

Chapter 2

Ethics: Fundamental Elements

Ethics is to know the difference between what you have the right to do and what is right to do.

Potter Stewart

With respect to social consequences I believe that every researcher has responsibility to assess, and try to inform others of the possible social consequences of the research products he is trying to create.

Herbert Simon

2.1 Introduction

Ethics deals with the study and justification of moral beliefs. It is a branch of philosophy which examines what is *right* and what is *wrong*. *Ethics* and *More* are regarded as identical concepts, but actually they are not. The term *ethics* is derived from the Greek word *ἦθος* (*ethos*) meaning *moral character*. The term *morality* comes from the Latin word *mos* meaning *custom* or *manner*. *Morals*, from which the term *morality* is derived, are social rules or inhibitions from the society. In present times this is, in a way, reverted, i.e., *ethics* is the science, and *morals* refer to one's conduct or character. *Character* is an *inner-driven* view of what constitutes morality, whereas *conduct* is an *outer-driven* view. Philosophers regard *ethics* as moral philosophy and *morals* as societal beliefs. Thus it might happen that some society's *morals* are not *ethical*, because they represent merely the belief of the majority. However, there are philosophers who argue that *ethics* has a relativistic nature, in the sense that what is *right* is determined by what the majority believe [1–3]. For example, in ancient Greece Aristotle's view of *ethics* was that “ethical rules should always be seen in the light of traditions and the accepted opinions of the community”.

Some psychologists such as Lawrence Kohlberg argue that moral behavior is derived by moral reasoning which is based on the principles and methods that one uses in his/her judgment. Other psychologists regard the ethical behavior as the

humanistic psychology movement. For example, to determine what is right and wrong, one may start from “*self-actualization*” which is one’s highest need and fulfils his/her potential. Still other psychologists have developed the *evolutionary psychology* which is based on the assumption that the ethical behavior can sometimes be seen as an evolutionary process. For example, altruism towards members of one’s own family promotes his/her inclusive fitness.

The objective of this chapter is to present the fundamental concepts and issues of ethics in general. In particular, the chapter:

- Discusses the branches of analytic philosophy ethics.
- Investigates the principal theories of ethics.
- Discusses the issue of professional ethics and presents the codes of ethics for engineers, electrical and electronic engineers, and robotic engineers.

2.2 Ethics Branches

In analytic philosophy, ethics is distinguished in the following levels:

- Meta ethics
- Normative ethics
- Applied ethics

2.2.1 Meta Ethics

Meta ethics is one of the fundamental branches of philosophy which examines the nature of morality in general, and what justifies moral judgments. Three questions investigated by meta ethics are:

- Are ethical demands *true-apt* (i.e., capable of being true or not true) or are they, for example, emotional claims?
- If they are *true-apt*, are they ever true, and if so what is the nature of the facts they represent?
- If there are moral truths what makes them true, and they are absolutely true or always relative to some individual or society or culture?

If there are more truths, one way to find what makes them true is to use a *value system*, and here the question is if there is a value that can be discovered. The ancient Greek philosophers, e.g., *Socrates* and *Plato* would reply *yes* (they both believed that goodness exists absolutely), although they did not have the same view about what is good. The view that there are no ethical truths is known as “*moral anti-realism*”. The modern empiricist *Humes* has the position that moral expressions are expressions of emotion or sentiment feeling. Actually, the value system of

a society is created by great individuals (writers, poets, artists, leaders, etc.) or derived from some list of *moral absolutes*, e.g. religious moral code, whether explicit or not.

2.2.2 Normative Ethics

Normative ethics studies the issue of how we ought to live and act. A normative ethics theory of the good life investigates the requirements for a human to live well. A normative theory of right action attempts to find what it is for an action to be morally acceptable.

In other words normative ethics attempts to provide a system of principles, rules and procedures for determining what (morally speaking) a person should do and should not do. Normative ethics is distinguished from meta-ethics because it investigates standards for the rightness and wrongness of actions, whereas meta-ethics examines the meaning of moral language and the metaphysics of moral facts. Normative ethics is also different from “descriptive ethics” which is an empirical investigation of people’s moral beliefs.

