Chapter 2: Professional Codes of Ethics

Summary

Nearly every professional association for engineers has its own code of ethics. This chapter discusses three of the most influential codes embraced by some of the largest engineering organizations in the United States: the National Society of Professional Engineers (NSPE), Institute of Electrical and Electronics Engineers (IEEE), and Association for Computer Machinery (ACM).

A code of professional ethics is a convention agreed upon by a group of professionals, but the mere fact that the members of an organization have agreed on a morally wrong code does not make the content of such a code right. No code of ethics can cover all the unforeseeable moral problems that may confront an engineer, and nearly every code has multiple interpretations. A code of ethics is not a full-fledged ethical theory.

The moral principles expressed in a code typically fall within one of three categories: prohibitive, preventive, or aspirational principles. Prohibitive principles describe actions that are morally prohibited; preventive principles seek to prevent certain types of problems from arising; and aspirational principles state goals that engineers should strive to achieve.

The chapter includes a discussion of how engineers should reason when two or more principles of a professional code give conflicting advice, or at least appear to do so. One option is to reinterpret or reformulate the principles of the code; a second option is to introduce a mechanism for resolving the conflict (e.g., a hierarchical ranking of the principles); a third option is to interpret the principles as contributory instead of conclusive moral reasons; and a fourth option is to accept the fact that it is sometimes impossible to comply with the code.

Learning Objectives

After studying this chapter, students should:
- Be familiar with the concepts of prohibitive, preventive and aspirational moral principles.
- Know the major professional codes of ethics for engineers.
- Know the causes of the *Challenger* and *Columbia* disasters and the lessons for engineers.
- Understand the difference between proper management decisions and proper engineering decisions.

Essay Questions

1. Is it ever morally permissible to violate one's professional code of ethics?
2. What should engineers do if their professional codes of ethics seem to give conflicting advice, or no advice at all?
*3. According to the NSPE code of ethics, engineers shall "avoid deceptive acts." How should we understand this principle?
*4. Who was morally responsible for the Challenger disaster?
5. Who was morally responsible for the Columbia disaster?

Multiple-Choice Questions

1. Which is *not* a reason to follow a code of ethics that was discussed?
*a) It is important for maintaining personal integrity.
b) Joining a profession is effectively making a promise.
c) Having professional standards strengthens an engineer's ability to stand by principles.
d) The personal cost to refusing moral actions is diminished by practicing the code.

*2. Philosopher Michael Davies writes, "Without a professional code, an engineer could not object [to doing something unethical] as an engineer. An engineer could, of course, still object 'personally' and refuse to do the job. But if he did, he would risk being replaced by an engineer who would not object." Which ethical theory fits best with this view about professional codes?
*a) Utilitarianism
b) Ethical egoism, as applied to groups
c) Virtue ethics
d) Kantianism

3. Which of the following is an example of an aspirational ethical principle in the NSPE code? Engineers shall
a) hold paramount the safety, health, and welfare of the public.
b) perform services only in areas of their competence.
c) issue public statements only in an objective and truthful manner.
*d) conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

*4. Which of the following principles is a prohibitive principle?
a) Engineers shall hold paramount the safety, health and welfare of the public.
*b) Engineers shall issue public statements only in an objective and truthful manner.
c) Engineers shall perform services only in areas of their competence.
d) Engineers shall conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

5. According to the Fundamental Canons of the NSPE Code of Ethics, engineers shall conduct themselves
a) honorably, morally, responsibly, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.
b) honorably, morally, ethically, and lawfully so as to enhance the prestige, reputation, and usefulness of the profession.
*c) honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and prestige of the profession.
d) None of the above

*6. The moral principles expressed in a professional code of ethics, including the NSPE code, can typically be characterized as a
a) prohibitive, descriptive, or normative principles.
*b) prohibitive, preventive, or aspirational principles.
c) prohibitive, descriptive, or aspirational principles.
d) factual, descriptive, or normative principles

7. Which of the following are Fundamental Canons of the NSPE Code of Ethics? "Engineers, in the fulfillment of their professional duties, shall
a) hold paramount the safety, health, and welfare of the public."
b) avoid deceptive acts."
c) conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession."
*d) All of the above

*8. Which of the following principles is a preventative principle?
a) Engineers shall avoid deceptive acts.
*b) Engineers shall hold paramount the safety, health and welfare of the public.
c) Engineers shall issue public statements only in an objective and truthful manner.
d) Engineers shall conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

9. According to the NSPE code of ethics, engineers shall "avoid deceptive acts." This is a(n) _____ element of the NSPE code.
*a) prohibitive
b) preventive
c) aspirational
d) All of the above

*10. According to the NSPE code of ethics, engineers shall "perform services only in areas of their competence." This is a(n) _____ element of the NSPE code.
a) prohibitive
*b) preventive
c) aspirational
d) All of the above

11. LeMessurier violated the third fundamental canon to only issue public statements in an objective and truthful manner. How might this violation have been required to comply with one of the fundamental canons of the NSPE code?
a) Citibank, his client, specifically ordered him to lie.
b) His honor and reputation and that of the profession rested upon repairing the building without anyone knowing.
c) A faithful agent delegates the responsibility of informing the public to the client.
*d) Truthfully disclosing all the relevant information to the public would have caused a panic and actually harmed the public good.

*12. How do the ACM and NSPE codes differ from the IEEE code?
a) The ACM and NSPE codes distinguish between fundamental moral principles and more specific rules.
b) The IEEE code emphasizes honesty and integrity.
c) The IEEE code has no prohibitive principles.
*d) The IEEE code specifically discusses bribes.

13. The direct technical cause of the *Challenger* disaster in 1986 was
*a) a leaking O-ring in a fuel tank, which could not cope with the unusually low temperature at the day of the take-off.
b) a lack of respect for the NSPE code of ethics, which stipulates that engineers shall hold paramount the health, safety and welfare of the public.
c) foam-shedding, which was caused by the unusually low temperature at the day of the take-off.
d) normalization of deviance.

*14. A Proper Engineering Decision (PED) is a decision that
a) requires technical expertise.
b) may significantly affect the health, safety and welfare of others.
c) has the potential to violate the standards of an engineering code of ethics in other ways.
*d) All of the above

15. A Proper Management Decision (PMD) is a decision that
a) affects the performance of the organization.
b) does not require any technical expertise.
c) does not significantly affect the health, safety and welfare of others or has any potential to violate the standards of an engineering code of ethics in other ways.
*d) All of the above

*16. Determining whether *Challenger*'s launch should be delayed or not was treated as a management decision by Gerald Mason rather than as a proper engineering decision and has been identified as a major mistake leading to the *Challenger* disaster. All of the following are aspects of a proper engineering decision *except*:
a) Has the potential to violate the standards of an engineering code of ethics.
*b) Affects the performance of the organization.
c) Requires technical expertise.
d) May significantly affect the health, safety, and welfare of others.

17. When Gerald Mason told Boisjoly's supervisor Bob Lund to "take off your engineering hat and put on your management hat," Mason
a) violated all six fundamental canons of the NSPE code of ethics.
b) violated the first fundamental canons of the NSPE code of ethics.
c) violated the sixth fundamental canons of the NSPE code of ethics.
*d) did not respect the distinction between Proper Engineering Decisions and Proper Management Decisions.

*18. Sociologist Diane Vaughn coined the term *normalization of deviance* for describing the process in which
*a) a technical error is accepted as normal, even though the technological system is not working as it should.
b) an nontechnical error is accepted as normal, even though the technological system is working as it should.

c) the process in which an ethical mistake is accepted as normal, even though the technological system is working as it should.
d) All of the above

19. Which of the following is an example of *normalization of deviance*?
a) The low oil pressure warning in your car lights up every morning for two weeks; you think it is an electric problem until the engine stops working and needs to be replaced.
b) Small pieces of foam fell of the space shuttles many times; nobody took any notice until the *Columbia* disaster.
c) Your computer fails to install the latest updates on several occasion; you don't worry about it until it crashes, and your work is lost.
*d) All of the above

*20. Which aspect of the *Challenger* case is an example of the normalization of deviance?
a) The burden of proof shifted from the engineers being able to prove the launch was safe to launch to having to prove it is not safe to stop launch.
*b) The O-ring blow-by was an aberration known to have occurred without disaster in the past and so did not alarm engineers.
c) Lund was told to take off his engineering hat and put on his management hat.
d) The conditions were unusually cold for launch that January.

Weblinks

The National Society of Professional Engineers: http://www.nspe.org/
IEEE: http://www.IEEE.org/
ACM: http://www.IEEE.org/
A video about the Challenger disaster: https://www.youtube.com/watch?v=-O_DMyHdq_M

Key Terms

Aspirational ethics—Ethical principles that go beyond the bare minimum required for avoiding wrongdoing. For example, an engineer promotes the welfare of society by working for Engineers Without Borders in his free time.

Association for Computer Machinery (ACM)—The world's largest society for computing professionals with thousands of members around the world.

Code of Ethics—A set of moral rules for managing ethical problems within a specific (professional) domain.

Existentialism—A philosophical theory developed by French philosopher's Jean-Paul Sartre and others that emphasizes the individual's freedom and responsibility to make decisions by exercising his or her free will.

Institute of Electrical and Electronics Engineers (IEEE)—The world's largest professional organization for engineers with hundreds thousands of members around the world.

Moral dilemma—In a narrow, academic sense a moral dilemma is a situation in which all alternatives open to the agent are morally wrong. Such moral dilemmas are by definition irresolvable. In ordinary, nonacademic contexts, a moral dilemma is a difficult moral choice situation, which need not always be irresolvable.

National Society of Professional Engineers (NSPE)—A learned society for engineers that addresses the professional concerns of licensed engineers (called professional engineers, or PEs for short) across all engineering disciplines.

Normalization of deviance—The process in which a technical error is accepted as normal, even though the technological system is not working as it should.

Preventive ethics—Moral principles that seek to prevent accidents and other types of problems from arising.

Proper engineering decision (PED)—A Proper Engineering Decision is a decision that requires technical expertise and may significantly affect the health, safety, and welfare of others or has the potential to violate the standards of an engineering code of ethics in other ways.

Proper management decision (PMD)—A Proper Management Decision is a decision that affects the performance of the organization but does not require any technical expertise and does not significantly affect the health, safety, and welfare of others nor has any potential to violate the standards of any engineering code of ethics.

Prohibitive ethics—Moral principles that seek to prohibit certain types of actions. Example: cheating and bribery.

Professional Engineer (PE)—In the United States, a professional engineer is someone who has obtained a license to practice engineering by taking a written tests and gaining some work experience. Only professional engineers can become members of the National Society of Professional Engineers (NSPE).

Case Study: The Example of OpenAI

In 2015, Elon Musk of PayPal, Tesla, and SpaceX; Peter Thiel of Palantir; Reid Hoffman of LinkedIn; and Sam Altman of Y Combinator teamed up to launch OpenAI, a nonprofit artificial intelligence (AI) venture that would aim to generate AI technology for the benefit of humanity and would be made available to everyone. The group maintains that it can best seek ways to use AI only for human benefit by severing the profit motive from the research. The group holds a very high standard for what AI technology must do: "We believe AI should be an extension of individual human wills and, in the spirit of liberty, as broadly and evenly distributed as is possible safely." In other words, rather than AI becoming a tool of government to conduct mass surveillance on citizens and control them or business using advanced AI to predict, influence, and control human spending, AI should not primarily be a tool of institution, public or private, to be used on individuals. Rather, as an "extension of individual human wills," AI should be

democratized and put to the use of expanding individual autonomy. It is not hard to see how this would be difficult to conduct in an organization seeking profits. All the intellectual property OpenAI develops will be publicly available without charge; the only exceptions would be technology that poses risk to human safety. So far, the main achievement of OpenAI has been its gaming bots that have defeated Dota 2 players. Dota 2 is a video game played by teams and is considered to be more difficult for computers than chess or Go.

Approximately three years after the founding of the organization, Elon Musk stepped down voluntarily as chairman to prevent a future conflict of interest. While Musk will still advise the nonprofit, his own company Tesla has come to emphasize AI more and more. While Tesla is primarily a manufacturer of electric cars, the direction the company is moving is to produce autonomous electric cars. Clearly insofar as the for-profit company is developing AI, there would be a conflict of interest between it and the free AI offered to the public by OpenAI.

How would the mission of OpenAI fit under the types of ethical principles discussed in the chapter? When Elon Musk stepped down as the chair, what sort of principle was he following?

Case study by Robert Reed

https://www.fastcompany.com/3054593/elon-musk-launches-openai-a-nonprofit-aimed-at-using-ai-to-benefit-humanity
https://motherboard.vice.com/en_us/article/qveedq/elon-musk-steps-down-from-open-source-ai-group

Instructor's Manual

Howdy!

The aim of the Instructor's Manual and Test Bank is to provide you, the instructor, with information and resources that will help you guide your students through *Ethics for Engineers*. For each of the sixteen chapters, we have prepared a PowerPoint presentation, a chapter summary, twenty multiple-choice questions, some essay questions, as well as links to a couple of relevant Internet resources.

Most of the material in this manual was prepared by my assistant, Mr. Robert Reed. I am very grateful for his efforts and I am extremely pleased with the result. I have made some minor changes here and there, so if you find any inaccuracies, they are most likely mine. Feel free to send me an email if you have any questions or suggestions. I usually respond within two to three days. My address is martinpeterson@tamu.edu

With best wishes,

Martin Peterson

Features of the Instructor's Manual and Test Bank
- Two sample syllabi
- Summaries of the main themes and lines of argument of each chapter
- Test bank contains:
  - Essay questions for each chapter
  - Multiple-choice questions for each chapter
- Links to relevant websites for each chapter
- Key terms for each chapter
- Case studies for each chapter

Support Materials for *Ethics for Engineers*

Along with the *Instructor's Manual and Test Bank*, Oxford University Press offers a **companion website** that includes:

- An **Instructor Resources** section that contains all the materials in the *Instructor's Manual and Test Bank* and lecture outlines in PowerPoint format.
- A **Student Resources** section that contains chapter summaries, key terms, weblinks, case study questions, and self-quizzes with multiple-choice questions on each chapter of the book so that students may check their basic understanding of the key points.

Please visit the Oxford Higher Education website for more information.

About *Ethics for Engineers*

Ethics for Engineers provides in-depth coverage of major ethical theories, professional codes of ethics, and case studies in a single volume. Incorporating numerous practical examples and about 100 review questions, it helps students better understand and address ethical issues that they may face in their future careers. Topics covered include whistle-blowing, the problem of many hands, gifts, bribes, conflicts of interest, engineering and environmental ethics, privacy and computer ethics, ethical technology assessment, and the ethics of cost-benefit analysis and risk and uncertainty.

TABLE OF CONTENTS

Sample Syllabus A (Version That Covers Ethical Theories)

COURSE DESCRIPTION
This course in engineering ethics provides in-depth coverage of major ethical theories, professional codes of ethics, and case studies. Topics covered include whistle-blowing, the problem of many hands, gifts, bribes, conflicts of interest, engineering and environmental ethics, privacy and computer ethics, ethical technology assessment, and the ethics of cost–benefit analysis and risk and uncertainty.

LEARNING OUTCOMES AND MAJOR OBJECTIVES
As a result of meeting the requirements in this course, students will:
- Be able to identify, analyze, and reflect on ethical problems in engineering.
- Develop a basic understanding of ethical theories and how they inform common engineering practices.
- Be familiar with some of the classic case studies in engineering ethics and some of the typical ethical and professional issues which arise in engineering.
- Know the NSPE code of ethics and the code of at least one other major professional society or organization in engineering.

To achieve these outcomes and objectives, students are encouraged to participate actively in class discussions. Students are required to do a substantial amount of writing in response to the material presented in the course.

PREREQUISITES: Junior classification

REQUIRED TEXT: Peterson, M. (2020). *Ethics for Engineers*. New York: Oxford University Press.

ATTENDANCE AND PARTICIPATION
[State your attendance policy.]

A NOTE ON E-MAIL COMMUNICATION
As preparation for writing effectively in their careers, students are expected to communicate professionally with instructors and teaching assistants using email. Professional style includes an appropriate salutation and closing and reasonable care in the construction of the message.

GRADED COMPONENTS

Exams
There will be two exams. They may include multiple-choice, short answer, and essay questions. Exams are cumulative.

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Students will work in groups of [*n* students] on an in-class presentation about one of the case studies covered in the textbook. Students are encouraged to actively search for additional material about each case in the library and online. Presentations must include visual aids such as PowerPoint. Students

are expected to prepare their presentations outside class. Each student in the group must give part of the presentation in class. More detailed instructions will be provided during the semester.

Writing Assignments

Students will be asked to write [2, 3, or 4] short papers on a topic assigned by the instructor. Each short paper, which should be about 1,500 words long, is worth [×%] of the course grade. Students can revise each short paper. The maximum score that a revision can earn is 20 points above the grade given the initial submission.

GRADED COMPONENTS

Participation   10%
Presentation   10%
First Exam   20%
Second Exam   20%
Short Paper 1   20%
Short Paper 2   20%

GRADING

A   90% - 100%
B   80% - <90%
C   70% - <80%
D   60% - <70%
F   <60%

THE SEMESTER AT A GLANCE

[This schedule is based on the assumption that the class meets twice weekly for about 75 min.]

