction of the preferences of people affected.

DISCUSSION QUESTIONS

1. Apply act-utilitarianism and rule-utilitarianism in resolving the following moral problems. Do the two versions of utilitarianism lead to the same or different answers to the problems?

   a. George had a bad reaction to an illegal drug he accepted from friends at a party. He calls in sick the day after, and when he returns to work the following day he looks ill. His supervisor asks him why he is not feeling well. Is it morally permissible for George to lie by telling his supervisor that he had a bad reaction to some medicine his doctor prescribed for him?

   b. Jillian was aware of a recent company memo reminding employees that office supplies were for use at work only. Yet she knew that most of the other engineers in her division thought nothing about occasionally taking home notepads, pens, computer disks, and other office "incidentals." Her eight-year-old daughter had asked her for a company-inscribed ledger like the one she saw her carrying. The ledger costs less than $20, and Jillian recalls that she has probably used that much from her personal stationery supplies during the past year for work purposes. Is it all right for her to take home a ledger for her daughter without asking her supervisor for permission?

2. Can utilitarianism provide a moral justification for engineers who work for tobacco companies, for example, in designing cigarette-making machinery? In your answer take account of the following facts (and others you may be aware of).[8] Cigarettes kill more than 400,000 Americans each year, which is more than the combined deaths caused by alcohol and drug abuse, car accidents, homicide, suicide, and AIDS. Cigarette companies do much good by providing jobs (Philip Morris employs more than 150,000 people worldwide), through taxes (over $4 billion paid by Philip Morris in a typical year), and through philanthropy. Most new users of cigarettes in the United States are teenagers (under 18). There is disagreement over just how addictive cigarettes are, but adults have some choice in deciding whether to continue using cigarettes, and they may choose to continue using for reasons beyond the addictive potential of nicotine.
3. Some cost-benefit analyses place a price tag on the loss of life. Is doing so inherently offensive, or can it be a reasonable procedure for limited purposes? In the Pinto case,

even if Ford was justified in making the cost-benefit analysis, were there additional moral considerations that they should have used in deciding whether to improve the safety of the car?

4. Make a list of the things (activities, relationships, etc.) that are intrinsically good. Do you believe that every intelligent person would agree with your list? How much of your list is either culture bound or applicable only to individuals who share your interests? Is there any reason why engineers should adopt a particular theory of (intrinsic) good as either pleasure, a list of desirable activities and relationships, happiness, satisfaction of rational goods, or preference satisfaction?

3.2 RIGHTS ETHICS AND DUTY ETHICS

Rights ethics regards human rights as fundamental, and duty ethics regards duties of respect for autonomy as fundamental. Historically, the theories developed as distinct moral traditions, but their similarities are far more pronounced than their differences. Both theories emphasize respect for individuals' dignity and worth, in contrast with utilitarians' emphasis on the general good. Furthermore, rights ethics and duty ethics are largely mirror images of each other: Because you have a right to life, I have a duty not to kill you; and if I have a duty not to deceive you then you have a right not to be deceived.

3.2.1 Human Rights

Rights enter into engineering in many ways. Holding paramount the safety, health, and welfare of the public can be interpreted as having respect for the public's rights to life (by producing safe products), rights to privacy, rights not to be injured (by dangerous products), and rights to receive benefits through fair and honest exchanges in a free marketplace. In addition, the basic right to liberty implies a right to give informed consent to the risks accompanying technological products, an idea developed in chapter 4. Again, employers have rights to faithful service from employees, and employees have rights to reciprocal fair and respectful treatment from employers, as discussed in chapter 6. And rights to life imply a right to a livable environment, an idea explored in chapter 8.