Norms are sentences (rules) that aim to affect an action, rather than conceptual abstractions which describe, explain, and express. Normative sentences include commands, permissions and prohibitions, while common abstract concepts include sincerity, justification, and honesty. Normative rules interpret “ought-to” kind of statements and assertions, as contrasted from sentences that give “is” type statements and assertions. A typical way to “normative ethics” is to describe “norms” as reasons to believe, and to feel.

Finally, a theory of *social justice* is an attempt to find how a society must be structured, and how the social goods of freedom and power should be distributed in a society.

2.2.3 Applied Ethics

Applied ethics is the branch of ethics which investigates the application of ethical theories in actual life. To this end, applied ethics attempts to illuminate the possibility of disagreement about the way theories and principles should be applied [4]. Specific areas of applied ethics are:

- Medical ethics
- Bioethics
- Public sector ethics
- Welfare ethics
- Business ethics
- Decision making ethics
- Legal ethics (justice)

- Media ethics
- Environmental ethics
- Manufacturing ethics
- Computer ethics
- Robot ethics
- Automation ethics

Strict deontological principles of ‘Ten Commandments’ type provides solutions to particular cases that are not globally acceptable. For example, in medical ethics a strict deontological approach would never allow the deception of a patient about his/her illness, whereas a utilitarian approach might permit lying to a patient if the outcome of the deception is good.

2.3 Ethics Theories

Key ethical theories are the following:

- Virtue theory (*Aristotle*)
- Deontological theory (*Kant*)
- Utilitarian theory (*Mill*)
- Justice as fairness theory (*Rawls*)
- Egoism theory
- Value-based theory
- Case-based theory

2.3.1 Virtue Theory

Aristotle’s ethical theory is based on the concept of *virtue* which is defined to be a character a human being needs to flourish or live well. *Virtue* is coming from the Latin word *virtus* and the Greek *αρετή* (areti) meaning excellence of a person. A *virtuous agent* is one who has and applies the virtues (i.e., an agent that acts virtuously). Virtue theory tells that “an action is right if it is what a virtuous agent would do in the situation at hand” [5, 6]. Thus, virtue theory is actually concerned with building good personality (character) by creating traits and habits toward acting with justice, prudence, courage, temperance, compassion, wisdom, and fortitude. The character (model of practical reasoning) is built by answering the question “what habits should I develop?” In overall, the creation of personal identity is achieved by combining desires, reason and character habits. Aristotle’s two principal virtues are “*σοφία*” (sophia) meaning *theoretical wisdom* and “*φρόνησις*” (phronesis) meaning *practical wisdom*. Plato’s cardinal virtues are *wisdom, courage, temperance, and justice*, i.e., if one is wise, courageous, temperate and just, then right actions will follow.

2.3.2 Deontological Theory

Kant's ethical theory [7] gives emphasis to the principles upon which the actions are based rather than the actions' results. Therefore, to act rightly one must be motivated by proper universal deontological principles that treat everyone with respect (respect for persons theory). The term *deontology* is derived from the Greek word “*δεοντολογία*” (deontology) which is composed by two words “*δέον*” (deon = duty/obligation/right) and “*λόγος*” (logos = study). Thus deontology is the ethical theory based on duties, obligations and rights. When one is motivated by the right principles he/she overcomes the animal's instincts and acts ethically. The center of Kant's ethics is the concept of “*categorical imperative*”. His model of practical reasoning is based on the answer to the question: “how do I determine what is rational?” Here, rationality means “do what reason requires” (i.e., without inconsistent or self-contradictory policies). Another approach to deontological theory is *Aquinas natural law* [8]. A further formulation of deontology is: “act such that you treat humanity, both in yourself and in that of another person, always as an end and never as a means”. Persons, unlike things, ought never merely be used. They are ends in themselves.