	Class	Read	Additional Homework
Week 1	1. Introduction 2. Professional Codes of Ethics	Chapter 1 Chapter 2	Read "The Fifty-Nine Story Crisis" by Joe Morgenstern
Week 2	1. The Challenger and Columbia Cases 2. The History of Engineering	Chapter 2 Chapter 3	Watch: https://www.youtube.com/watch?v=-O_DMyHdq_M
Week 3	1. The Methods of Applied Ethics 2. Utilitarianism and Egoism	Chapter 4 Chapter 5	Watch: https://www.youtube.com/watch?v=bRPE0IImxzs
Week 4	1. Kantian Ethics 2. Virtue Ethics 3. Rights	Chapter 6	Read: https://plato.stanford.edu/entries/kant-moral/ Take a look at: https://www.buildchange.org/about/staff/elizabeth-hausler/
Week 5	1. Exam 1 2. Whistle-Blowing	Chapter 7	Prepare for exam Watch: https://www.youtube.com/watch?v=YQ04V8IjwAQ
Week 6	1. Conflicts of Interests 2. Group Pre-sentation	Chapter 8	Watch: https://www.youtube.com/watch?v=e8_2AI99JUA
Week 7	1. Cost–Benefit Analysis 2. Group Pre-sentations	Chapter 9	First paper due Read: https://www.autosafety.org/wp-content/uploads/import/phpq3mJ7F_FordMemo.pdf Watch: https://www.youtube.com/watch?v=-_gU50mfehI
Week 8	1. Risk and Un-certainty 2. Group Pre-sentations	Chapter 10	Read: http://science.sciencemag.org/content/236/4799/280
Week 9	1. Privacy 2. Group Presentations	Chapter 11	Take a look at: http://faculty.uml.edu/sgallagher/Brandeisprivacy.htm
Week 10	1. The Concept of Responsibility 2. Group Presentations	Chapter 12	Watch: https://www.youtube.com/watch?v=98l3Us8IU-I\

Week 11	1. Technology Assessment 2. Group Presentations	Chapter 13	Browse: http://www.princeton.edu/~ota/
Week 12	1. Optimism versus Pessimism 2. Group Presentations	Chapter 14	Watch: https://www.youtube.com/watch?v=m64X1hMCJoE
Week 13	1. The Ethics of Artifacts 2. Group Presentations	Chapter 15	Second paper due
Week 14	1. Sustainability and Engineering 2. Group Presentations	Chapter 16	Browse: https://www.sustain.ucla.edu/about-us/what-is-sustainability/
Week 15	Exam 2		Prepare for exam

Sample Syllabus B (Emphasis on Case Studies)

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Week 3	1. The Ford Pinto Case 2. Cost–Benefit Analysis	(Chapter 5) Chapter 9	Read: https://www.autosafety.org/wp-content/uploads/import/phpq3mJ7F_FordMemo.pdf Watch: https://www.youtube.com/watch?v=-_gU50mfehI
Week 4	1. Engineers without Borders 2. Build Change	Chapter 2 (Chapter 6)	Read: https://plato.stanford.edu/entries/kant-moral/ Take a look at: https://www.buildchange.org/about/staff/elizabeth-hausler/
Week 5	1. Exam 1 2. Whistle-Blowing	Chapter 7	Prepare for exam Watch: https://www.youtube.com/watch?v=YQ04V8IjwAQ
Week 6	1. Conflicts of Interests 2. Group Presentation	Chapter 8	Watch: https://www.youtube.com/watch?v=e8_2AI99JUA
Week 7	1. The History of Engineering, Prior to 1700 [1.] 1. The History of Engineering, 1700–	Chapter 3	First paper due
Week 8	1. Risk and Uncertainty 2. Group Presentations	Chapter 10	Read: http://science.sciencemag.org/content/236/4799/280
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Chapter 1: Introduction

Summary

The subject matter of engineering ethics primarily concerns questions about professional obligations engineers have in virtue of being engineers. In the United States, the practice of engineering is regulated at the state level. Each state has its own licensure board, and the licensure requirements vary somewhat from state to state. Licensed engineers have the right to use the title "professional engineer" (PE). Only licensed engineers are authorized to offer engineering services to the public and to sign and seal construction plans and other key documents.

Questions about what engineers "may," "must," or "ought" to do have legal as well as ethical dimensions, but legal and ethical norms do not always overlap each other. Some actions are ethically wrong but legally permitted. According to natural law theory, morality determines what is, or should be, legally permissible and impermissible. Legal positivists believe that law and morality are entirely distinct domains, meaning that we cannot infer *anything* about what is, or should be, legally permitted from claims about what is morally right or wrong.

In the 1960s and 1970s, a series of engineering disasters triggered fundamental concerns about the value of engineering and technological development. Technological pessimists question the value of technological progress; technological optimists point out that while it is true that some technological processes are hard to control and predict and sometimes lead to unwanted consequences, the world would have been much worse without many of the technological innovations of the past century. The legal term "negligence" can be defined as "a failure to exercise the care and skill that is ordinarily exercised by other members of the engineering profession in performing professional engineering services under similar circumstances." (Dal Pino, J. "Do you know the standard of care?", Council of American Structural Engineers, 2014, p. 4.) Engineers who fail to meet this standard of care violate the law and typically act unethically.

Learning Objectives

After studying this chapter, students should:
- Be familiar with how the engineering profession is regulated.
- Be familiar with the main ideas of technological optimism and technological pessimism.
- Understand the distinction between macroethics and microethics and the implications for engineers.
- Be familiar with the distinction between moral and legal codes and how they bear on professional conduct.

Essay Questions

1. William LeMessurier lied to the public about the Citicorp building. Did the extreme circumstances excuse his lie?
2. How do moral norms differ from legal ones, and can it ever be morally permissible to break the law?
3. What is the difference, if any, between science and engineering?

*4. Should all engineers be licensed?
*5. Technological optimism versus pessimism: Which position is most plausible?

Multiple-Choice Questions

1. When LeMessurier realized in the summer of 1978 that the Citicorp tower could collapse in a moderate storm, he knew he had to act fast. Which of the following actions did LeMessurier take?
a) He informed the building's owner about the problem, contacted the City of New York, hired a team of weather forecasters to monitor the weather 24/7, and sent out a prerelease that correctly described the problem caused by strong winds.
b) He informed the building's owner about the problem, hired a team of weather forecasters to monitor the weather 24/7, and sent out a prerelease that correctly described the problem caused by strong winds.
*c) He informed the building's owner about the problem, contacted the City of New York, and hired a team of weather forecasters to monitor the weather 24/7.
d) He informed the building's owner about the problem, contacted the City of New York, hired a team of weather forecasters to monitor the weather 24/7, and wrote a letter to the National Society for Professional Engineers.

*2. What was the problem with the Citicorp building in New York designed by William LeMessurier?
a) The unusual glass facade of the tower made the tower vulnerable to perpendicular winds.
b) The unusual glass facade of the tower made the tower vulnerable to quartering winds.
*c) The unusual location of the load-bearing columns made the tower to quartering winds.
d) The unusual location of the load-bearing columns made the tower vulnerable to perpendicular winds.

3. The design flaw in the Citicorp building was first discovered by
a) LeMessurier while double-checking his calculations.
*b) an undergraduate engineering major who called LeMessurier's office.
c) the code enforcement arm of the City of New York.
d) None of the above

*4. What changes had the builders made to LeMessurier's design?
a) They moved the load-bearing columns away from corner of building.
b) They increased the amount of glass in the building.
c) They changed the number of load-bearing columns.
*d) None of the above

5. Why might the winds of a 16-year storm have the power to topple the Citicorp building?
a) There were two few columns.
b) Flooding might undermine the columns.
*c) A loss of power would disable the mass damper.
d) None of the above

*6. Upon discovering the danger of a collapse, LeMessurier first
a) informed the building's owners.
b) informed the City of New York.
*c) developed a plan to fix the problem.
d) informed FEMA.

7. As Hurricane Ella approached New York with winds that would topple the building, LeMessurier
a) ordered an evacuation.
b) told the truth to the public about the danger.
c) contemplated suicide
*d) None of the above

*8. LeMessurier told the truth about the building's situation to
a) only those workers fixing the problem.
b) only the employees working in the building itself.
c) the media.
*d) None of the above.

9. The workers who repaired the design flaw in the building
a) worked with nondisclosure agreements barring them from talking to the press.
b) were chosen because they did not speak English.
c) were disguised every day when brought into the building.
*d) worked only at night.

*10. LeMessurier put out a press release about the repairs that, among other things, stated what?
a) The risk of collapse is quite low.
b) Only a 55-year hurricane could topple the building.
*c) There is no danger.
d) None of the above

11. The public only became aware of the full story when
a) LeMessurier put out another press release upon the completion of repairs.
*b) *The New Yorker* ran a story about it 17 years later.
c) a city council meeting the following year.
d) None of the above.

*12. LeMessurier's claim in the press release
*a) was an outright lie.
b) was illegal.
c) resulted in the loss of his license.
d) All of the above

13. The NSPE code of ethics holds that engineers shall "issue public statements only in an objective and truthful manner." Why might LeMessurier's actions be ethically acceptable anyway?

a) The NSPE has exceptions for when one's professional reputation is in danger through someone else's mistake.
*b) The NSPE code also prioritizes public safety and the press release prevented a panic.
c) These are guidelines, LeMessurier had no proper duty to the public.
d) None of the above

*14. The main lesson of the LeMessurier case is that
a) the NSPE should be ignored.
b) one should always do whatever maximizes the consequences in the situation.
c) the NSPE should be followed to the letter of the law in all situations.
*d) None of the above

15. Both scientists and engineers must master mathematics and science; the difference is that engineering
a) is much easier than scientific research.
b) comes under ethical constraints; scientific research does not.
*c) is about making the subject matter of science useful.
d) None of the above

*16. In the United States, the regulations for engineers
a) come from the NSPE.
b) are developed by professional organizations.
*c) are mandated at the state level.
d) None of the above

17. Engineers who work for the US government
a) make regulations for the rest of the engineers.
*b) are exempted from being licensed engineers.
c) are subject to more strict licensing standards.
d) None of the above

*18. All of the following are ways to practice engineering without being licensed except
a) practice engineering in the United Kingdom, Germany, or Sweden.
b) obtain an industry exemption.
c) work for the US government.
*d) None of the above.

19. Microethics concerns
*a) an individual's act.
b) microeconomics.
c) scientific research standards.
d) None of the above

*20. According to legal positivism,
a) morality and the law cannot be treated as separate domains.
b) we can infer what should be legal by what is moral.

c) laws are never morally neutral conventions.
*d) None of the above

Weblinks

The Ethics Center for Science and Engineering: https://www.onlineethics.org/
Morgenstern's article on the Citicorp Crisis in 1995:
https://www.newyorker.com/magazine/1995/05/29/the-fifty-nine-story-crisis
William LeMessurier on the Citicorp Crisis in 1995: https://www.youtube.com/watch?v=um-7IlAdAtg
Stanford Encyclopedia of Philosophy: http://plato.stanford.edu/
Internet Encyclopedia of Philosophy: http://www.iep.utm.edu/

Key Terms

Ethics — Moral principles, values, virtues or other considerations that govern our behavior toward other persons or morally relevant entities.

Legal positivism — The view that law and morality are entirely distinct entities. Laws are social constructions, and we cannot infer anything about what is, or should be, legally permitted from claims about what is morally right or wrong.

Macroethics — The investigation of moral issues related to largescale societal problems, such as global warming.

Microethics — The investigation of moral issues that concern the behavior of individuals or small groups of people. Example: moral issues related to conflicts on interests in one's workplace.

Morals — Ethical principles, values, virtues or other considerations that govern our behavior toward other persons or ethically relevant entities.

Natural law theory — The view that moral concerns determine what is, or should be, legally permissible or impermissible.

Technological optimism — The view that technological progress has mostly improved our living conditions and that further technological advancements would make us even better off.

Technological pessimism — The view that technological progress has no or little value and that we are therefore no better off that we would have been without modern technology.

Chapter 2: Professional Codes of Ethics

Summary

Nearly every professional association for engineers has its own code of ethics. This chapter discusses three of the most influential codes embraced by some of the largest engineering organizations in the United States: the National Society of Professional Engineers (NSPE), Institute of Electrical and Electronics Engineers (IEEE), and Association for Computer Machinery (ACM).

A code of professional ethics is a convention agreed upon by a group of professionals, but the mere fact that the members of an organization have agreed on a morally wrong code does not make the content of such a code right. No code of ethics can cover all the unforeseeable moral problems that may confront an engineer, and nearly every code has multiple interpretations. A code of ethics is not a full-fledged ethical theory.

The moral principles expressed in a code typically fall within one of three categories: prohibitive, preventive, or aspirational principles. Prohibitive principles describe actions that are morally prohibited; preventive principles seek to prevent certain types of problems from arising; and aspirational principles state goals that engineers should strive to achieve.

The chapter includes a discussion of how engineers should reason when two or more principles of a professional code give conflicting advice, or at least appear to do so. One option is to reinterpret or reformulate the principles of the code; a second option is to introduce a mechanism for resolving the conflict (e.g., a hierarchical ranking of the principles); a third option is to interpret the principles as contributory instead of conclusive moral reasons; and a fourth option is to accept the fact that it is sometimes impossible to comply with the code.

Learning Objectives

After studying this chapter, students should:
- Be familiar with the concepts of prohibitive, preventive and aspirational moral principles.
- Know the major professional codes of ethics for engineers.
- Know the causes of the *Challenger* and *Columbia* disasters and the lessons for engineers.
- Understand the difference between proper management decisions and proper engineering decisions.

Essay Questions

1. Is it ever morally permissible to violate one's professional code of ethics?
2. What should engineers do if their professional codes of ethics seem to give conflicting advice, or no advice at all?
*3. According to the NSPE code of ethics, engineers shall "avoid deceptive acts." How should we understand this principle?
*4. Who was morally responsible for the Challenger disaster?
5. Who was morally responsible for the Columbia disaster?

Multiple-Choice Questions

1. Which is *not* a reason to follow a code of ethics that was discussed?
*a) It is important for maintaining personal integrity.
b) Joining a profession is effectively making a promise.
c) Having professional standards strengthens an engineer's ability to stand by principles.
d) The personal cost to refusing moral actions is diminished by practicing the code.

*2. Philosopher Michael Davies writes, "Without a professional code, an engineer could not object [to doing something unethical] as an engineer. An engineer could, of course, still object 'personally' and refuse to do the job. But if he did, he would risk being replaced by an engineer who would not object." Which ethical theory fits best with this view about professional codes?
*a) Utilitarianism
b) Ethical egoism, as applied to groups
c) Virtue ethics
d) Kantianism

3. Which of the following is an example of an aspirational ethical principle in the NSPE code? Engineers shall
a) hold paramount the safety, health, and welfare of the public.
b) perform services only in areas of their competence.
c) issue public statements only in an objective and truthful manner.
*d) conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

*4. Which of the following principles is a prohibitive principle?
a) Engineers shall hold paramount the safety, health and welfare of the public.
*b) Engineers shall issue public statements only in an objective and truthful manner.
c) Engineers shall perform services only in areas of their competence.
d) Engineers shall conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

5. According to the Fundamental Canons of the NSPE Code of Ethics, engineers shall conduct themselves
a) honorably, morally, responsibly, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.
b) honorably, morally, ethically, and lawfully so as to enhance the prestige, reputation, and usefulness of the profession.
*c) honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and prestige of the profession.
d) None of the above

*6. The moral principles expressed in a professional code of ethics, including the NSPE code, can typically be characterized as a
a) prohibitive, descriptive, or normative principles.
*b) prohibitive, preventive, or aspirational principles.
c) prohibitive, descriptive, or aspirational principles.
d) factual, descriptive, or normative principles

7. Which of the following are Fundamental Canons of the NSPE Code of Ethics? "Engineers, in the fulfillment of their professional duties, shall
a) hold paramount the safety, health, and welfare of the public."
b) avoid deceptive acts."
c) conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession."
*d) All of the above

*8. Which of the following principles is a preventative principle?
a) Engineers shall avoid deceptive acts.
*b) Engineers shall hold paramount the safety, health and welfare of the public.
c) Engineers shall issue public statements only in an objective and truthful manner.
d) Engineers shall conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

9. According to the NSPE code of ethics, engineers shall "avoid deceptive acts." This is a(n) _____ element of the NSPE code.
*a) prohibitive
b) preventive
c) aspirational
d) All of the above

*10. According to the NSPE code of ethics, engineers shall "perform services only in areas of their competence." This is a(n) _____ element of the NSPE code.
a) prohibitive
*b) preventive
c) aspirational
d) All of the above

11. LeMessurier violated the third fundamental canon to only issue public statements in an objective and truthful manner. How might this violation have been required to comply with one of the fundamental canons of the NSPE code?
a) Citibank, his client, specifically ordered him to lie.
b) His honor and reputation and that of the profession rested upon repairing the building without anyone knowing.
c) A faithful agent delegates the responsibility of informing the public to the client.
*d) Truthfully disclosing all the relevant information to the public would have caused a panic and actually harmed the public good.

*12. How do the ACM and NSPE codes differ from the IEEE code?
a) The ACM and NSPE codes distinguish between fundamental moral principles and more specific rules.
b) The IEEE code emphasizes honesty and integrity.
c) The IEEE code has no prohibitive principles.
*d) The IEEE code specifically discusses bribes.

13. The direct technical cause of the *Challenger* disaster in 1986 was
*a) a leaking O-ring in a fuel tank, which could not cope with the unusually low temperature at the day of the take-off.
b) a lack of respect for the NSPE code of ethics, which stipulates that engineers shall hold paramount the health, safety and welfare of the public.
c) foam-shedding, which was caused by the unusually low temperature at the day of the take-off.
d) normalization of deviance.

*14. A Proper Engineering Decision (PED) is a decision that
a) requires technical expertise.
b) may significantly affect the health, safety and welfare of others.
c) has the potential to violate the standards of an engineering code of ethics in other ways.
*d) All of the above

15. A Proper Management Decision (PMD) is a decision that
a) affects the performance of the organization.
b) does not require any technical expertise.
c) does not significantly affect the health, safety and welfare of others or has any potential to violate the standards of an engineering code of ethics in other ways.
*d) All of the above

*16. Determining whether *Challenger*'s launch should be delayed or not was treated as a management decision by Gerald Mason rather than as a proper engineering decision and has been identified as a major mistake leading to the *Challenger* disaster. All of the following are aspects of a proper engineering decision *except*:
a) Has the potential to violate the standards of an engineering code of ethics.
*b) Affects the performance of the organization.
c) Requires technical expertise.
d) May significantly affect the health, safety, and welfare of others.