Nearly all ethical theories leave room for rights. Thus, rule-utilitarians construe rights as those areas of liberty that are so important as to deserve special safeguards in society. Rights ethics is distinctive, however, in that it makes human rights the ultimate appeal—the moral bottom line. At its core, morality is about respecting the inherent dignity and worth of individuals as they exercise their liberty. Human rights constitute a moral authority to make legitimate moral demands on others to respect our choices, recognizing that others can make similar claims on us. As such, rights ethics provides a powerful foundation for the special ethical requirements in engineering and other professions.[9]

Rights ethics should sound familiar, for it provides the moral foundation of the political and legal system of the United States. Thus, in the Declaration of Independence Thomas Jefferson wrote: "We hold these truths to be self-evident; that all men are created equal; that they are endowed by their Creator with certain

unalienable Rights, that among these are Life, Liberty, and the pursuit of Happiness." Unalienable—or inalienable, natural, human—rights cannot be taken away (alienated) from us, although of course they are sometimes violated. Human rights have been appealed to in all the major social movements of the twentieth century, including the women's movement, the civil rights movement, the farm workers' movement, and the gay rights movement. Human rights have been used as the basis for critiquing the violation of rights in other countries, such as the former Soviet Union and current dictatorships. They are also embodied in the Universal Declaration of Human Rights proclaimed by the General Assembly of the United Nations in 1948. Indeed, the idea of human rights is the single most powerful moral concept in making cross-cultural moral judgments about customs and laws.

As this point indicates, the notions of human rights and legal rights are distinct. Legal rights are simply those the law of a given society says one has. Human rights are those we have as humans, whether the law recognizes them or not.

3.2.2 Two Versions of Rights Ethics

Rights ethics gets more complex as we ask which rights exist. Thus, human rights might come in two forms: liberty rights and welfare rights. *Liberty rights* are rights to exercise one's liberty, and they place duties on other people not to interfere with one's freedom. (The "not" explains why they are also called negative rights.) *Welfare rights* are rights to benefits needed for a decent human life, when one cannot earn those benefits (perhaps because one is severely handicapped) and when the community has them available. (As a contrast to negative rights, they are sometimes called positive rights.)

The extent of welfare rights is controversial, especially when they enter into the law. But most rights ethicists affirm that both liberty and welfare human rights exist. Indeed, they contend that liberty rights imply at least some basic welfare rights. What, after all, is the point of saying that we have rights to liberty if we are utterly incapable of exercising liberty because, for example, we are unable to obtain the basic necessities, such as jobs, worker compensation for serious injuries, and health care? Shifting to legal rights, most Americans also support selective welfare rights, including a guaranteed public education of kindergarten through twelfth grade, Medicare and Medicaid, Social Security, and reasonable accommodations for persons with disabilities.

This first version of rights ethics conceives of human rights as intimately related to communities of people. A. I. Melden, for example, argues that having moral rights presupposes the capacity to show concern for others and to be accountable within a moral community.[10] Melden's account, like that of most rights ethicists, allows for more "positive" welfare rights to community benefits needed for living a minimally decent human life (when one cannot earn those benefits on one's own and when the community has them available). Thus it lays the moral groundwork for recognizing the limited welfare system in the United States. The extent of welfare rights, just like that of liberty rights, always has to be determined

contextually—for example, by what the community has available by way of resources and the severity of the obstacles to freedom confronted by various individuals.

A second version of rights ethics denies there are welfare human rights. *Libertarians* believe that only liberty rights exist; there are no welfare rights. John Locke (1632–1704), who was the first philosopher to carefully articulate a rights ethics, is often interpreted as a libertarian.[11] He believed that the three most basic human rights are to life, liberty, and property. His views had an enormous impact at the time of the French and American revolutions and provide the moral foundation of contemporary American society. Indeed, Jefferson simply modified Locke's triad of basic rights, changing property to the pursuit of happiness.

Locke's version of a human rights ethics was highly individualistic. He viewed rights primarily as entitlements that prevent other people from meddling in one's life. He thought of property as whatever we gain by "mixing our labor" with things—for example, coming to own lumber by going into the wilderness and cutting down a tree. Today, our understanding of property is far more complex. Many believe that property is largely what the law and government specify as to how we can acquire and use material things.