The reason why Kant does not base ethics on consequences of actions but to duties is that, in spite of our best efforts, we cannot control the future. We are praised or blamed for actions within our control (which includes our will or intention) and not for our achievements. This does not mean that Kant did not care about the outcomes of actions. He simply insisted that for a moral evaluation of our actions, consequences do not matter.

2.3.3 Utilitarian Theory

This theory, called *Mill's ethical theory*, belongs to the consequentialism ethical theories that are “*teleological*”, which aim at some goal state and evaluate morality of actions toward the goal. More specifically, *utilitarianism* measures morality on the basis of the maximization of net expected utility for everyone affected by a decision or action. The fundamental principle of utilitarianism can be stated as [9]:

Actions are moral to the extent that they are oriented towards promoting the best long-term interests (greatest good) for everyone concerned.

Of course, in many cases it is not clear what constitutes the “*greatest good*”. Some utilitarians consider that what is intrinsically good is pleasure and happiness, while others say that other things are intrinsically good, namely beauty, knowledge and power.

According to *Mill* not all pleasures have equal worth. He defined the “good” in terms of *well-being* (pleasure or happiness), which is the Aristotelian *ευδαιμονία*

(*eudaimonia* = happiness). He distinguished happiness not only quantitatively but also qualitatively between various forms of pleasure.

The utility principle tries to bridge the gap between *empirical* facts and *normative conclusions* using a pure cost/benefit analysis. Here, each one person should be counted as only one and no one person is allowed to be counted as more than one. Drawbacks (difficulties) of utilitarianism include the following:

- It is not always possible to determine who is affected by the outcome of an action.
- An outcome may not be the result of a unique action.
- The pleasures cannot easily be quantified using cost/benefit analysis.
- The greatest good for the greatest number is specified in “aggregate” way. Therefore this good may be obtained under conditions that are harmful to some ones.
- The process of determining what is right (or wrong) is a complex and time-consuming process.

2.3.4 *Justice as Fairness Theory*

This theory was developed by *John Rawls* (1921–2002). He combined the Kantian and utilitarian philosophies for the evaluation of social and political bodies. The *justice as fairness* theory is based on the following principle [10]:

General primary goods—liberty and opportunity, income and wealth, and the bases of self-respect – are to be distributed equally, unless an unequal distribution of any or all of these goods is to the advantage of the least favored.

This principle involves two parts: the *liberty principle* (each human has an equal right to the widest basic liberty compatible with the liberty of others) and the *difference principle* (economic and social inequalities must be regulated such as they are reasonably expected to be to everyone’s benefit attached to positions and offices to all). The Kantian liberty principle calls for universal basic respect for people as a minimum standard for all institutions. The difference principle suggests that all actions may be to the economic and social advantage of all, especially the least favored (like the utilitarian theory) with reasonable differences allowed.

2.3.5 *Egoism Theory*

Egoism theory is a teleological theory of ethics which sets as goal the greatest good (pleasure, benefit, etc.) of the one self alone. Egoism is derived from the Greek

word “*εγώ*” (ego = myself). Egoism theory is distinguished in the following categories:

- *Psychological egoism* (based on the argument that humans are naturally motivated by self-interest).
- *Ethical egoism* (based on the argument that it is normative for the individuals to act in their own interest). The ethical egoist believes that whatever is for his/her own benefit is morally right.
- *Minimalist egoism* (better applied to social or economic processes where all agents are trying to get maximum profit with minimum loss). Clearly, this is neither a normative nor a descriptive approach.

Egoism theory is contrasted to *altruism* which is not restricted to the interests of one self alone, but includes in its goal the interest of others as well.

2.3.6 Value-Based Theory

The *value-based* theory uses some *value system* which consists of the ordering and prioritization of ethical and ideological values that an individual or community holds [11]. Value is *what* a person wants to do. It is not a deontological action but a *want-to-do* action. Two individuals or communities may have a set of common values but they may not have the same prioritization of them. Therefore, two groups of individuals with some of their values the same, may be in conflict with each other ideologically or physically. People with different value systems will not agree on the rightness or wrongness of certain actions (in general, or in specific situations).