17. When Gerald Mason told Boisjoly's supervisor Bob Lund to "take off your engineering hat and put on your management hat," Mason
a) violated all six fundamental canons of the NSPE code of ethics.
b) violated the first fundamental canons of the NSPE code of ethics.
c) violated the sixth fundamental canons of the NSPE code of ethics.
*d) did not respect the distinction between Proper Engineering Decisions and Proper Management Decisions.

*18. Sociologist Diane Vaughn coined the term *normalization of deviance* for describing the process in which
*a) a technical error is accepted as normal, even though the technological system is not working as it should.
b) an nontechnical error is accepted as normal, even though the technological system is working as it should.

c) the process in which an ethical mistake is accepted as normal, even though the technological system is working as it should.
d) All of the above

19. Which of the following is an example of *normalization of deviance*?
a) The low oil pressure warning in your car lights up every morning for two weeks; you think it is an electric problem until the engine stops working and needs to be replaced.
b) Small pieces of foam fell of the space shuttles many times; nobody took any notice until the *Columbia* disaster.
c) Your computer fails to install the latest updates on several occasion; you don't worry about it until it crashes, and your work is lost.
*d) All of the above

*20. Which aspect of the *Challenger* case is an example of the normalization of deviance?
a) The burden of proof shifted from the engineers being able to prove the launch was safe to launch to having to prove it is not safe to stop launch.
*b) The O-ring blow-by was an aberration known to have occurred without disaster in the past and so did not alarm engineers.
c) Lund was told to take off his engineering hat and put on his management hat.
d) The conditions were unusually cold for launch that January.

Weblinks

The National Society of Professional Engineers: http://www.nspe.org/
IEEE: http://www.IEEE.org/
ACM: http://www.IEEE.org/
A video about the Challenger disaster: https://www.youtube.com/watch?v=-O_DMyHdq_M

Key Terms

Aspirational ethics — Ethical principles that go beyond the bare minimum required for avoiding wrongdoing. For example, an engineer promotes the welfare of society by working for Engineers Without Borders in his free time.

Association for Computer Machinery (ACM) — The world's largest society for computing professionals with thousands of members around the world.

Code of Ethics — A set of moral rules for managing ethical problems within a specific (professional) domain.

Existentialism — A philosophical theory developed by French philosopher's Jean-Paul Sartre and others that emphasizes the individual's freedom and responsibility to make decisions by exercising his or her free will.

Institute of Electrical and Electronics Engineers (IEEE) — The world's largest professional organization for engineers with hundreds thousands of members around the world.

Moral dilemma   In a narrow, academic sense a moral dilemma is a situation in which all alternatives open to the agent are morally wrong. Such moral dilemmas are by definition irresolvable. In ordinary, nonacademic contexts, a moral dilemma is a difficult moral choice situation, which need not always be irresolvable.

National Society of Professional Engineers (NSPE)   A learned society for engineers that addresses the professional concerns of licensed engineers (called professional engineers, or PEs for short) across all engineering disciplines.

Normalization of deviance   The process in which a technical error is accepted as normal, even though the technological system is not working as it should.

Preventive ethics   Moral principles that seek to prevent accidents and other types of problems from arising.

Proper engineering decision (PED)   A Proper Engineering Decision is a decision that requires technical expertise and may significantly affect the health, safety, and welfare of others or has the potential to violate the standards of an engineering code of ethics in other ways.

Proper management decision (PMD)   A Proper Management Decision is a decision that affects the performance of the organization but does not require any technical expertise and does not significantly affect the health, safety, and welfare of others nor has any potential to violate the standards of any engineering code of ethics.

Prohibitive ethics   Moral principles that seek to prohibit certain types of actions. Example: cheating and bribery.

Professional Engineer (PE)   In the United States, a professional engineer is someone who has obtained a license to practice engineering by taking a written tests and gaining some work experience. Only professional engineers can become members of the National Society of Professional Engineers (NSPE).

Case Study: The Example of OpenAI

In 2015, Elon Musk of PayPal, Tesla, and SpaceX; Peter Thiel of Palantir; Reid Hoffman of LinkedIn; and Sam Altman of Y Combinator teamed up to launch OpenAI, a nonprofit artificial intelligence (AI) venture that would aim to generate AI technology for the benefit of humanity and would be made available to everyone. The group maintains that it can best seek ways to use AI only for human benefit by severing the profit motive from the research. The group holds a very high standard for what AI technology must do: "We believe AI should be an extension of individual human wills and, in the spirit of liberty, as broadly and evenly distributed as is possible safely." In other words, rather than AI becoming a tool of government to conduct mass surveillance on citizens and control them or business using advanced AI to predict, influence, and control human spending, AI should not primarily be a tool of institution, public or private, to be used on individuals. Rather, as an "extension of individual human wills," AI should be

democratized and put to the use of expanding individual autonomy. It is not hard to see how this would be difficult to conduct in an organization seeking profits. All the intellectual property OpenAI develops will be publicly available without charge; the only exceptions would be technology that poses risk to human safety. So far, the main achievement of OpenAI has been its gaming bots that have defeated Dota 2 players. Dota 2 is a video game played by teams and is considered to be more difficult for computers than chess or Go.

Approximately three years after the founding of the organization, Elon Musk stepped down voluntarily as chairman to prevent a future conflict of interest. While Musk will still advise the nonprofit, his own company Tesla has come to emphasize AI more and more. While Tesla is primarily a manufacturer of electric cars, the direction the company is moving is to produce autonomous electric cars. Clearly insofar as the for-profit company is developing AI, there would be a conflict of interest between it and the free AI offered to the public by OpenAI.

How would the mission of OpenAI fit under the types of ethical principles discussed in the chapter? When Elon Musk stepped down as the chair, what sort of principle was he following?

Case study by Robert Reed

https://www.fastcompany.com/3054593/elon-musk-launches-openai-a-nonprofit-aimed-at-using-ai-to-benefit-humanity
https://motherboard.vice.com/en_us/article/qveedq/elon-musk-steps-down-from-open-source-ai-group

Chapter 3: A Brief History of Engineering

Summary

Prehistoric humans were hunter-gathers. About 500,000 years ago, they began to use tools for a wide range of purposes, but their strategy for survival began to change around 12,000 to 10,000 BCE. In the fertile river deltas in Mesopotamia in present-day Iraq, and along the Nile River, an agricultural revolution gained momentum. While Egyptian engineers used trial and error for improving their technical know-how, Greek engineers relied on math and science. Around 300 BCE the political and economic importance of the Greek civilization began to decline. The Romans gradually gained influence, mostly because their armies were larger and better equipped. The Romans made fewer scientific breakthroughs than the Greeks, but their engineers were remarkably successful. Over approximately 600 years, Roman engineers constructed a network of roads that stretched 60,000 miles and connected 4,000 towns and cities all over Europe. The Roman Empire continued to expand until its sheer size made it difficult for a single person to govern it effectively from Rome. Around 300 CE the empire was split in two halves.

Between approximately 700 BCE and 1200 CE Islamic technology was more advanced than that of medieval Europe. In Europe, the iron plow was introduced around 600 CE. Unlike wooden plows, it cut deeper into the soil (up to one foot). This triggered an agricultural revolution in northern Europe. During the early modern era Europe became the most prosperous and fastest developing region of the world. Good ports and agricultural conditions led to increased trade, in combination with increased respect for private ownership and a functioning legal system.

There is no consensus in the literature on what causes technological change. Technological determinists argue that technological innovations determine social developments. Social constructivists believe that human decision makers shape technological innovation processes and give meaning to new technologies. On this view, human action drives societal transitions, as well as the development of new technologies. The co-constructivist stance is an intermediate position between technological determinism and social constructivism. Co-constructivists believe that technological innovations together with social processes shape social and technological transitions. Neither element is the sole cause. To explain change over time we therefore need to pay attention to the technological as well as the societal dimension.

Learning Objectives

After studying this chapter, students should:
- Be familiar with some aspects of engineering history and its relevance for engineers today.
- Be able to explain the basic technological achievements of ancient civilizations.
- Know the major technological developments of the industrial revolution.
- Be familiar with basic interpretations of technological development.
- Understand the difference between social constructivism and technological determinism and the arguments from each from the history of engineering.

Essay Questions

*1. Develop an argument both for and against technological determinism.
2. Develop an argument both for and against technological co-constructivism.
*3. What is the most important invention in history? Explain why.
4. Can we predict future technologies by studying the past? Explain why.
5. Discuss engineers in Ancient Egypt.

Multiple-Choice Questions

*1. The view that there is a fixed sequence to technological development and therefore a necessary path over which technologically developing societies must travel.
a) Technological pessimism
b) Technological optimism
c) Social Constructivism
*d) None of the above

2. Alexander Graham Bell invented the telephone to help people who were hard of hearing, yet the device quickly became used primarily for long-distance communication. This best illustrates which of the following views of technology?
a) The technological determinist model by which technology is seen to determine social change
b) Luddite view on which technological inventions after the 17th century are mostly superfluous
*c) Social constructivist view on which humans as a social group ultimately determine the meaning and purpose of technology
d) Co-constructivist model, which gives priority neither to technology nor to society

*3. The invention of the light bulb might support Heilbroner's thesis about technological determinism in what way?
a) The light bulb is only an incremental improvement over a kerosene lamp.
b) The conditions of the early 19th century made its invention easy to predict.
c) Once invented, it is impossible to go back because we are determined to use this invention.
*d) Two inventors invented it almost simultaneously.

4. Technological determinists believe that
a) technology is the driving force in societal transitions and decision making processes.
b) technological innovations determine social developments.
c) a wide range of political decisions made after World War II were ultimately triggered by the development of the nuclear bomb in the early 1940s.
*d) All of the above

*5. All of the following would be found in use in ancient Mesopotamia *except*
a) the wheel.
b) the plow.
*c) iron tools.
d) writing.

6. The Egyptians built massive temple cities and 80 pyramids using
a) the wheel.

b) iron tools.
c) strong draft animals like horses and the oxen.
*d) surplus labor as a result from relatively easy agriculture.

*7. The main technological innovation of the Greeks was
a) bronze tools.
b) sophisticated pulleys.
*c) rigorous mathematics.
d) the wheel.

8. The skill of Roman engineering practices is evidenced by the long life of all the following except
a) Roman highways.
*b) Roman city of Pompeii.
c) the Roman Colosseum.
d) Roman aqueducts.

*9. All of the following are engineering advances of the medieval period except for
a) the number zero.
b) horseshoes.
*c) the waterwheel.
d) gunpowder.

10. When did universities adopt Engineering as a course of study?
a) From the beginning of the University in the Middle Ages
b) In the 20th century
c) Near the end of the Industrial Revolution in the 19th century
*d) In the early modern period around 1600

*11. The Industrial Revolution is characterized primarily by the invention of
a) insurance.
*b) the steam engine.
c) the waterwheel.
d) the iron plow.

12. Which of the following is a change that the invention of the washing machine is thought to have contributed to in the early 20th century?
a) Cleaner clothes and a reduction in disease
*b) More women in the workplace
c) The spread of electricity to private homes
d) The need for larger and more reliable municipal water supplies

*13. One example of a technological transition driven by political views is
a) the invention of air conditioning.
b) the move from cassette tapes to CDs.
*c) interest in shifting from gas-powered cars to electric cars.

d) None of the above

14. Co-constructivism can best be described as
a) the major forces driving history are socio-economic, cultural, ideological, and political.
b) the major force driving history is technology itself and engineers.
c) the major force driving history is economic and ideological.
*d) None of the above

*15. Which of the following are considerations against technological determinism?
*a) We don't have household-sized nuclear power plants in our homes.
b) Cell phone screens are bigger.
c) Washing machines became automatic.
d) None of the above

16. The manner in which the automatic washing machine became a symbol for gender equality supports
a) technological determinism.
b) technological optimism.
c) technological pessimism.
*d) None of the above

*17. Which of the following illustrates Heilbroner's claim that the history of technology lacks technical leaps?
*a) No attempt to harness nuclear power in 1700s
b) Electric washing machine
c) LCD screens on cell phones
d) None of the above

18. All of the following are elements of Heilbroner's thesis *except*
a) absence of technical leaps.
b) simultaneity of invention.
c) predictability of technology.
*d) None of the above

*19. The use of DC electricity in the 19th century reflects
a) the superiority of Edison over Tesla.
b) the superiority of Direct Current over Alternating Current.
*c) the technological lock-in effect.
d) None of the above

20. The Industrial Revolution can be credited for
a) making England fabulously wealthy.
b) inspiring Marx and Engels.
c) exacerbating the gap between rich and poor.
*d) All of the above

Key Terms

Co-constructivism   An intermediate position between technological determinism and social constructivism, which attributes the power to change history to technology itself as well as to a multitude of social forces: socio-economic, cultural, ideological, and political factors.

Techno-fix   A technological solution to a social problem.

Technological determinism   According to Heilbroner, this is the view that "there is a fixed sequence to technological development and therefore a necessitous path over which technologically developing societies must travel."

Case Study: Is Gunpowder Responsible for the Modern State?

Geoffrey Parker is one of the major figures who draws a strong connection between the invention and later introduction of gunpowder into Europe and the conditions under which Europeans came to militarily dominate the globe in the 19th century and the existence of the modern state staffed with professional bureaucrats and paid for by regular taxes. Parker argues that when gunpowder was introduced into Europe, there was no single dominant power or hegemon, and so the situation was one of continual warfare and constant striving for advantages. European states quickly realized the potential of gunpowder to provide military advantage and began many different strategies to place them into battle. While gunpowder was invented in China in approximately the 9th century, its use on the battlefield in Chinese and Mongol armies was limited. Europeans come into contact with gunpowder in the 13th century. By the 16th century, they had developed large cannons, which eventually made castle walls and large stone fortresses obsolete. By the late 1300s, primitive guns were replacing crossbows and even infantry. Yet, because the rate of fire was so slow, they did not immediately take over. Early guns were fired from a stand and not particularly mobile, but by the time of the matchlock and later flintlock musket in the 1600s, they were more mobile than men with pikes.

The invention of the bayonet in 1690 marked the end of the few remaining traditional pikemen. The changing dynamics of battle dominated by guns favored larger armies—the rate of fire was a factor. Also, the fact that expensive armor of the nobility was obsolete and that infantry were now more valuable than cavalry led to major increases in the size of armies. Initially, government had trouble paying for the ever larger armies and more extended campaigns; overall strategy increased during this time as armies grew. It was not uncommon for monarchs to go bankrupt attempting to pay for the increasing costs of warfare. Budget problems from warfare arguably led to the English Civil War and the French Revolution a century later; both ended with monarchs losing their heads.

At the beginning of the early modern period, government staffs were quite small by modern standards and most executive offices were effectively positions in the king's household, typically held by nobility who had some pre-existing tie of loyalty to the king. It was not uncommon for a single man to hold numerous offices at once, several of which he sublet out to others to actually administer. There is no question but that government at this time was incredibly inefficient. Taxes were also quite unreliable. In England, there were no regular taxes, but rather the king had to call a parliament to gain consent for a tax, and the tax itself was of only a finite duration and amount. An infamous parliament summoned for the purpose of taxes helped begin the English Civil War. As more money was needed, states found more efficient and regular methods of tax collection and monarchs began relying upon university-trained professionals to administer the growing government. The modern state today entirely run by professionals and perpetual taxations is ultimately formed from these pressures on state-building.

Does the case of gunpowder favor technological determinism or social constructivism? Why or why not?

Case study by Robert Reed

Parker, Geoffrey. *The Military Revolution: Military Innovation and the Rise of the West 1500-1800*. Cambridge, England: Cambridge University Press, 2016.
Ertman, Thomas. *The Birth of Leviathan: Building States and Regimes in Medieval and Early Modern Europe*. Cambridge, England: Cambridge University Press, 2011.
Parrott, David. *The Business of War: Military Enterprise and Military Revolution in Early Modern Europe*. Cambridge, England: Cambridge University Press, 2014.
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https://en.wikipedia.org/wiki/Musket

Chapter 4: A Methodological Toolbox

Summary

There is no universally accepted method of engineering ethics. However, the absence of a single, universally accepted method does not entail that all methods are equally good or that "anything goes." Some methods, views, and positions are clearly more coherent and nuanced than others.

The distinction between facts and values is central to nearly all discussions of ethics. People who disagree on some moral issue may do so because they disagree on what the relevant facts are or because they do not accept the same value judgments. The Scottish philosopher David Hume (b. 1711–d. 1776) famously pointed out that many moral arguments begin with a set of nonmoral claims and then proceed to a moral claim without clarifying the relation between the moral and nonmoral claims. According to what is commonly known as Hume's law, no moral claims can be derived from purely nonmoral premises.

Metaethics is the subfield of ethics that tries to answer questions about the nature and status of moral claims. Metaethical theories are thus theories *about* ethics, not theories about what someone ought to do or what actions are morally right or wrong. Four of the most prominent metaethical theories are ethical objectivism, ethical nihilism, ethical constructivism, and ethical relativism. Normative ethical theories seek to establish what features of the world *make* right acts right and wrong ones wrong. Ethical theories are often summarized in general moral principles: "Never treat others merely as a means to an end!" or "Only perform actions that lead to optimal consequences.

Learning Objectives

After studying this chapter, students should:
- Be familiar with the distinctions between moral claims, factual claims, and conceptual claims.
- Be familiar with Hume's law.
- Be familiar with some major metaethical theories.
- Have a basic understanding of normative ethical theories and how they might be relevant to solving problems for engineers.

Essay Questions

*1. Are the commands of the NSPE Code of Ethics valid for the members of NSPE in an objective sense? If so, what does this mean?

2. Does a professional association that revises its code of ethics construct a new set of valid moral rules? Why or why not?

*3. What, if anything, can we conclude from the fact that reasonable and equally well-informed moral peers sometimes disagree on what is right and wrong?