The individualistic aspect of Locke's thought is reflected in the contemporary political scene in the Libertarian political party and outlook, with its emphasis on the protection of private property and the condemnation of welfare systems. Libertarians take a harsh view of taxes and government involvement beyond the bare minimum necessary for national defense and the preservation of free enterprise. Locke's followers tend to insist that property is sacrosanct and that governments continually intrude on property rights, particularly in the form of excessive taxation and regulation. They also oppose extensive government regulation of business and the professions. Thus, Milton Friedman (discussed in chapter 1) is a leading libertarian thinker who argues against both government regulation and requiring corporations to accept responsibilities beyond maximizing profit (within the bounds of minimum laws, such as forbidding fraud).

We have been speaking of human rights, but there are also *special moral rights*—rights held by particular individuals rather than by every human being. For example, engineers and their employers have special moral rights that arise from their respective roles and the contracts they make with each other. Special rights are grounded in human rights, however indirectly. Thus, contracts and other types of promises create special rights because people have human rights to liberty that are violated when the understandings and commitments specified in contracts and promises are violated. And when the public purchases products, there is an implicit contract, based on an implicit understanding, that the products will be safe and useful.

Finally, few rights are absolute, in the sense of being unlimited and having no justifiable exceptions. Libertarians and other rights ethicists agree that members of the public do not have an absolute right not to be harmed by technological products. If people purchase hang gliders and then injure themselves by flying them carelessly or under bad weather conditions, their rights have not been

violated—assuming that advertisements about the joys of hang gliding did not contain misleading information. But human rights to pursue one's legitimate interests do imply rights not to be poisoned, maimed, or killed by technological products whose dangers are not obvious or are deliberately hidden. These rights also imply a right to informed consent when purchasing or using products or services that might be dangerous, for example, buying an airline ticket. We might think of this as a right to make an "informed purchase."

3.2.3 Duty Ethics

Duty ethics says that right actions are those required by duties to respect the liberty or autonomy (self-determination) of individuals. One writer suggests the following list of important duties: "1. Don't kill. 2. Don't cause pain. 3. Don't disable. 4. Don't deprive of freedom. 5. Don't deprive of pleasure. 6. Don't deceive. 7. Keep your promise. 8. Don't cheat. 9. Obey the law. 10. Do your duty [referring to work, family, and other special responsibilities]."[12]

How do we know that these are our duties? Immanuel Kant (1724–1804), the most famous duty ethicist, argued that all such specific duties derive from one fundamental duty to respect persons. Persons deserve respect because they are moral agents—capable of recognizing and voluntarily responding to moral duty (or, like children, they potentially have such capacities). *Autonomy*—moral self-determination or self-governance—means having the capacity to govern one's life in accordance with moral duties. Hence, respect for persons amounts to respect for their moral autonomy.

Immorality occurs when we "merely use" others, reducing them to *mere* means to our ends, treating them as mere objects to gratify our needs. Violent acts such as murder, rape, and torture are obvious ways of treating people as mere objects serving our own purposes. We also fail to respect persons if we fail to provide support for them when they are in desperate need and we can help them at little inconvenience to ourselves. Of course we need to "use" one another as means all the time: business partners, managers and engineers, and faculty and students use each other to obtain their personal and professional ends. Immorality involves treating persons as "mere" means to our goals, rather than as autonomous agents who have their own goals.

We also have duties to ourselves, for we, too, are rational and autonomous beings. As examples, Kant says we have a duty not to commit suicide, which would bring an end to a valuable life; we have duties to develop our talents, as part of unfolding our rational natures; and we should avoid harmful drugs that undermine our ability to exercise our rationality. Obviously, Kant's repeated appeal to the idea of rationality makes a number of assumptions about morally worthy aims. After beginning with the minimal idea of rationality as the capacity to obey moral principles, he builds in a host of specific goals as part of what it means to be rational.

In a famous sentence, Kant stated the fundamental duty of respect for persons as rational and autonomous beings: "Act so that you treat humanity, whether in your own person or in that of another, always as an end and never as a means