Values are distinguished in [11]:

- *Ethical values* (which are used for specifying what is right or wrong, and moral or immoral). They define what is permitted or prohibited in the society that holds these values.
- *Ideological values* (which refer to more general or wider areas of religion, political, social and economic morals). A value system must be consistent, but in real-life this may not be true.

2.3.7 Case-Based Theory

This is a modern ethics theory that tries to overcome the apparently impossible divide between deontology and utilitarianism. It is also known as *casuistry* [12] and starts with immediate facts of a particular case. *Casuists* start with a particular case itself and then examine what are morally significant features (both theoretical and practical). Casuistry finds extensive application in juridical and ethical considerations of law ethics. For example, lying is always not permissible if we follow the

deontological principle. However, in casuistry one might conclude that a person is wrong to lie in formal testimony under oath, but lying is the best action if the lie saves life.

2.4 Professional Ethics

Professional ethics provides guidance for interaction between professionals such that they can serve both each other and the whole society in the best way, without the fear of other professionals undercutting them with less ethical actions [13, 14]. Such codes are available in most professions, and are different from moral codes which are used to the education and religion of an entire larger society. Ethical codes are more specialized than moral codes, more internally consistent, and typically simple to be applied by an ordinary practitioner of the profession, without the need for extensive interpretation.

One of the earliest codes of professional ethics was the *Hippocrates Oath*, which provided rules for physician's ethical performance so as not to harm their patients. The oath and the whole code is written in the first person [15]. This medical profession code of ethics was revised by *Percival* [16] who defined acceptable conduct taking away the subjectivity of Hippocratic code.

Percival's code does not use the first person further discouraging personal interpretations of the code, and helps for a more consistent interpretation by different individuals, so that the standards are more universally applied [16]. This code was used as the basis for the formulation of professional ethics codes by many scientific and professional societies. Modern professional codes have the same attributes, specifying what primary duties and to whom a professional has, as unambiguously as possible.

In the following we present the following codes:

- The code of the National Society of Professional Engineers (**NSPE**) [17].
- The code of the Institute of Electrical and Electronic Engineers (**IEEE**) [18].
- The code of the American Society for Mechanical Engineers (**ASME**) [19].
- The code for robotics engineers developed by the Worcester Polytechnic Institute (**WPI**) [20].

2.4.1 NSPE Code of Ethics of Engineers

This code is stated as follows:

“Engineers in the fulfillment of their professional duties, shall:

1. Hold paramount the safety, health, and welfare of the public.
2. Perform services only in areas of their competence.

3. Issue public statements only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession”.

This code is addressed to the entire engineering profession with no reference to particular engineering specialties. The detailed code which includes: (i) Rules of Practice, (ii) Professional Obligations, and (iii) a Statement by the NSPE Executive Committee, can be found in [17].

2.4.2 IEEE Code for Ethics

This code has ten attributes of ethical commitment and is stated as follows [18a]:

“We, the members of the IEEE, in recognition of the importance of our technologies in affecting the quality of life throughout the world, and in accepting a personal obligation to our profession, its members and the communities we serve, do hereby commit ourselves to the highest ethical and professional conduct and agree:

1. To accept responsibility in making decisions consistent with the safety, health and welfare of the public, and to disclose promptly factors that might endanger the public or the environment;
2. To avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;
3. To be honest and realistic in stating claims or estimates based on available data;
4. To reject bribery in all its forms;
5. To improve the understanding of technology, its appropriate application, and potential consequences;
6. To maintain and improve our technical competence and to undertake technological tasks for other only if qualified by training or experience, or after full disclosure of pertinent limitations;
7. To seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;
8. To treat fairly all persons regardless of such factors as race, religion, gender, disability, age, or national origin;
9. To avoid injuring others, their property, reputation, or employment by false or malicious action;
10. To assist colleagues and co-workers in their professional development and to support them in following this code of ethics”.

Clearly, this code is again very general aiming to provide ethical rules for all electrical and electronic engineers. The IEEE code for conduct (of IEEE members and employees), approved and issued in June 2014, is given in [18b].