4. Can moral problems (always) be resolved without ethical theories?

5. Are some moral rules universally valid—that is, for everyone at all points in time and space?

Multiple-Choice Questions

1. Which of the following is a conceptual claim as opposed to a factual claim?
a) Public officials have many laws governing the money they can and cannot accept.
b) Corruption is a bigger problem in government today than 30 years ago.
*c) Illicit payments are legally prohibited.
d) Corrupt politicians never get away with their crimes.

*2. According to David Hume's is–ought thesis,
a) we can never derive a moral conclusion from a set of premises containing a bridge premise.
*b) we cannot derive a moral conclusion from purely nonmoral premises.
c) all answers to moral questions are insensitive to factual information.
d) All of the above

3. Which of the following inferences could serve as a bridge premise to conclude it is wrong to get your little brother to tell lies?
a) Lying is a form of untruthfulness.
*b) It is wrong to tell lies.
c) Lying causes anxiety and stress for the liar.
d) Lying ruins one's reputation.

*4. Which of the following is *not* among the standard objection to ethical objectivism?
a) Ethical properties would be strange entities.
b) It is not clear how ethical properties could motivate us to act.
*c) Objective truth is not possible.
d) Moral disagreement between cultures is not what we expect on hypothesis of ethical objectivism.

5. An ethical expressivist would understand the sentence "It is wrong to murder" as
a) a necessarily false proposition.
b) an emphatic expression of moral truth.
c) a sentence expressing the subjective opinion of the speaker.
*d) signifying the speaker's negative attitude toward murder.

*6. Mackie's error theory maintains
a) there are no mistakes in moral codes at the level of culture.
b) individuals cannot be mistaken in their moral commitments.
*c) moral statements have truth value and all are false.
d) conscience is prone to error and requires moral education.

7. An ethical constructivist would deny
a) moral statements have a truth value.
b) there are human rights.
c) moral truths are posterior to social fact.
*d) moral statements are feelings we construct to navigate society.

*8. Which *best* describes the commitment of an ethical relativist?
*a) The truth value of moral statements varies by cultural context.

b) There is no real right or wrong; it is all relative.
c) Morality is purely subjective opinion.
d) All moral statements are equally groundless.

9. Which consideration might support particularism as best explaining how we should come to warranted conclusions about what to do in particular cases?
a) There is no agreement on which moral theory is correct, and the theories often give contradictory moral judgments.
b) Kant's theory does not care about consequences of actions.
c) Utilitarianism is impractical as a theory.
*d) None of the above

*10. Suppose the detective knows Bob's fingerprints are found at the scene of the murder, and the detective thinks this fact is a reason to think Bob is the murderer. But suppose the detective is informed that the murder scene is where Bob goes to work every day. The detective no longer thinks the fingerprints count as evidence against Bob. The detective's reasoning is an example of
a) simple deduction.
*b) reasons holism.
c) theory-centered approach.
d) pragmatic reasoning.

11. Which of the following best describes domain specific principles?
a) Culture determines the domain of ethical theory.
*b) A limited form of reasons holism in which a principle applies within a certain domain.
c) Utilitarianism can only be applied to the domain of criminal justice
d) Applied ethics is divided into different domains such as medical, engineering, and legal ethics.

*12. Ethical theories
a) make general claims about what makes right acts right and wrong ones wrong.
b) are applicable to all decisions made by engineers and everyone else, such as politicians, doctors, philosophy professors, and movie stars.
c) should be to engineering ethics what math is to the engineering sciences: a solid foundation on which precise conclusions about real-world problems can be based.
*d) All of the above

13. Domain-specific principles
a) are a form of particularism.
b) work on a case by case basis.
c) are an example of ethical subjectivism.
*d) apply to moral issues within a given domain but not outside it.

*14. Which of the following is a domain-specific principle of engineering ethics?
a) Nonmaleficence
b) Justice
*c) Autonomy principle
d) Beneficence

15. Casuists argue that any new case where moral judgment is required can be analyzed by
a) the unique features of the case.
*b) similarity to a paradigmatic case.
c) a general moral principle.
d) norms of the culture.

*16. One major objection to the theory-centered approach is that
a) it is very difficult to see how theories apply in most situations.
*b) there is widespread disagreement as to the correct moral theory.
c) most people accept moral subjectivism.
d) All of the above

17. Ethical relativism and ethical constructivism differ in what respect?
a) Constructivists accept human rights; relativists do not.
b) Constructivists thinking that ethics are constructed by reason; relativists think it comes from subject desires and affect.
*c) Constructivists might think there are social facts that make ethical truths apply across all cultures; relativists think it is always relative to culture.
d) None of the above

*18. What is the problem with the inference from the fact that the F-150 is less fuel efficient to the moral judgment that the engineers who design the F-150 have a moral obligation to make it more fuel efficient?
a) This is a culturally relative judgment.
*b) There is no bridge premise.
c) We don't know the social facts necessary to construct the relevant moral values.
d) It is classist.

19. Mackie argues against ethical objectivism from the fact that
a) there is widespread moral disagreement.
b) if there are moral properties, they would be strange entities.
c) it is hard to see how moral facts would be motivating.
*d) All of the above

*20. One problem with ethical relativism is that
a) it devolves into Subjectivism.
*b) it is not clear how we can disagree with gross moral outrages like the Holocaust.
c) the value of a pickup truck is not culturally relative.
d) None of the above

Weblinks

An article on metaethics in the *Stanford Encyclopedia of Philosophy* that uses a slightly different terminology:
https://plato.stanford.edu/entries/metaethics/

Casuistry   A case-based method of ethical reasoning, holding that no general moral principles are required for reaching warranted conclusions about real-world cases.

Coherence (in ethics)   The property a set of moral judgements has when they support and explain each other well.

Conceptual claim   A claim that is true or false in virtue of its meaning. Example: No triangle has more than four sides.

Domain-specific moral principle   A moral principle that is applicable only to moral problems within a specific domain of professional ethics.

Ethical theory   A general claim about what makes morally right acts right and wrong ones wrong. Examples: Utilitarianism, duty ethics, virtue ethics, and rights-based theories.

Factual claim   A claim whose truth or falsity depends on what fact of the world obtain or do not obtain. Example: Many engineering students take courses in engineering ethics.

Hume's Law   David Hume's (b. 1711–d. 1776) claim that we cannot derive an "ought" from an "is": Every valid inference to a moral conclusion requires at least one (nonvacuous) moral premise.

Moral principle   A claim about how one ought to behave.

Moral realism   The metaethical view every moral statement is either true or false, in a sense that is independent of our feelings, attitudes, social conventions, and other similar social constructions.

Moral relativism   The metaethical view that moral statements are true or false relative to some cultural tradition, religious conviction, or subjective opinion.

Particularism   The view that ethical problems can and must be resolved without invoking any moral principle, only particular judgments about individual cases.

Principlism   A method of ethical reasoning in which a set of domain-specific moral principles are balanced against each other for reaching a warranted conclusion about some real-world case.

Case Study: Dam Failure in Laos—What Sort of Facts Are Required for a Moral Judgment?

On July 23, 2018, a dam under construction in Laos collapsed from heavy rain and flooding. The Saddle Dam D was one part of a large system of planned hydroelectric dams in Laos on the Mekong River. When the dam failed, massive amounts of water swept into villages in the Sanamxay district downstream and, in many cases, they were completely wiped away. At least

40 people were confirmed dead, and between 100 and 1,000 are missing, likely dead, and as many as 7,000 people lost their homes as the water swept all the structures in the villages away. Those rescued from the flooding complained that they only received warning a few hours before the floodwaters hit. Lee Kang Yeol, an official in charge of resettlement at the Xe-Pian Xe-Namoy Power Company sent a letter to provincial officials warning that flooding was coming soon as the dam was about to fail. He warned that all residents in the Xe-Pian valley must evacuate to higher ground. The company, which is a joint venture between two South Korean companies, an electric company in Thailand, and a state-owned company in Laos, initially denied that the dam collapsed. The dam itself is a way for the cash-strapped nation to make money, selling 90% of the 1860 GWH to neighboring Thailand. No official explanation was given for the catastrophic failure other than the tremendous amount of rainfall that the region experienced. However, this area is prone to massive amounts of rainfall, and while any particular event is unpredictable, the company's engineers should expect that catastrophic flooding may strike the region at some point during the dam's service life. The dam did not last very long. Because Laos is a rather secretive Communist state, it is unlikely all the details of the dam's collapse will be forthcoming.

From an ethical perspective, what would we need to know to make a moral judgment about the engineers designing the dam, the builders putting it together, the company officials planning the process, and the government? Put another way, simply knowing that the dam failed because of rainfall is not enough to make a moral judgment; what sort of bridge premise could yield a moral judgment in this scenario?

https://www.theguardian.com/world/2018/aug/21/laos-dam-collapse-work-continues-on-huge-projects-despite-promised-halt
https://en.wikipedia.org/wiki/2018_Laos_dam_collapse
https://www.nytimes.com/2018/07/24/world/asia/laos-dam-collapse-hundreds-missing.html

Chapter 5: Utilitarianism and Ethical Egoism

Summary

In this chapter, we discuss two ethical theories that evaluate actions solely in terms of their consequences: utilitarianism and ethical egoism. These theories are special versions of a broader class of consequentialist ethical theories. All consequentialists believe that the moral rightness and wrongness of our acts depend on nothing but consequences. However, advocates of different versions of consequentialism disagree on exactly how the moral properties of our acts correlate with their consequences. Utilitarians believe that an act is morally right if and only if no alternative act brings about a greater sum total of well-being for everyone affected by the act. Ethical egoists consider only the consequences for the agent herself.

Utilitarianism sometimes conflicts with conventional morality and deeply rooted cultural norms. If, for instance, lying brings about the best overall consequences, then that is the right thing to do. Another type of objection is that the utilitarian theory is too demanding. If the only morally right acts are those that bring about the best consequences, then nearly all acts we perform are wrong.

Ethical egoists stress that people we interact with are often more likely to be nice to us if we are nice to them. Therefore, the practical implications of ethical egoism are not as radical as one might think. In many everyday situations, the best outcome for oneself is achieved by behaving in the same way as nonegoists. However, critics argue that if all of us do what is best for ourselves, then everyone will end up in a situation that is worse from an egoistic point of view, compared to if we had not been selfish. The prisoner's dilemma is a classic example of this.

Learning Objectives

After studying this chapter, students should:
- Be familiar with utilitarianism and its analysis of moral rightness.
- Understand the differences between various forms of utilitarianism.
- Be somewhat familiar with John Stuart Mill as a major utilitarian thinker and the classical utilitarian conception of happiness.
- Be familiar with different conceptions of egoism.

Essay Questions

*1. What is the best objection to the utilitarian theory?
*2. How would a utilitarian think about climate change?
3. How would a utilitarian think about overpopulation?
4. What is the best objection to ethical egoism?
5. Is happiness valuable for its own sake?

Multiple-Choice Questions

*1. All the following are true of utilitarianism *except*
*a) the act that brings the most happiness is sometimes morally wrong.

b) it recognizes the right act as that which maximizes well-being.
c) everyone's well-being matters equally.
d) utilitarianism sometimes conflicts with conventional morality.

2. Why might a utilitarian think that expected consequences are what matter to utilitarian evaluation instead of actual?
a) If we could go back in time to change things, we would change acts based on their actual consequences because what happens is all we care about.
*b) Our inability to know all the actual consequences of an act would make knowing right from wrong impossible.
c) The purpose of utilitarianism is to evaluate acts by consequences, not serve as a decision-making procedure.
d) The only purpose of utilitarian theory is to specify the conditions under which an act is right or wrong.

*3. Act utilitarians believe that the right-making features of an act
a) are the consequences of that particular act, not the hypothetical effects of some set of rules.
b) include the consequences of the act for everyone affected by it from the time it is performed until the end of time.
c) depends on how well the consequences of that act rank when compared to the consequences of all alternative acts available to the agent.
*d) All of the above

4. Which best describes Bentham's utilitarianism?
a) We should only promote pleasures we would want others to promote for ourselves.
b) Utility should always be universalizable.
*c) Utility is a function of certainty, duration, remoteness, and intensity of pleasure.
d) There are higher and lower pleasures and we should prefer to maximize the higher pleasures.

*5. Which of the following best fits with the claim that the rightness of an act requires summing its consequences across more than one domain of value?
a) Egalitarianism
b) Prioritarianism
*c) Multidimensionalism
d) Hedonism

6. All of the following express the position of some type of consequentialism *except* the consequences that make an act right
a) must benefit everyone equally.
b) are the consequences for the agent.
c) depend upon different variables.
*d) must pass the universalizability test of conception.

*7. Suppose a healthy patient requiring minor surgery is at the hospital, and the surgeon realizes this patient is a donor match for five patients dying of organ failure and decides to let the scalpel

slip and kill the patient to maximize utility by harvesting his organs. How might John Rawls object?

a) If the practice of killing healthy patients to harvest organs were followed as a general rule, it would reduce utility as healthy patients would avoid the hospital, causing their conditions to worsen.

b) If the killing could be done such that no one but the surgeon knew, then the killing would maximize utility and be morally necessary. The problem is that this contradicts conventional morality.

c) The requirement to kill this patient to make others well alienates the doctor from his larger practical project of healing people.

*d) The calculation of consequences treats the individual patients as mere containers for valuable experiences and fails to factor in that the loss of one person cannot be replaced by saving another.

8. Some objections to utilitarianism include that it (a) would sanction murder in certain cases, (b) fails to adequately respect the value of persons, and (c) makes many of our everyday pursuits and activities immoral because they fail to optimize consequences. Which of the following best summarizes the common criticism to all three objections?

*a) Utilitarians moral judgments often conflict with the pretheoretical moral judgments we make in everyday life. As a theory, utilitarianism cannot explain them and the degree to which we think our pretheoretical moral judgments are true disconfirms utilitarianism.

b) Utilitarianism cannot account for the feeling of moral shame or regret that one might feel when performing the act that maximizes utility.

c) Utilitarianism demands too much of people's cognitive abilities to anticipate consequences.

d) Agents are more likely to reverse-engineer anticipated consequences to satisfy utilitarian requirements for a course of action they already favor than to actually investigate what consequences they should expect.

*9. Which of the following best describes ethical egoism?

a) The ego emerges from the initial internalization of other people's moral judgments as a small child.

b) People are going to always act in their own self-interest.

*c) The moral act is the one that maximizes consequences for oneself.

d) The most important aspect of the ethical life is taming the ego and self-interest.

10. Consider the following prisoner's dilemma: If Alice and Bob cooperate with one another by not confessing to police and informing on the other, they will each serve three years. If both choose not to cooperate with one another but to confess to the police and inform on each other, they will each serve eight years. And if one decides to cooperate with the other prisoner by not confessing and informing, but the other prisoner confesses and informs, the prisoner who confesses gets only one year and the other twenty-five. Egoistic reasoning by both Alice and Bob leads to what?

a) Bob serves one year in prison, and Alice serves twenty-five.

b) Bob and Alice each serve three years in prison.

c) Bob serves twenty-five years in prison, and Alice serves one.

*d) Bob and Alice each serve eight years in prison.

*11. John Stuart Mill proposed the following argument for utilitarianism: "No reason can be given why the general happiness is desirable, except that each person, so far as he believes it to be attainable, desires his own happiness." How might one criticize it?
*a) This argument is problematic because Mill seeks to derive an "ought" from an "is."
b) This argument is problematic because Mill was a well-known supporter of duty ethics.
c) This argument is problematic because the conclusion is a factual statement, not a moral one.
d) This argument is problematic because Mill confused happiness with Aristotle's notion of Eudaimonia.

12. Imagine that five patients will die unless they receive new organs from a healthy stranger. From a utilitarian point of view, it thus seems right to kill one innocent patient to save five.
a) Utilitarians can respond that all things considered the overall consequences of killing healthy patients would be negative, because patients would no longer trust their doctors.
b) Utilitarians can respond that all things considered the overall consequences of killing healthy patients are hard to predict, which means that we have a compelling reason for not killing healthy patients.
c) Utilitarians respond that all things considered the overall consequences of killing healthy patients can be expected to be negative under some circumstances, which means that we have a compelling reason for not killing healthy patients.
*d) All of the above

*13. A common objection to ethical egoism is that the theory is self-defeating.
a) The essence of this objection is that if all of us do what is best for ourselves, then this would entail a version of utilitarianism, so ethical egoism defeats itself.
*b) The essence of this objection is that if all of us do what is best for ourselves, then everyone will end up in a situation that is worse from an egoistic point of view.
c) No, ethical egoism is not self-defeating, but the utilitarian theory is.
d) No, ethical egoism is not self-defeating, but Kant's duty ethics is.

14. According to John Stuart Mill, "It is better to be a human being dissatisfied than a pig satisfied; better to be Socrates dissatisfied than a fool satisfied." If true, this is a problem for
*a) mainstream utilitarians because their theory entails that it would be better to be a satisfied pig.
b) virtue ethicists because their theory entails that it would be better to be a satisfied pig.
c) duty ethicists because their theory entails that it would be better to be a satisfied pig.
d) None of the above

*15. Utilitarianism is
a) a general ethical theory that is applicable to all decisions made by engineers as well as others.
*b) the view that an act is right just in case it bring about the greatest sum total of pleasure or well-being for everyone affected by the act.
c) incompatible with the political slogan "America first!" when interpreted in the intended way.
d) All of the above

16. Which of the following statements is the best explanation of the distinction between psychological egoism and ethical egoism.
a) Psychological egoism is the view that everyone should maximize their own psychological well-being; ethical egoism is the view that it is morally right to maximize one's own psychological well-being.
b) Psychological egoism is the view that knowledge of one's own psychology is the key to human well-being; ethical egoism is the view that it is morally right to maximize one's own psychological well-being.
c) Psychological egoism is the view that knowledge of one's own psychology is the key to human well-being; ethical egoism is the view that it is ethically acceptable to maximize one's own psychological well-being.
*d) Psychological egoism is the view that many people do in fact seek to maximize their own psychological well-being; ethical egoism is the view that it is morally right to maximize one's own psychological well-being.

*17. Rule utilitarians believe that we ought to act per a set of rules of that would lead to optimal consequences in society if they were to be accepted by
*a) everyone, or almost everyone.
b) the agent throughout his life.
c) the agent at the point in the action is performed.
d) the agent and the people directly affected by the agent's actions.

18. John Stuart Mill wrote, "It is better to be a human being dissatisfied than a pig satisfied; better to be Socrates dissatisfied than a fool satisfied. And if the fool, or the pig, is of a different opinion, it is only because they only know their own side of the question." This quote
a) proves that Mill was not a utilitarian, because utilitarians think we should bring about the greatest good to the greatest number.
b) proves that Mill was not a utilitarian, because only Aristotelians can accept this theory of value.
*c) is compatible with the utilitarian theory; Mill is just making a claim about the moral value of certain types of consequences.
d) shows that Mill accepted Aristotle's theory of happiness.

*19. John Stuart Mill proposed the following argument for utilitarianism: "No reason can be given why the general happiness is desirable, except that each person, so far as he believes it to be attainable, desires his own happiness." The argument
a) violates Hume's is–ought thesis.
b) would be valid if we were to add the following bridge premise: "If everyone desires X, then X is desirable."
c) would be valid if we were to add the following bridge premise: "If at least one person desires X, then X is desirable."
*d) All of the above

20. Ethical egoists have to keep in mind that how things go for oneself often depends on how others behave.

a) If you are rude and dishonest to your colleagues in the office they are likely to treat you in the same way. As an egoist you therefore have a strong reason to treat others well.
b) If your acquaintances find out that you are an egoist they are likely to punish you, so if you are an egoist, it is likely to be in your best interest to not tell anyone about this and be nice and polite to others.
c) The consequences of some of the actions open to us are sometimes unknown or difficult to foresee, meaning that we may not be in a position to conclude with certainty what an ethical egoist should do in a particular case.
*d) All of the above

Weblinks

John Stuart Mill's book *Utilitarianism* (1863):
https://www.utilitarianism.com/mill1.htm
An article in *Stanford Encyclopedia of Philosophy* on consequentialism:
https://plato.stanford.edu/entries/consequentialism/
Peter Singer on consequentialism and utilitarianism:
https://www.youtube.com/watch?v=bRPE0IImxzs

Key Terms

Criterion of rightness   Necessary and sufficient conditions that separate morally right acts from wrong ones.

Egalitarianism   The view that well-being, primary social goods, or other bearers of value ought to be distributed equally in society.

Ethical egoism   The view that it is morally right to do whatever produces to the best consequences for the agent herself.

Prioritarianism   Prioritarians believe that benefits to those who are worse off count for more than benefits to those who are better off. Well-being has a decreasing marginal moral value, just like most people have a decreasing marginal utility for money.

Rule utilitarianism   An ethical theory holding that we ought to act per a set of rules of that would lead to optimal consequences if they were to be accepted by an overwhelming majority of people in society.

Prisoner's dilemma   A type of situation in which rational and fully informed agents acting in accordance with their self-interest that is suboptimal from each agent's own point of view.

Case Study: The Ten Mile Creek Storage and Water Quality Project

In 2005 Skanska Inc. completed a $34 million dollar water storage and restoration project in Florida's Ten Mile Creek basin. The project was a small but important part of the Everglades

Restoration Project, funded by the National Park Service through the US Department of the Interior. Skanska describes the aim of the Ten Mile Creek project as follows:

> The project seeks to restore, protect and preserve the water resources of central and southern Florida. By capturing freshwater from Ten Mile Creek and storing it during the rainy season, the amount of freshwater and sediment entering waterways can be controlled. Construction consisted of a 6,000 acre-feet above ground reservoir; a pump station; a gated-water control structure for moderating the release of water back into the creek; a gated gravity control structure for draining the facility for maintenance purposes; and control structures between the deep water storage area and appurtenant structures. In addition to the obvious environmental benefits of the project, St. Lucie County will use part of the site as a nature preserve area to promote hiking, fishing, bird watching and other outdoor activities. (Skanska, February 2019)

From an engineering point of view, everything went well. The aim of the project was fulfilled and no engineer involved in the project did anything morally questionable. However, it is worth reflecting a bit on what the *morally relevant consequences* of this project might have been. *Why* was it important to restore the Ten Mile Creek Water basin? Were the positive consequences for the environment in the Ten Mile Creek area worth $34 million? For utilitarians and other consequentialists, positive consequences for the natural environment have no direct moral value. The natural environment is only important in so far as it affects the well-being of sentient beings. Although the money spent on the project certainly helped to promote hiking, fishing, and bird watching in the Ten Mile Creek area, utilitarians and other consequentialists would stress that we should compare these positive consequences with those of all alternative ways of spending the same amount of money.

Do you believe that that consequences of the Ten Mile Creek Project were at least as good of those of every alternative act? If not, does this show that it was morally wrong to restore the Ten Mile Creek basin? Or should we rather conclude that the utilitarian theory (and other forms of consequentialism) is too demanding?

Case study by Martin Peterson

https://www.usa.skanska.com/what-we-deliver/projects/57178/Ten-Mile-Creek-Water-Preserve
https://www.sfwmd.gov/sites/default/files/documents/fyi_10_mile_creek.pdf
https://www.saj.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/479985/ten-mile-creek-water-preserve-area/

Chapter 6: Duties, Virtues, and Rights

Summary

This chapter discusses three examples of nonconsequentialist theories. The first is the theory of duty ethics introduced by Immanuel Kant. According to Kant, an act's rightness depends on the intention with which it is performed. Acts that are performed with an appropriate intention are right, whereas actions performed with inappropriate intentions are wrong. The second example of a nonconsequentialist theory is virtue ethics. Virtue ethicists believe than an act is right if and only if it would have been performed by a fully virtuous agent. This is an ancient theory advocated by, among others, Aristotle. The third and final nonconsequentialist theory takes the notion of rights as its point of departure. Two particularly influential accounts are John Locke's *Two Treatises of Government* and Robert Nozick's *Anarchy, State and Utopia*. Nozick argues that rights are moral "side constraints." If you, for instance, own a piece of land, this entails that there are a number of things others are not allowed to do, such as building a house on your land. Your ownership right to your land creates side constraints for what other people are permitted to do.

Learning Objectives

After studying this chapter, students should:
- Be able to explain the distinction between hypothetical and categorical imperatives and discuss why it is important for understanding Kant's theory.
- Be familiar with Kant's universalization test: "Act only according to that maxim whereby you can, at the same time, will that it should become a universal law."
- Be able to explain the distinction between perfect and imperfect duties.
- Be familiar with virtue ethics and some of its criticisms.
- Be familiar with Robert Nozick's theory of rights.

Essay Questions

*1. Is it always morally wrong for engineers to lie to their clients?
2. How would a virtue ethicist analyze the Ford Pinto case (see Chapter 9)?
3. What is the difference between rule utilitarianism and Kantian duty ethics?
4. Robert Nozick asked: "If I own a can of tomato juice and spill it in the sea . . . , do I thereby own the sea, or have I foolishly dissipated my tomato juice?" What is in your opinion the best answer to this question, and why is it important?
*5. Imagine that you walk by a pond in which a three-year-old girl is about to drown. You are the only person around; unless you rescue the girl she will die. How would a Kantian analyze this situation, and what would Robert Nozick say?

Multiple-Choice Questions

1. Consider an engineer who decides not to overcharge his client even though he could get away with it because he does not want to risk developing a reputation for dishonesty. Kant might consider this decision not to overcharge the client as an example of a(n)

a) act that conforms to the demands of duty but which is not from a respect for duty.
b) act done from a universalizable maxim.
c) act that maximizes consequences.
*d) example of psychological egoism.

*2. Which of the following best encapsulates Kant's view on the source of goodness?
a) Nothing is good but an act done from altruistic motives.
b) Acts draw their moral goodness from the goal of the agent.
c) Acts draw their goodness from the outcomes.
*d) Nothing is good in itself but a good will.

3. Which would of the following is an example of a hypothetical imperative?
a) I am tired of looking at your room. Clean it now!
b) If you are late one more time, I am going to order you to run a mile!
*c) If you want pudding, eat your meat!
d) Never steal!

*4. Which of the following is an example of a maxim in Kant's sense?
a) Never lie!
*b) Staying home from class because it is raining outside
c) Going hunting every December
d) Returning a library book

5. When conducting the universalizability test, Kant asks us to consider
a) the consequences if everyone performed our act and whether they would be bad or not.
b) our maxim for our act as though it were a law of nature and evaluate the consequences.
c) whether anyone in the universe could act on our maxim.
*d) our maxim for our act as though it were a law of nature and see if the act could still achieve the purpose of the maxim or whether it would necessarily fail.

*6. How might Kant explain how we distinguish between perfect duties and imperfect duties?
a) No one has a duty to perfection.
b) Ought implies can.
c) Perfect duties are required by the moral law; imperfect duties are purely supererogatory.
*d) An imperfect duty is one in which the maxim as universal law could be conceived without contradiction, but which we could never rationally will.

7. Kant's formula of humanity is best expressed as:
a) Never use others as a means; always treat them as ends.
b) Love thy neighbor as thyself.
*c) Always treat humanity as an end in itself and never as a mere means.
d) Do unto others as you would have them do unto you.

*8. Which of the following best describes the virtue ethics approach of Aristotle, Aquinas, and Confucius?
a) Virtues give on the ability to fulfill one's moral duty.

b) Living virtuously maximizes utility.

*c) Virtues are not so much defined by particular acts but by the dispositions that cause us to live well.

d) Virtues provide an efficient means to happiness for an egoist.

9. Which of the following is objection to virtue ethics covered in the reading?

a) Virtues are only conditionally good; they require the presence of a good will.

*b) Virtues are about a good life as a whole and good character and have little guidance for particular decisions.

c) Living a life of virtue often requires self-sacrifice.

d) Virtuous people are unlikely to make decisions necessary to maximize consequences.

*10. Which of the following would be an example of a positive right?

a) Property rights that constrain other from using one's property

b) The right to life

c) The right to free speech

*d) The right to clean drinking water

11. What determines an act's rightness or wrongness according to virtue ethicists is the character traits or act dispositions of the agent who performs the act. Consequences and intentions are relevant only in so far as

*a) virtuous agents have reason to care about them.

b) they can be derived from the Categorical Imperative.

c) they lead to the greatest happiness for the greatest number.

d) None of the above

*12. For Aristotle, Aquinas, and Confucius, ethics is not primarily about distinguishing right acts from wrong ones. The most important ethical question for them is

a) to ensure that we do not violate anyone's rights.

b) to ensure that no person is treated as a mere means to an end.

*c) how we ought to live. What is a good human life?

d) None of the above.

13. One of Dr. Peterson's many habits is to drink a cup of filter coffee every morning. This habit neither a virtue nor a vice because virtues are character traits that

a) bring about positive consequences for society and drinking coffee in the morning does not have any consequences for society.

b) are firmly entrenched in an agent's personality and drinking coffee in the morning is not part of Dr. Peterson's personality.

*c) make the agent better off in the long run and drinking coffee in the morning does not make Dr. Peterson better or worse off in the long run.

d) None of the above

*14. The mixing theory of labor is the idea that

a) information cannot be owned by anyone.

b) everyone has a right to privacy, unless something more valuable can be created by mixing labor with something that is not already owned by others.
*c) you own yourself and become the owner of whatever you create by mixing your labor with something that is not already owned by others.
d) intellectual property rights must always be respected.

15. Robert Nozick wrote: "If I own a can of tomato juice and spill it in the sea . . . do I thereby own the sea, or have I foolishly dissipated my tomato juice?" This is meant to be an objection to
a) the strong anthropocentric view.
b) the biocentric view.
c) utilitarianism.
*d) the mixing theory of labor.

*16. What is the difference between Aristotle's notion of eudaimonia and the classic utilitarian notion of happiness?
a) There is no difference. These are different terms for the same idea.
*b) The utilitarian notion happiness is exclusively focused on pleasure; Aristotle would insist that pleasure is one of many components of human happiness.
c) The utilitarian notion happiness is exclusively focused on preference satisfaction; Aristotle would insist that happiness is exclusively focused on pleasure.
d) Aristotle insisted that our intellectual virtues affect our happiness, but utilitarians reject the idea that intellectual skills can have an effect on our happiness.

17. Kant proposed the following argument for duty ethics: "Nothing can possibly be conceived in the world, or even out of it, which can be called good, without qualification, except a good will." This argument is problematic because
a) Kant was a well-known supporter of utilitarianism.
b) the conclusion is a factual statement, not a moral one.
c) acts performed with a good will sometimes have catastrophic consequences.
*d) None of the above

*18. Imagine that you walk by a pond in which a three-year-old girl is about to drown. You are the only person around and unless you rescue the girl she will die. A world in which all children in distress are left to die by passers-by is conceivable. However, you cannot rationally will that all of us were to live in such a world. You, therefore,
a) have a strong utilitarian reason to rescue the girls if you can do so without danger to yourself.
*b) have an imperfect Kantian duty to rescue the drowning girl.
c) act virtuously if you rescue the girl, because this is the generous and courageous thing to do.
d) All of the above

19. Kant thinks it might sometimes be permissible to treat a person as a means to an end, but he insists that it is wrong to treat persons as mere means to an end. We can avoid treating persons as mere means to an end by
a) paying for all services we use (such as taxi rides).
b) not saying or doing anything that can make the other person feel upset.
*c) respecting their autonomy and human dignity.

d) None of the above

*20. Kant was not a rule-utilitarian. Why not? It is irrelevant whether the sum total of well-being would increase when a maxim is universalized; what matters is whether
*a) it is conceivable that the maxim is universalized, or if one can rationally will that the maxim is universalized.
b) a virtuous agent would accept the maxim.
c) it is legally permissible to accept the maxim.
d) All of the above

Weblinks

A *Stanford Encyclopedia of Philosophy* article on Kant's moral philosophy:
https://plato.stanford.edu/entries/kant-moral/
An *Stanford Encyclopedia of Philosophy* article on virtue ethics:
https://plato.stanford.edu/entries/ethics-virtue/
An interview with Robert Nozick:
https://www.youtube.com/watch?v=Ldngi2WtGik
Elisabeth Hausler, Founder of Build Change: https://www.buildchange.org/about/staff/elizabeth-hausler/

Key Terms

Categorical imperative   A moral command in Kant's ethical theory that is valid under all circumstances and in all situation, regardless of the agent's wishes or desires. Example: "Act only according to that maxim whereby you can, at the same time, will that it should become a universal law."

Courage   The virtue of acting in accordance with one's (moral) convictions or beliefs.

Doctrine of the mean   The claim that a virtuous agent should strive for the desirable middle between deficiency and excess.

Duty ethics   An ethical theory according to which an act's moral rightness or wrongness depends on the intention with which it is performed, rather than its consequences or the agent's act dispositions.

Eudaimonia   A technical term in virtue ethics that is often translated as human flourishing or happiness.

The golden rule   The moral principle according to which you should "do unto others as you would have them do unto you."

Hypothetical imperative   A moral command in Kant's ethical theory that is valid only if the agent has certain wishes or desires. Example: "If you wish to eat good pasta, then you should dine in Little Italy in New York."

Imperfect duty   A duty that, according to Kant, does not have to be fulfilled under all circumstances.

Maxim   The rule that governs the intention with which one is acting. It can often be formulated by stating the agent's reason for doing something.

Mixing theory of labor   The view that one becomes the owner of something if one mixes one's labor with something that is not owned by anyone, while leaving enough left for others.

Perfect duty   A duty that, according to Kant, has to be fulfilled under all circumstances.

Prudence   The virtue of being cautious and exercising good judgement.

Temperance   The virtue of moderation or self-restraint.

Socially constructed right   The view that rights are created by society. On this view we do not have any rights merely in virtue of being moral agents (or patients).

Technê   An ancient Greek term often translated as the craft or art to build or make things.

Trolley problem   A moral choice situation in which you have to choose between killing one person, which will prevent the death of five others, or let the five die.

Utilitarianism   The ethical theory holding that an act is right just in case it brings about the greatest sum total of pleasure or well-being for everyone affected by the act.

Virtue   An act disposition or character trait that is stable over time, in particular ones that characterize morally excellent individuals.

Case Study: The Right to One's Own DNA: Natural or Socially Constructed?

In 2007, 23andMe began offering a service whereby one sends the company saliva and then the company sends back a genetic profile that could be interesting for purposes of learning about one's ancestry or even for learning about the risk of certain heritable diseases. Users paid for the service, but, really, what they gave 23andME was arguably more valuable than the money they paid or what they received back. 23andMe now has well over 5 million genetic profiles from the general population. This massive amount of data can be used for all sorts of research purposes. One of the world's leading drug manufacturers, GlaxoSmithKline has invest $300 million into 23andMe so as to gain access to the genetic information. Some users of 23andMe may be surprised to learn that they have already consented to allowing their data to be used even by third parties such as GSK and Pfizer. The process by which 23andMe obtains consent is a typical online privacy and terms agreement that most people are accustomed to simply clicking "Agree." The drug companies that have paid for access to the genetic information are planning on using it for very valuable research that could lead to treatments for many disorders, Alzheimer's disease being perhaps the most visible. Privacy advocates worry that the process circumvents the typical

medical research process of obtaining informed consent and charge that 23andMe was created precisely to get such information without the rules governing collection of data during medical treatment.

How would the right to one's own genetic information be viewed upon by a natural rights theorist? Would a natural rights theorist think there is such a right or not? Consider, would the right to one's own genetic information fall under the fundamental right of self-ownership? Or could one argue that the genetic information does not exist as information to be used until "mixed" with sophisticated technology? How would a social constructivist about rights compare the benefits of such data for finding cures for Alzheimer's disease versus individual rights to their own genetic information?