2.4.3 ASME Code of Ethics of Engineers

This code covers the entire profession of engineers and is formulated as follows [19]:

ASME requires ethical practice by each of its members and has adopted the following *Code of Ethics of Engineers*.

“The Fundamental Principles

Engineers uphold and advance the integrity, honor and dignity of the engineering profession by:

1. Using their knowledge and skill for the enhancement of human welfare;
2. Being honest and impartial, and serving with fidelity their clients (including their employers) and the public; and
3. Striving to increase the competence and prestige of the engineering profession”.

“The Fundamental Canons

1. Engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties.
2. Engineers shall perform services only in the areas of their competence; they shall build their professional reputation on the merit of their services and shall not compete unfairly with others.
3. Engineers shall continue their professional development throughout their careers and shall provide opportunities for the professional and ethical development of those engineers under their supervision.
4. Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest or the appearance of conflicts of interest.
5. Engineers shall respect the proprietary information and intellectual property rights of others, including charitable organizations and professional societies in the engineering field.
6. Engineers shall associate only with reputable persons or organizations.
7. Engineers shall issue public statements only in an objective and truthful manner and shall avoid any conduct which brings discredit upon the profession.
8. Engineers shall consider environmental impact and sustainable development in the performance of their professional duties.
9. Engineers shall not seek ethical sanction against another engineer unless there is good reason to do so under relevant codes, policies and procedures governing that engineer’s ethical conduct”.

The detailed criteria for interpretation of the Canons are presented in [19].

2.4.4 WPI Code of Ethics for Robotics Engineers

This code is specialized to robotics engineers and is formulated as follows [20]:

“As an ethical robotics engineer, I understand that I have responsibility to keep in mind at all times the well being of the following communities:

Global—the good of people and the environment

National—the good of the people and government of my nation and its allies

Local—the good of the people and environment of affected communities

Robotics Engineers—the reputation of the profession and colleagues

Customers and End-Users—the expectations of the customers and end-users

Employers—the financial and reputation well-being of the company

To this end and to the best of my ability I will:

1. Act in such a manner that I would be willing to accept responsibility for the actions and uses of anything in which I have a part in creating.
2. Consider and respect people’s physical well being and rights.
3. Not knowingly misinform, and if misinformation is spread do my best to correct it.
4. Respect and follow local, national, and international laws whenever applicable.
5. Recognize and disclose any conflicts of interest.
6. Accept and offer constructive criticism.
7. Help and assist colleagues in their professional development and in following this code”.

As stated in [20], “this code was written to address the current state of robotics engineering and cannot be expected to account for all possible future developments in such a rapidly developing field. It will be necessary to review and revise this code as situations not anticipated by this code need to be addressed”. Detailed discussions on robotic ethics and the WPI code of ethics for robotics engineers can be found in [21, 22], and a useful discussion on ethics and modular robotics is provided in [23].

2.5 Concluding Remarks

In this chapter we have presented the fundamental concepts and theories of ethics. The study of ethics in an analytical sense was initiated by the Greek philosophers Socrates, Plato and Aristotle who have developed what is called “*ethical naturalism*”. Modern Western philosophers have developed other theories falling within the framework of analytic philosophy, which were described in the chapter. Actually, it is commonly recognized that there is an essential difference between ancient ethics and modern morality. For example, there appears to be a vital difference between *virtue theory* and the modern moralities of *deontological ethics*

(Kantianism) and *consequential ethics* (utilitarianism). But actually we can see that both ethical approaches have more in common than their stereotypes may suggest. Understanding the strengths and weaknesses of *virtue ethics* and *modern ethics* theories can help to overcome present-day ethical problems and develop fruitful ethical reasoning and decision-making approaches. The dominating current approach that individuals or groups follow in their relations is the *contract ethics* which is an implementation of minimalist theory. In *contract ethics* goodness is defined by mutual agreement for mutual advantage. This approach is followed because the players have more to gain than not.

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Roboethics

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