Case study by Robert Reed

https://www.digitaltrends.com/cool-tech/23andme-gsk-drugs/
https://www.wired.com/story/23andme-glaxosmithkline-pharma-deal/

Chapter 7: Whistle-blowing: Should You Ever Break with Protocol?

Summary

A whistle-blower is someone who passes along information about what he or she justifiably believes to be serious moral or legal wrongdoing in an organization of which he or she is a member to an internal or external party he or she is not authorized to contact with the intention to stop this wrongdoing. The moral debate over whistle-blowing is complex. Some scholars are concerned that whistle-blowing is, by definition, disloyal, though others question that idea. According to the harm-preventing view, whistle-blowing is justified if the whistle-blower initiates a causal process that leads to the prevention of serious harm. Another justification focuses on the distribution of guilt. Davis, who defends this view, argues that: "[Whistle-blowers] are generally deeply involved in the activity they reveal. This involvement suggests that we might better understand what justifies (most) whistleblowing if we understand the whistle-blower's obligation to derive from complicity in wrongdoing rather than from the ability to prevent harm." A third justification holds that whistle-blowing is justified whenever that increases people's autonomy.

It is not uncommon for whistle-blowers to be dismissed or punished by their employers. Many organizations *say* they welcome and respect whistle-blowers, but they do not always do so when push comes to shove.

Learning Objectives

After studying this chapter, students should:
- Be familiar with the definition of whistle-blowing.
- Be familiar with the Edward Snowden case.
- Be able to apply the various criteria of whistle-blowing to cases already studied.
- Be familiar with various theories of whistle-blowing such as harm prevention and complicity avoiding.
- Be familiar with the way that normative theories are relevant to how we justify whistle-blowing.

Essay Questions

*1. Is Edward Snowden a hero or a traitor? Explain.
2. Is whistle-blowing a disloyal act? Explain.
*3. How should a morally conscientious employer treat a whistle-blower?
4. What is the best objection to the harm-preventing defense of whistle-blowing?
5. What is the best objection to the complicity-avoiding defense of whistle-blowing?

Multiple-Choice Questions

1. All of the following are features of whistle-blowing *except*
a) the whistle-blower brings attention to the authorities of wrongdoing.
b) the whistle-blower is within the institution responsible for the wrongdoing.
c) the whistle-blower bypasses normal protocols for reporting, sometimes even contacting media.

*d) the whistle-blower works undercover for the government.

*2. Which element of whistle-blowing is absent from the following case: An engineer knows that his company is breaking the law by periodically allowing untreated wastewater with a low pH into the sewer, creating a risk of killing the bacteria at the municipal wastewater treatment plant. The engineer sabotages the company's discharge creating a spill that draws the attention of the authorities and then explains to them what the company has been doing.
*a) Merely passes information along to authorities
b) Justifiably believes wrongdoing has occurred
c) Intention to end wrongdoing (not merely revenge)
d) Serious wrongdoing

3. What might be the missing element of responsible whistle-blowing in the following scenario? One employee, Amy, tells another employee, Bob, that she has seen the company pass sensitive data on to clients in a way that violates user privacy. Bob then makes a report to the authorities.
a) Merely passes information along to authorities
*b) Justifiably believes wrongdoing has occurred
c) Intention to end wrongdoing (not merely revenge)
d) The wrongdoing is serious

*4. According to DeGeorge's harm-preventing view, whistle-blowing which of the following conditions is not necessary for whistle-blowing to be morally permissible?
a) A practice or product does or will cause serious harm to individuals or society at large.
b) The charge of wrongdoing has been brought to the attention of immediate superiors.
c) No appropriate action has been taken to remedy the wrongdoing.
*d) There is documentation of the potentially harmful practice or defect.

5. On the harm-preventing view, which condition is one of the two necessary conditions to make whistle-blowing morally obligatory?
a) There is good reason to believe that public disclosure will avoid the present or prevent similar future wrongdoing.
b) No appropriate action has been taken to remedy the wrongdoing.
c) The company will not be angry with you when the information is revealed.
*d) A practice or product does or will cause serious harm to individuals or society at large.

*6. The complicity-avoiding view takes you to be obliged to blow the whistle if and only if (1) what you will reveal derives from your work for an organization; (2) you are a voluntary member of that organization; (3) you believe that the organization, though legitimate, is engaged in serious moral wrongdoing; and (4) you believe that your work for that organization will contribute (more or less directly) to the wrong if (but not only if) you do not publicly reveal what you know and your beliefs are true and justified. What sort of case calls the necessity of these criteria in question?
*a) A case where the wrongdoing is in another part of the organization or above you
b) A case where the wrongdoing is illegal
c) A case where you have already participated in the wrongdoing yourself
d) A case where your company is about to be bought by another

7. Which identifies as the crucial condition for whistle-blowing a situation in which people cannot make informed consent without you revealing wrongdoing publicly?
a) Complicity-avoiding
b) Harm-preventing
*c) Autonomy-based
d) Utilitarian

*8. In the BER case, Engineer A discovered that Engineer A's company, SPQ, was cheating a vendor by using software in violation of agreement. Upon learning of this wrongdoing, Engineer A responded by reporting SPQ on a confidential hotline. BER determined this act of whistle-blowing to be unethical. All of the following considerations supported their conclusion *except*
a) there was no immediate threat to the public.
b) Engineer A was disloyal.
c) Engineer A did not properly calculate the utility.
*d) Engineer A did not notify SPQ to give them a chance to fix the problem.

9. Which of the following accurately describes the case of whistle-blowing of Mr. Vokes against TransCanada over their pipelines for violating safety guidelines?
a) Mr. Vokes did not report his complaint up the chain of command.
b) No other employees at TransCanada thought the violations merited reporting.
c) None of Mr. Vokes worries about pipelines exploding have been validated.
*d) After being fired from TransCanada in retaliation for whistle-blowing, Mr. Vokes was unable to find permanent employment elsewhere.

*10. All the following are true of Edward Snowden's whistle-blowing on the NSA *except*
a) Snowden discovered as a private contractor that the NSA was monitoring millions of private phone calls of US citizens.
b) The NSA admitted much of Snowden's allegations were true, and Congress responded with new legislation to restrict the NSA's monitoring activity.
c) Attorney General Eric Holder said that Snowden had performed a public service.
*d) Snowden received a presidential pardon for his whistle-blowing.

11. According to the harm-preventing account of whistle-blowing, a necessary (but not sufficient) condition for morally permissible instances of whistle-blowing is that
a) You believe that the organization, though legitimate, is engaged in serious moral wrongdoing.
b) You believe that your work for that organization will contribute (more or less directly) to the wrong if (but not only if) you do not publicly reveal what you know.
*c) A practice or product does or will cause serious harm to individuals or society at large.
d) None of the above

*12. According to the complicity avoiding view about whistle-blowing, a necessary (but not sufficient) condition for morally permissible instances of whistle-blowing is that
*a) you believe that the organization, though legitimate, is engaged in serious moral wrongdoing.
b) there is documentation of the potentially harmful practice or defect.
c) a practice or product does or will cause serious harm to individuals or society at large.

d) the charge of wrongdoing has been brought to the attention of immediate superiors.

13. A whistle-blower is someone who
a) sells information about what he or she justifiably believes to be serious moral or legal wrongdoing in an organization to an internal or external party.
b) passes along information about what he or she justifiably believes to be serious moral or legal wrongdoing in an organization.
c) passes along information about what he or she justifiably believes to be serious moral or legal wrongdoing in an organization of which he or she is a member.
*d) passes along information about what he or she justifiably believes to be serious moral or legal wrongdoing in an organization of which he or she is a member to an internal or external party he or she is not authorized to contact with the intention to stop this wrongdoing.

*14. According to Richard T. DeGeorge's harm-preventing view, whistle-blowing is morally permissible if a practice or product does or will cause serious harm to individuals or society at large,
*a) the charge of wrongdoing has been brought to the attention of immediate superiors, and no appropriate action has been taken to remedy the wrongdoing.
b) the charge of wrongdoing has been brought to the attention of immediate superiors, and there is documentation of the potentially harmful practice or defect.
c) the charge of wrongdoing has been brought to the attention of immediate superiors, and there is good reason to believe public disclosure will avoid the present or prevent similar future wrongdoing.
d) and the charge of wrongdoing has been brought to the attention of immediate superiors.

15. According to Michael Davis's complicity-avoiding view, whistle-blowing is morally permissible if
a) a practice or product does or will cause serious harm to individuals or society at large.
*b) what you will reveal derives from your work for an organization; you are a voluntary member of that organization; you believe that the organization, though legitimate, is engaged in serious moral wrongdoing; you believe that your work for that organization will contribute (more or less directly) to the wrong if (but not only if) you do not publicly reveal what you know; and these beliefs are true and justified.
c) a practice or product does or will cause serious harm to individuals or society at large and the charge of wrongdoing has been brought to the attention of immediate superiors.
d) the charge of wrongdoing has been brought to the attention of immediate superiors and no appropriate action has been taken to remedy the wrongdoing.

*16. Roger Boisjoly is best known for having
a) blown the whistle before the launch of the Space Shuttle Challenger, which he did by contacting the press.
b) blown the whistle before the launch of the Space Shuttle Challenger, which he did by contacting the executive director of NASA.
*c) raised serious concerns about the O-ring the months before the launch of the Space Shuttle Challenger.
d) None of the above

17. Michael Davis summarizes his complicity-avoiding account of whistle-blowing in six criteria. In his view, you are obliged to blow the whistle just in case (1) what you will reveal derives from your work for an organization; (2) you are a voluntary member of that organization; (3) you believe that the organization, though legitimate, is engaged in serious moral wrongdoing; (4) you believe that your work for that organization will contribute (more or less directly) to the wrong if (but not only if) you do not publicly reveal what you know; (5) you are justified in beliefs (3) and (4); and (6) beliefs (3) and (4) are true. Which ethical theory offers the best support of this account of whistle-blowing?
*a) Utilitarianism
b) Ethical egoism
c) Kantian duty ethics
d) Virtue ethics

*18. Richard T. DeGeorge defends a harm-preventing view about whistle-blowing. In his view, it is permissible to blow the whistle just in case (1) a practice or product does or will cause serious harm to individuals or society at large; (2) the charge of wrongdoing has been brought to the attention of immediate superiors; and (3) no appropriate action has been taken to remedy the wrongdoing. Which ethical theory offers the best support of this account of whistle-blowing?
a) Utilitarianism
b) Ethical egoism
*c) Kantian duty ethics
d) Virtue ethics
e. None of the above

19. A whistle-blower is someone who passes along information about what he or she justifiably believes to be
a) a violation of the NSPE code of ethics with the intention to stop this wrongdoing.
b) an illegal activity with the intention to stop this wrongdoing.
c) serious moral or legal wrongdoing in an organization of which he or she is not a member with the intention to learn from this wrongdoing.
*d) serious moral or legal wrongdoing in an organization of which he or she is a member with the intention to stop this wrongdoing.

*20. The fact that whistle-blowers are generally deeply involved in the activity they reveal is thought by some theorists to show that
a) prevention of harm is the salient feature of whistle-blowing.
b) whistle-blowing always involves breaking one's word to one's employee.
*c) avoiding complicity is the most morally relevant aspect of whistle-blowing.
d) None of the above

Weblinks

An NGO that protects whistle-blowers:
https://www.whistle-blowers.org/
An interview with Evan Vokes:

https://www.youtube.com/watch?v=YQ04V8IjwAQ
A documentary about Edward Snowden:
https://www.youtube.com/watch?v=8OGmvE9znFY

Case Study: Does Big Tech Need More Whistle-Blowers? Facebook and Tesla Face Public Criticism from Insiders

Between 2014 and the 2016 election, Cambridge Analytica, a big data political consulting firm chaired by Alexander Nix was founded by Donald Trump's future campaign strategist, Steve Bannon who acted as vice president of the company for a time. A famous Republican donor, Robert Mercer, invested to help Bannon start the company. The company provided targeted advertising to more than 40 US campaigns in 2014 and provided its services to LeaveEU during the Brexit campaign and most famously to Donald Trump's presidential campaign. The company was built on the expertise of Michal Kosinski who researched at the Psychometrics Centre of Cambridge University. Kosinski showed how psychological profiles of users could be formed based on social media activity such as "liking" posts, thus allowing smart, targeted advertising. Targeted advertising is not illegal nor is data gathering per se, but Cambridge Analytica did not acquire its data legally nor with the informed consent of the users.

An app developed by another researcher at Cambridge, Alexander Kogan, called mydigitiallife was advertised to Amazon's Mechanical Turks and Qualtrics as a personality quiz. The app gave permission to access the users' Facebook account and gather information from their profile and from their contacts. In fact, the personality quiz was little more than a rouse to obtain data from Facebook activity – including of the users' contacts – so as to form a personality profile. Over 320,000 people downloaded the app, and information was gathered from, on average, 160 of their friends. Ultimately, the personal data of 80 million Facebook users was collected and used to make psychological profiles. This gathering of data in and of itself was not illegal because Kogan had permission from Facebook to collect such data for academic purposes. However, Kogan sold that data to Cambridge Analytica in a violation of Facebook's protocols (it is illegal to sell such data to a third party without the permission of the person). From there, Cambridge Analytica made an algorithm to profile even more people for use in elections.

The role that Facebook played became clearer when Christopher Wylie, the employee at Cambridge Analytica who worked on the algorithm, came forward and blew the whistle on Cambridge Analytica primarily but also exposed Facebook's inaction. Facebook initially downplayed the data breach, and Wylie's recollection indicates that Facebook was well aware of the breach but did very little to rectify the situation. Wylie explained that the only actions Facebook took upon discovering the illegal handling of the data was to have lawyers contact him about the data being obtained illegally and demand that he delete it. He did. Since Wylie gave his public interview, Facebook has suspended Wylie's Facebook and WhatsApp accounts. Critics say this is retaliation, but Facebook released a statement saying in effect that the suspension is

due to Wylie's admission of misusing user data and that the suspension will be lifted when Wylie talks to Facebook about the data breach.

Tesla is dealing with a situation that can be described as meta-whistle-blowing. Martin Tripp, a former Tesla employee, blew the whistle on what he claimed were unsafe manufacturing practices involving damaged batteries that were placed back on the assembly line. (Tripp released information to *Business Insider*.) Tripp also alleged environmental malfeasance at factories. Then another Tesla employee from internal security blew the whistle on Tesla's alleged retaliation of Tripp. Karl Hensen worked on Tesla's internals security team and alleges that Tesla used devices to intercept communications of employees at work and accessed Mr. Tripp's phone even after he was no longer working for the company. Hensen maintains that this pattern of spying on employees and former employees coincides with the fact that many members of the security team formerly worked for Uber at a time it was alleged to have engaged in corporate espionage on competitors.

Wylie was unquestionably a whistle-blower for Cambridge Analytica, but how should we understand his role exposing Facebook's lackadaisical response to the data breach? Was he a whistle-blower? Did Facebook treat him like a whistle-blower? When Wylie came forward, which view of whistle-blowing best explains his intent? Harm-prevention or complicity avoidance?

How would Tripp and Hensen's whistle-blowing fit into the categories discussed in the chapter? Harm-preventing? Complicity avoiding? The pattern we see in these cases is whistle-blowers going to the media. Does this reveal a problem in organizational structure or a need for government regulation? Why or why not?

https://gizmodo.com/elon-musk-on-whistle-blower-accusing-tesla-of-illegally-1828399337
https://www.businessinsider.com/tesla-martin-tripp-files-countersuit-2018-7
https://www.theguardian.com/news/2018/mar/17/data-war-whistle-blower-christopher-wylie-faceook-nix-bannon-trump
https://techcrunch.com/2018/03/17/trump-campaign-linked-data-firm-cambridge-analytica-reportedly-collected-info-on-50m-facebook-profiles/
https://techcrunch.com/2018/03/18/facebook-has-suspended-the-account-of-the-whistle-blower-who-exposed-cambridge-analytica/

Chapter 8: Conflicts of Interest: When Is It Permissible to Influence the Actions of Others?

Summary

According to a widely accepted definition, a conflict of interest is "a set of circumstances that creates a risk that professional judgment or actions regarding a primary interest will be unduly influenced by a secondary interest." Conflicts of interests can be further divided into actual, potential, and apparent conflicts of interest. According to the NSPE Code of Ethics, "Engineers shall disclose all known or potential conflicts of interest to their employers or clients by promptly informing them of any business association, interest, or other circumstances which could influence or appear to influence their judgement or the quality of their services."

From a utilitarian point of view, conflicts of interests should be avoided because they tend to lead to bad consequences. Kantians believe that the engineer's obligation to avoid conflicts of interests is an imperfect duty. A world in which engineers do not disclose or avoid all conflicts of interests is conceivable but we cannot rationally will that all of us were to live in such a world. For virtue ethicists, they key issue concerns how responses to conflicts of interest manifest virtues such as justice, courage and prudence.

According to US law, a bribe is "the offering, giving, receiving, or soliciting of something of value for the purpose of influencing the action of an official in the discharge of his or her public or legal duties." A prosecutor seeking to get a suspect convicted for bribery must therefore demonstrate that there is a direct connection between the giving of the bribe and some specific past or future action performed in return for the bribe. However, attitudes to bribery vary around the world. In some countries bribery is a natural and ever-present element of everyday life. The Foreign Corrupt Practices Act (FCPA) makes it unlawful for US citizens and corporations to make payments to foreign officials to assist in obtaining or retaining business, even if such payments are legal in the country in which they are made.

Learning Objectives

After studying this chapter, students should:
- Know what counts as a bribe and a conflict of interest
- Know how conflicts of interest are addressed in the NSPE Code of Ethics
- Be familiar with the difference between actual, potential and apparent conflicts of interests.
- Know the difference between bribes and extortion under the Foreign Corrupt Practices Act.

Essay Questions

[1.] When does a gift become a bribe? Explain.
*2. Must a virtue ethicist always avoids conflicts of interests? Explain.
*3. Is it morally wrong to make extortion payments in foreign countries in which such payments are very common? Explain.
4. "When in Rome do as the Romans do." Discuss!
5. Does the US Foreign Corrupt Practices Act square well with our considered moral intuitions? Explain.

1. A prosecutor attempting to prove a public official is guilty of bribery must show which of the following about the acceptance of a gift or money?
a) The acceptance of the gift by the public official created a conflict of interest between his or her public duties and the interest of the donor.
b) The gift was not officially reported.
*c) There is a direct connection between the giving of the bribe and some specific past or future action by the official.
d) The voting record of the official aligns with the political views of the one giving the money.

*2. Why might it be unethical for a public official to accept a gift of a discounted trip to Paris from a company that his agency regulates?
a) A reasonable person would conclude that there had been a quid pro quo.
b) It is wrong to enjoy luxurious vacations.
c) No one could go on such a trip and not be permanently biased in favor of the giver.
*d) A neutral observer could reasonably doubt that the official's treatment of all airlines is fair and without preference.

3. Which of the following is one condition the NSPE holds for acting as a faithful trustee or agent?
a) Engineers shall not accept compensation, financial or otherwise, from more than one party for services on the same project.
b) Engineers shall never accept gifts of any kind, even of a value less than $20 from an interested party.
*c) Engineers shall disclose all known or potential conflicts of interest that could influence or appear to influence their judgment or quality of services.
d) Engineers shall not solicit or accept financial or other valuable consideration from other engineers.

*4. A manager assessing the work performance of her spouse would be
a) an apparent conflict of interest.
b) a potential conflict of interest.
*c) an actual conflict of interest.
d) not a conflict of interest.

5. When a conflict of interest arises, an engineer must
a) trust his or her conscience.
b) make a cost–benefit analysis.
*c) disclose and resolve it.
d) None of the above

*6. Why might rule utilitarians have difficulty justifying Schindler's embracing of a conflict of interest to save Jews?

*a) Rule utilitarians justify policies according to consequences of general obedience, not consequences specific to situation.
b) It is not clear which moral rule is the most salient in this situation.
c) Extraordinary situations cannot be captured by rules.
d) None of the above

7. Kantians might determine that conflicts of interests are to be avoided by recognizing that
a) there is a contradiction in conception when we try to universalize the maxim that embraces conflicts of interest.
b) there is a contradiction between the purpose of engineering contracts and accepting conflicts of interest.
*c) we could never will a world where people consistently and universally embraced conflicts of interest.
d) None of the above

*8. A virtue ethicist might determine conflicts of interest are to be avoided by considering all the following virtues *except*
a) fidelity.
b) justice.
c) prudence.
*d) generosity.

9. How does the Foreign Corrupt Practices Act distinguishes between bribes and extortion payments?
a) Both bribes and extortion payments are fine so long as they are legal in the foreign country.
b) Both bribes and extortion payments are illegal in a foreign country so long as they would be illegal by American law.
c) While both are illegal even if legal in the foreign country, bribes are a felony and extortion payments are not.
*d) Paying for access to business is a bribe and illegal; paying to avoid loss of something one has a prior right to is an extortion payment and not illegal.

*10. The Foreign Corrupt Practices Act (FCPA) makes it unlawful for US citizens (and certain other groups of legal entities) to make payments to foreign officials to assist in obtaining or retaining business
a) if such payments are illegal in the country in which they are made.
b) if such payments are illegal in the country in which they are made, and they violate the NSPE Code of Ethics.
*c) irrespective of whether such payments are illegal in the country in which they are made.
d) irrespective of whether such payments are illegal in the country in which they are made, but only if they violate the NSPE Code of Ethics.

11. The Foreign Corrupt Practices Act (FCPA) makes it unlawful for US citizens (and certain other groups of legal entities) to
*a) bribe foreign government officials, but grease payments are sometimes permissible.
b) bribe foreign government officials, but extortion payments are sometimes permissible.

c) make grease payments to foreign government officials, but extortion payments are sometimes permissible.
d) make extortion payments to foreign government officials, but grease payments are sometimes permissible.

*12. TeliaSonera claims that when it acquired a small Gibraltar-based company for the purpose of gaining access to telecom licenses in Uzbekistan, it did nothing wrong. What about the company might indicate corruption?
a) The company had no employees or assets or holdings other than it held the licenses to phone frequencies in Uzbekistan.
b) The company was owned by Gulnara Karimova, the daughter of Uzbekistan's ruler.
c) A US company that had declined business dealings with Karimova found its frequency jammed by the Uzbek government.
*d) All of the above

13. Does the Foreign Corrupt Practices Act permit a US citizen to bribe foreign officials in country X, if doing so in legal in country X?
a) Yes, if the bribe is worth less than $1000.
b) Yes, if the bribe is reported to the IRS.
c) No, never.
*d) No, to pay bribes is illegal, although it is sometimes permitted to pay "grease money" to a foreign official if that helps one to obtain something to which one is entitled.

*14. One of the acceptable "customs" in Country X is for consultants to give substantial gifts to public officials in connection with the awarding of public works contracts. Engineer A recognizes that the giving of such gifts may be a violation of US law, although they may not technically be a violation of the law in Country A.
a) Engineer A does not violate any US law by giving the gift, because country X is outside US jurisdiction.
b) The Foreign Corrupt Practices Acts is applicable to this case, but as long as the value of the gift is declared to the IRS it is legal to give the gift.
*c) The Foreign Corrupt Practices Acts is applicable to this case: It would not be legal for Engineer A to give the gift.
d) The Foreign Corrupt Practices Acts is applicable to this case: it is legal for Engineer A to give the gift only if it is distributed via a non-US courier.

15. Alice and Bob are utilitarian engineers working in the oil and gas industry in Houston. They are currently seeking permission to drill for gas in Siberia, Russia. The only way to obtain all the required permissions, to which they are not entitled, is to bribe the Mayor of Krasnovgorod. Would it be ethically and legally permissible to do so?
a) While it would certainly be illegal to bribe foreign government officials, this might still be the morally right thing to do, if the total consequences for everyone concerned would be optimal.
b) It would certainly be illegal to bribe foreign government officials, and according to all versions of the utilitarian theory, this would also be morally wrong.
c) The legal status of this act is unclear, but it would certainly be morally right to pay the bribe.
*d) None of the above (All answers are incorrect.)

*16. What is the difference between bribery and extortion?
a) Extortion refers to payments made in exchange for something one is not entitled to; a bribe is a payment made to obtain something one is entitled to.
*b) A bribe is a payment made in exchange for something one is not entitled to; extortion refers to payments made to obtain something one is entitled to.
c) While some types of bribes are legally permitted under the Foreign Corrupt Practices Act, extortion is always prohibited.
d) There is no difference between bribery and extortion.

17. Which of the following gives the FCPA jurisdiction over a bribe paid in a foreign country?
a) An agreement exists with the foreign country.
b) The bribe must have been paid by a US citizen.
*c) The transaction was wired through US banks.
d) None of the above

*18. Oskar Schindler's behavior toward his client illustrates
*a) that what often are taken to be universal rules may be subject to exceptions.
b) that duty always requires disclosing conflicts of interest.
c) the failure of utilitarian accounts.
d) the necessity of the FCPA.

19. Acceptance of the right for a client to be informed about a conflict of interest on grounds that this rule leads to optimal consequences over time is consistent with
a) rule utilitarianism.
b) social constructivism.
c) consequentialism.
*d) All of the above

*20. How can the TeliaSonera case can be used to criticize the FCPA?
a) The jurisdiction is too large because the agent committing the crime need only have a minor connection to the United States.
b) It amounts to the United States imposing corruption laws on the world.
c) The fines paid are not paid to the true victims but to the United States.
*d) All of the above

Weblinks

A documentary about the Telia Sonera case:
https://www.youtube.com/watch?v=e8_2AI99JUA

Key Terms

Conflict of interest—A set of circumstances that creates a risk that someone's (professional) judgment will be unduly influenced by an inappropriate interest or consideration. A conflict of interest can be actual, potential, or merely apparent.

Foreign Corrupt Practices Act (FCPA)   This law prohibits US citizens and corporations to make payments to foreign officials to assist in obtaining or retaining business, even if such payments are legal in the country in which they are made.

Case Study: Corrupting Foreigners?

In 2018, Mark E. Miller of Springfield, Illinois pled guilty to taking bribes while he was an employee of the Army Corp of Engineers working in Afghanistan. He was sentenced to more than 11 years in prison by a Federal judge. Miller worked for the ACOE for approximately ten years between 2005 and 2015. For a period of three years between 2009-2012, Miller was a site manager at a base in Eastern Afghanistan that had many construction projects. While at Camp Clark, Miller went out asked for $280,000 in bribes, which he received, from the local company that ultimately received the contract. At the same time, the contract increased from $2.9 million to $8 million. Miller later received another $40,000 from the company to help secure future contracts. (The increase in cost of project indicates that the Afghan company who paid the bribe got a nice return on their investment.)

Miller had to work out a complicated system in order to receive the cash. Afghans visiting Camp Clark were thoroughly search and so the Afghans could not pay the bribe to him on base. And yet, wire transfers to him would arouse immediate suspicion. Miller's solution was to enlist the help of another supervisor at another camp who could bring the cash to Camp Clark unchecked and with whom Miller split the proceeds. Miller mailed the cash home to family in 50 envelopes of $3,000 each. Miller tackled his student debt, bought a motorcycle, paid down a loan on a truck, and did some home renovation.

The Federal attorney who prosecuted Miller reflected that although he had prosecuted many bribery cases, "I've never had a case of a federal officer shaking down private citizens, an Afghan company in this case." During sentencing, the judge said, "I don't care if that's the culture over there, that's not this culture, that's not the United States of America." In addition to the prison sentence, Miller had to give up his motorcycle and pay $180,000 in restitution, though American taxpayers likely lost millions in the contract due to Miller's corrupt activity.

How does this case of bribery overseas differ from the sorts of paradigm corruption cases that Foreign Corrupt Practices Act is meant to govern?

Case study by Robert Reed

https://www.sj-r.com/news/20180308/springfield-man-sentenced-to-8-years-for-accepting-bribes-in-afghanistan
https://www.armytimes.com/news/your-army/2017/08/15/us-army-corps-of-engineers-contractor-pleads-guilty-to-taking-bribes/
https://www.justice.gov/usao-cdil/pr/former-employee-us-army-corps-engineers-afghanistan-pleads-guilty-soliciting

Chapter 9: Cost–Benefit Analysis: Do the Ends Justify the Means?

Summary

The aim of a cost–benefit analysis is to systematically assess the costs and benefits of all alternatives available to the decision maker before a decision is made. To facilitate such comparisons, all costs and benefits are routinely assigned monetary values. This includes items that can be very difficult to evaluate in monetary terms, such as pollution or the loss of human life in accidents. Critics of cost–benefit analysis object that the practice of assigning monetary values to nonmarket goods such as human life and pollution is unethical. Some argue that human life has infinite value (which makes it difficult to explain why it is better to save more rather than fewer all else being equal). Another way to understand the objection is to claim that a statistical life has no precise monetary value, or no monetary value at all.

The connection between cost–benefit analysis and utilitarianism is complex. Many of the moral objections that can be raised against utilitarianism can also be raised against the use of cost–benefit analysis. However, utilitarians typically equate good and bad consequences with well-being and suffering (or happiness and pain, or the satisfaction of preferences), rather than with monetary costs and benefits. Some authors argue that it is possible to assign values to nonutilitarian entities such as rights, duties and virtues within a cost–benefit analysis. Philosopher Sven Ove Hansson writes, "Deontological requirements can be included in a CBA, for instance by assigning negative weights to violations of prima facie rights and duties, and including them on the cost side in the analysis."

While advocates of cost–benefit analysis admit that it can be difficult to assign monetary values to the natural environment and remains from the past, they do not believe it is impossible to do so. *Hedonic pricing* and the *travel cost method* are two commonly used methodologies for assigning monetary values to nonmarket goods.

Learning Objectives

After studying this chapter, students should:
- Be familiar what a cost–benefit analysis is and its moral significance.
- Be familiar with the Ford Pinto case and the role cost benefit analysis played.
- Understand the connection between cost–benefit analysis and utilitarianism.
- Be familiar with input/output filters as modifications to cost–benefit analysis.
- Be familiar with hedonic pricing and travel cost assessment.

Essay Questions

1. What is the relation between cost–benefit analysis and utilitarianism?
2. Are some values incomparable? If so, how should we choose between them?
*3. Should we assign monetary values to statistical lives? Explain your answer.
4. Should we assign monetary values to environmental goods? Explain your answer.
*5. Can defenders of cost–benefit analysis weigh monetary costs against rights and duties? Explain.

Multiple-Choice Questions

1. One objection to cost–benefit analysis is that
a) probability can never be accurately assessed in most situations.
*b) it is wrong to assign a monetary value to human life.
c) we cannot trust corporations to accurately assess costs.
d) None of the above

*2. In 1973, Ford became aware that people were dying in low-speed rear-end collisions due to
a) faulty safety belts that would not release.
b) flammable upholstery.
*c) a fuel tank that exploded easily.
d) All of the above

3. Ford calculated that failing to fix the design flaw would result in how many burn deaths?
a) 8
b) 18
*c) 180
d) None of the above

*4. Ford calculated that the cost of fixing the design flaw came out to be about
*a) $11 per car.
b) More than $200 million.
c) More than $100 million more than the value of lives saved.
d) All of the above

5. When the National Highway Safety Administration proposed stricter regulations on fuel systems, Ford
a) developed the fuel-efficient Pinto to comply with new fuel system in only 25 months instead of the typical 43 months it takes to design a car.
*b) sent a memo to the NHTSA explaining why the regulation preventing 180 burn deaths was not worth the more than $100 million it would cost.
c) immediately sped up production on the Pinto so it would be grandfathered in.
d) None of the above

*6. The $200,000 value Ford placed on a single life came from
a) the public relations department of Ford.
b) lawyers hired by Ford.
*c) the NHSA.
d) All of the above

7. The value of a single human life Ford used was based on how much
*a) the person would contribute to the economy, and cost of emergency response.
b) debt someone would be willing to take on to pay for expensive medical treatment.
c) a jury was willing to award for a wrongful death.
d) All of the above

*8. Today, the value of a statistical life is approximately
a) $1.1 million.
b) $125 million.
c) $3.5 million.
*d) None of the above

9. The current value of a statistical life is determined by how much
a) the person would contribute to the economy, and cost of emergency response.
b) debt someone would be willing to take on to pay for expensive medical treatment.
c) a jury was willing to award for a wrongful death.
*d) None of the above

*10. Critics of the cost-benefit analysis object primarily that
*a) it is unethical in principle to set a monetary value on human life.
b) we can never precisely identify the monetary value of a human life.
c) cost-benefit analysis tends to always mistakenly put too low a value on human life.
d) None of the above

11. Friedman argues that
a) although unethical, sometimes we must assign a monetary value to human life as a matter of practice.
b) we can never be justified in assigning a monetary value to human life.
c) everyone in society should be willing to sacrifice a little to save a life.
*d) None of the above

*12. The cost-benefit analysis is best described as being similar to
*a) consequentialism.
b) deontology.
c) virtue ethics.
d) None of the above

13. Both utilitarianism and cost-benefit analysis think the value of a human life is its contribution to the aggregated sum total of valuable consequences to society as a whole, therefore
*a) a large loss to one person can be justified by the offsetting benefit to society as a whole.
b) it is important to recognize which duties to other are inviolable.
c) the whole must sometimes suffer for the individual.
d) None of the above

*14. One argument against the close association of utilitarianism and cost-benefit analysis is utilitarianism
a) only takes pleasure into account, cost-benefit analysis measure money.
*b) is a theory of rightness, while cost-benefit analysis is a process for decision-making.
c) emphasizes duties, cost-benefit analysis emphasizes human freedom.
d) All of the above

15. Hansson thinks that deontological requirements
a) are ruled out by the Cost-benefit Analysis.
b) cannot be mapped on to a Consequentialist calculus.
c) should be considered instead of running a Cost-benefit Analysis.
*d) None of the above

*16. Zamir and Medina's formula
a) rules out preventative action that would violate people's rights.
b) is an alternative to a cost-benefit analysis.
c) always maximizes utility.
*d) None of the above

17. An input filter is a way to
*a) to incorporate rights into a cost-benefit analysis.
b) limit the flammability of a gas tank.
c) make cars more sustainable.
d) None of the above

*18. Calculating the difference in price between the average home near a lake and the average home in the area not by the lake leads to
a) a price on nonmarket goods.
b) the hedonic value of the lake.
c) a way to calculate the aesthetic value of the environment.
*d) All of the above

*19. The travel cost method
a) protects the environment by imposing a cost on unnecessary travel.
b) is incompatible with cost-benefit analysis.
*c) assesses value of a site by the cost of travel to it.
d) All of the above

20. One problem with measuring the existence value of something like a lake is that
a) it only tracks what we are willing to pay for the existence of the lake.
b) future generations may be willing to pay more for the existence of the lake.
c) the lake may have value in itself.
*d) All of the above

Weblinks

The infamous memo Ford sent to NHTSA:
https://www.autosafety.org/wp-content/uploads/import/phpq3mJ7F_FordMemo.pdf
Milton Friedman on the Ford Pinto case:
https://www.youtube.com/watch?v=-_gU50mfehI
The Society for Benefit-Cost Analysis:
https://benefitcostanalysis.org/

Key Terms

Ford Pinto — A small, cheap automobile manufactured by Ford between 1971 and 1980, which was infamous for its poor safety record caused by a poorly designed fuel tank that was prone to explode in read-end collisions.

Hedonic pricing — A method for assigning monetary values to non-market goods, in particular the environment.

Quality-adjusted life years — A method for assigning monetary values to nonmarket goods in the health care sector.

Travel cost method — A method for assigning monetary values to nonmarket goods, in particular, the environment.

Case Study: The Fight over the Cost-Benefit Analyses That Authorize Carbon Emission Regulation

Perhaps not many American know that all major regulation proposed by agencies in the United States Federal government must satisfy a cost-benefit analysis. In 1981, President Ronald Reagan originally issued Executive Order 12291 that required all major regulation to be reviewed by the Office of Information and Regulatory Affairs, which operates within the Office of Management and Budget. The executive order defined regulation of "significant effect" as that which will affect the economy by $100 million dollars or more.

In October of 1993, President Bill Clinton amended and replaced Reagan's executive order with Executive Order 12866. This order specifically requires that a cost-benefit analysis of the proposed regulation be performed and mandates:

> Federal agencies should promulgate only such regulations as are required by law, are necessary to interpret the law, or are made necessary by compelling public need, such as material failures of private markets to protect or improve the health and safety of the public, the environment, or the well-being of the American people.

Agencies must prepare a review of any regulation (submitted to Office of Information and Regulatory Affairs [OIRA]) to determine whether it is significant or not and, if significant, produce a cost-benefit analysis that demonstrates the benefits outweigh the costs. President Obama amended and replaced Clinton's executive order with 13563. Changes were made, but the cost-benefit analysis requirement is the same, and while President Trump has issued additional executive orders to govern the implementation of the preceding, it remains the case that proposed regulation that has a significant effect on the economy must pass a cost-benefit analysis submitted to the OIRA.

Given that policymakers must justify their proposals on cost-benefit, it comes as no surprise that major political battles occur over how to assess the values at stake in regulations. Nowhere is this more true that the issue of climate change and carbon emissions. The *Scientific American* reports that under the Obama administration, multiple agencies working together came to the conclusion

that emissions of CO_2 in the United States cost $121 billion in damage a year. When factoring in how much CO_2 is emitted, this means that every ton of carbon emitted into the atmosphere costs the United States about $21. Thus, if regulation limiting carbon emissions costs the economy more than $21 a ton, it fails the cost-benefit analysis.

Assessing the damage is quite imprecise. Everything from flood deaths and damage to reduced crab harvests in Alaska (from increasing levels of carbon in seawater) might be identified as being a result of the increases in CO_2 and be tallied in the costs. However, it is unlikely that the federal agencies have identified *every* cost. And the cost that has been identified does not seem to outweigh the trillions of dollars it would cost to restructure the US energy infrastructure, promote green alternatives, educate the public about habits, etc. An anonymous EPA official said, "$21 doesn't really justify much," and estimates from US Global Change Research Program argues that only an assessment of between $36 and $88 per ton would justify the costs of doing what is necessary to reduce carbon emissions so that the world does not pass the 450 part per million threshold. Thus, those wanting to curb CO_2 emissions must find ways to assess more damage if they wish to justify more regulation. The Obama administration managed to later get the estimate up to $36 per ton. However, from the other side, the Trump administration issued new assessments, and this lowered the cost per ton to less than $6.

Given the tremendous variables and uncertainties that go into cost-benefit analyses and the ability of concerned parties either direction to manipulate assessments of costs, does it makes sense for cost-benefit analysis to govern federal regulation? Remember that in the Ford Pinto case, many people objected in principle to putting a price on the value of a human life, presumably because it is wrong in principle to put a dollar amount on a human life and because Ford used that number to justify loss of human life. How does Ford Pinto's use of cost-benefit compare to the EPA's? Would we want the EPA to exclude consideration of human life from its cost-benefit analysis because it is immoral to put a price on a human life?

Case study by Robert Reed

https://www.scientificamerican.com/article/epa-plan-would-discount-health-benefits-of-reducing-co2-emissions/
https://www.scientificamerican.com/article/is-the-us-government-underestimating/
https://en.wikipedia.org/wiki/Executive_Order_12866
https://obamawhitehouse.archives.gov/the-press-office/2011/01/18/executive-order-13563-improving-regulation-and-regulatory-review

Chapter 10: Risk and Uncertainty: How Safe Is Safe Enough?

Summary

The objective risk of an activity depends on how likely some negative event is to actually occur. The *subjective* risk, also known as the *perceived* risk, depends on what you believe about the world. If an activity's subjective risk differs from its objective risk, then this often triggers tensions between engineers and the public. It is not sufficient to ensure that a product *is* safe. Engineers also need to pay attention to how new and existing technologies are *perceived*.

Engineers often characterize risks in quantitative terms. According to the *engineering definition of risk*, the risk of some unwanted event *e* is the product of the probability that *e* will occur and the value of the harm caused by *e*, measured in whatever unit deemed appropriate.

The precautionary principle is an influential alternative to traditional risk-benefit analysis, especially in Europe and other countries outside the United States. According to the precautionary principle, there is no need to determine what the probability of sailing into a floating container is or what the probability of a nuclear meltdown might be. All we have to establish is that some *sufficiently bad* outcome *may* occur if no precautionary measures are taken.

The risk-benefit principle and the precautionary principle draw the line between acceptable and unacceptable risks by considering the risk's potential consequences as well as the information we have (or do not have) about the probability of those consequences. A fundamentally different approach is to argue that what matters is whether those exposed to the risk have given their informed consent to being exposed to the risk.

Learning Objectives

After studying this chapter, students should:
- Understand the distinction between subjective and objective risk.
- Be familiar with the engineering definition of risk.
- Be familiar with the notions of risk-benefit analysis and informed consent.
- Be familiar with the precautionary principle.

Essay Questions

1. Why is it difficult to apply the engineering definition of risk to chemicals with unknown chemical properties, and how should such risks be assessed?
*2. What is the role of informed consent in risk management?
*3. What is the best argument for the precautionary principle?
4. What is the best objection to the precautionary principle? Why?
[1.] Is it irrational to be risk averse? Explain your answer.

Multiple-Choice Questions

1. The objective risk of an activity depends on how likely some negative event is to actually occur. The subjective risk, also known as the perceived risk, depends on what the agent believes about
*a) the negative event in question.

b) the negative event in question and is therefore impossible to measure in an objective manner.
c) the negative event in question and is therefore widely agreed to be irrelevant for policy decisions.
d) the negative event in question and therefore always differs from the objective risk.

*2. If the probability is 1 in 10 million that an airliner with 450 passengers will crash in any given year, then the annual risk of a crash is
a) 450 deaths.
*b) 1 in 10 million (0.0000001).
c) $0.0000001 \times 450 = 0.000045$.
d) $1 - (0.0000001 \times 450) = 1 - 0.000045$.
e. None of the above

3. When dichlorodiphenyltrichloroethane (DDT) was introduced on a large scale in the agricultural sector in the 1950s, it was perceived as safe by experts as well as laypeople. The inventor, Paul Muller, was awarded the Nobel Prize in medicine for his work on DDT in 1948. However, in the 1960s, a group of scientists discovered that DDT is, as a matter of fact, extremely toxic. This shows that, in the 1960s, the
*a) objective risk of DDT was higher than the subjective risk.
b) subjective risk of DDT was higher than the objective risk.
c) perceived risk of DDT was higher than the subjective risk.
d) perceived risk of DDT was lower than the subjective risk.

*4. The engineering definition of risk is risk neutral. This means that
a) very large risks can always be balanced against other equally large and probable benefits.
b) small risks can always be balanced against other equally small and probable benefits.
c) very large risks can always be balanced against sufficiently many small but improbable benefits.
*d) All of the above

5. According to the engineering definition of risk,
*a) the risk of some unwanted event e is the product of the probability that e will occur and the value of the harm caused by e, measured in whatever unit deemed appropriate.
b) the risk of some unwanted event e is the product of the probability that e will occur and the value of the harm caused by e, measured in dollars.
c) the risk of any event e is the product of the probability that e will occur and the value of the harm caused by e, measured in whatever unit deemed appropriate.
d) the risk of any event e is the product of the probability that e will occur and the value of the harm caused by e, measured in dollars.

*6. According to the engineering definition of risk, the risk of some unwanted event e is the product of the probability that e will occur and the value of the harm caused by e measured
a) in dollars.
b) by the number or lives lost.
c) utility units.
*d) None of the above

7. According to the engineering definition of risk, it holds that a risk is
a) an unwanted event that may or may not occur.
*b) the probability that an event will occur multiplied by some appropriate measure of the consequence of that event.
c) the probability that an event will occur multiplied by the monetary value (usually measured in US dollars) of that event.
d) a quantitative entity defined in the design code applicable to a project.

*8. Trichloroethylene is a clear, nonflammable liquid commonly used as a solvent for a variety of organic materials. It was first introduced in the 1920s and widely used for industrial purposes until the 1970s. At that point, suspicions arose that trichloroethylene could be toxic. After many years of scientific debate, the EPA concluded in 2011 that trichloroethylene is a carcinogen. This shows that, between the 1920s and 2011,
a) the perceived risk of trichloroethylene was higher than the subjective risk.
b) the perceived risk of trichloroethylene was lower than the subjective risk.
c) the objective risk of trichloroethylene was higher than the subjective risk.
*d) the objective risk of trichloroethylene remained the same.

9. The risk-benefit principle entails that
*a) every large risk can always be outweighed by other, sufficiently large benefits.
b) some, but not all, large risks can be outweighed by other, sufficiently large benefits.
c) avoiding risks is more important than creating benefits.
d) None of the above

*10. Which of the following is a benefit of the precautionary principle over cost-benefit and risk-benefit?
a) One does not need to know the probability of the bad outcome to take action.
b) Precautionary measures fit deontology better.
c) Cost-benefit requires measurement in money.
*d) All of the above

11. Which of the following best fits with the precautionary principle?
a) Always take precautionary measures when objective risk cannot be assessed.
b) Precautionary measures are to be taken even when objective risk can be assessed.
*c) Where there are threats of serious or irreversible damage, lack of full scientific certainty should not to be used to postpone cost-effective preventive measures.
d) None of the above.

*12. Which of the following expresses the precautionary principle?
a) Rio Declaration
b) Wingspread Statement
c) There is no unique formulation of the precautionary principle.
*d) All of the above

13. The perceived dangers of train travel in the 19th century count as

a) evidence for precautionary principle that it is better to be safe than sorry.
*b) a consideration against precautionary measures taken in scientific ignorance.
c) evidence for risk–benefit assessment.
d) All of the above

*14. Which of the following was put forth as an explanation for the accelerator-related deaths in Camrys by Toyota?
a) Unusual floormat
b) Sticky gas pedal
c) Driver error
*d) All of the above

15. Who discovered the faulty code causing the acceleration in the Toyota Camry?
a) A team of NASA engineers hired by Department of Transportation
b) Toyota's own engineers
*c) Expert witnesses in a wrongful death suit
d) None of the above

*16. Which of the following best fits an application of the Wingspread criteria to the Camry case?
a) Until the engineers could prove the software was responsible, no precautionary measures were necessary.
b) Precautionary measures become necessary once it is known that risk is possible from software malfunction.
*c) Once it is reasonable to believe the software caused acceleration, precautionary measures were reasonable.
d) None of the above

17. How does the principle of informed consent compare to the other ethical principles?
a) It is easier to apply because one need not calculate the magnitude of the risk.
*b) It is an easier standard to meet because all that is necessary is that the person know and accept risk.
c) It is more restrictive because it requires more knowledge of risk.
d) None of the above

*18. The decision to shut down nuclear reactors in Germany because of the Fukushima disaster is an example of
a) how objective risk and subjective risk may diverge.
b) the difficulty of informing the public of risk.
c) precautionary action that did not satisfy the criteria of the precautionary principle.
*d) All of the above

19. The fact that rational choosers are often risk-averse instead of expected-utility maximizers counts against the
a) precautionary principle.
*b) engineering definition of risk.

c) distinction between objective and subjective risk.
d) None of the above

*20. The risk–benefit principle and the precautionary principle draw the line between acceptable and unacceptable risks by considering the risk's potential consequences. Kantian duty ethicists would argue that what matters is whether those exposed to the risk
a) have been properly informed about the risk, or could rationally wish that no information is required.
*b) have given their informed consent to being exposed to the risk, or could reasonably be expected to do so if properly compensated.
c) have consented to being exposed to the risk, no matter how much or little information was presented to them.
d) will raise valid complaints about the risk.

Weblinks

The Society for Risk Analysis:
http://www.sra.org/
A short video about DDT:
https://www.youtube.com/watch?v=MMSEnIVFBQ0
An article by Paul Slovic in Science about risk perception:
http://science.sciencemag.org/content/236/4799/280

Key Terms

Dichlorodiphenyltrichloroethane (DDT) — A highly toxic pesticide, which many experts falsely deemed to be safe for humans when it was first discovered. It was banned by the EPA in in 1972.

Expected value — The probability that some outcome will occur multiplied by the value of that outcome.

Risk — The term *risk* has different meanings in different contexts. According to the *engineering definition of risk*, the risk of some unwanted event is the product of the probability that the event will occur and the value of the harm caused by the event, measured in whatever unit deemed appropriate.

Precautionary principle — The principle holding that reasonable precautionary measures ought to be taken to safeguard against uncertain but nonnegligible threats.

Trichlorethylene — A clear nonflammable liquid commonly used as a solvent. For many years it has remained uncertain whether trichlorethylene is a human carcinogen. In 2011, the US National Toxicology Program's concluded that trichloroethylene can be "reasonably anticipated to be a human carcinogen."

Case Study: Genoa Viaduct Collapse and Responding to Risk

The *New York Times* ran an article in October 2018 over a catastrophic bridge collapse that killed a few dozen people in Genoa, Italy, interviewing both victims and engineers. The Genoa viaduct was designed by Riccardo Morandi and had a light design that made left very little margin for error. The bridge consisted of three A-frame towers paired with just 12 stays, which suspend the road from the towers. The design was praised for its elegant beauty, but the neat and trim design came with a cost. Critics pointed out that there was no redundancy—no possibility of redistribution of the load should one part fail. In other words, if one part of the bridge failed, it would likely lead to a total collapse. Andrew Herrmann, a structural engineer who is president of the American Society of Civil Engineers, said simple that "If you lose one stay the whole thing comes down." Most cable-stayed bridges today have numerous stays so that the loss of one does not lead to collapse.

In addition to the small number of stays, the structure of the stays created a special problem on its own. The steel cables were encased in prestressed concrete. While this was intended to reduce stay, it also had the consequence of making structural deterioration of the cables difficult to monitor. As it happened, the concrete did not protect the steel from rain, and it was known in the 1970s when the bridge was still new that water was already corroding the steel. The easternmost tower required maintenance in the 1990s, and as the steel was repaired, the concrete was jettisoned for a protective sheath. In 1999, a private company, Autostrade, took over maintenance of the bridge from the government during a budget crunch. Autostrade did not make the same refurbishments to the other two towers. Doing so would have replaced bad steel and then protected the new steel from water while making it easier to identify corrosion that does occur.

In October of 2017, Autostrade asked Carmelo Gentile to test for corrosion hidden away in the concrete encased stays of the other towers. Gentile uses an unusual method for diagnosing problem in the steel of bridges: He listens to them. Professor Gentile has performed his tests on over 300 bridges around the world. He tests the vibrations that pass through the steel cables and listens to their frequencies. A smooth wave indicates that the steel is continuous and in good condition; when the sound does not display such consistency, that indicates corrosion and a lack of structural soundness. Professor Gentile reported the findings and recommended that sensors be installed to monitor for corrosion. Autostrade admitted to being briefed on the concerns but claimed that it did not receive a warning of urgency. Autostrade did make plans to perform maintenance on the bridge to address its deteriorating condition, but never scheduled it—the bridge collapsed first.

On August 14, 2018, the stays on the south side of the bridge broke. This is all that was supporting the road on that side, and so the entire road began to rotate at an angle toward the south. Connecting pieces of road between that held up by the stays were then disconnected from the part of the road tilting south and collapse. Now the remaining roadway supported by the stays on the north snapped those stays and collapsed. The tower itself would collapse onto the rubble. More than 30 cars were on the bridge during the catastrophic failure, and 43 people were killed.

The bridge collapse was preventable had Autostrade acted sooner to fix it. But the costs of repair were extremely expensive, and there was talk of simply replacing the bridge rather than continually fixing it. While there was plenty of evidence of structural deterioration, there was no exact assessment of the likelihood of structural failure. One engineer the *New York Times* interviewed, Gary Klein, explained that ascertaining the condition of internal cables is extremely difficult and imprecise.

Given the evidence that there was structural damage and the inability to precisely identify the risk, what sort of risk approach should Autostrade have taken?

Case study by Robert Reed

https://www.nytimes.com/interactive/2018/09/06/world/europe/genoa-italy-bridge.html

Chapter 11: Privacy: What Is It and Why Should It Be Protected?

Summary

Do we have a right to privacy? We cannot base the right to privacy on the Lockean conception of natural rights, since privacy is not a property right. A possible solution is to introduce the right to privacy as a new, freestanding right. From a legal point of view, this is a simple fix. However, from an ethical point of view this maneuver seems somewhat arbitrary. If we cannot derive all rights from a single criterion (in natural rights theory, Locke's theory of ownership), how can we then be sure we actually have a moral right to privacy?

An alternative approach is to conceptualize the right to privacy as a socially constructed right. On this view, the moral justification of the right to privacy ultimately relies on the consequences of respecting people's privacy. We have a right to privacy just in case a society in which people's privacy is respected is a better one than a society in which we don't respect privacy.

Rather than claiming that people have a *right* to privacy, it could be argued that privacy is an important *moral value*, just like justice, freedom, and happiness. The difference between rights and values is that the former tends to be binary in ways that values are not. You either have a right or you don't, and every violation of your moral rights is morally wrong. However, moral values vary in strength and typically have to be balanced against other conflicting values. Therefore, if privacy is conceptualized as a value rather than a right, it will not always be morally wrong to violate people's privacy.

Learning Objectives

After studying this chapter, students should:
- Be familiar with some important historical attempts to view privacy as a right.
- Be familiar with the debates about the origin and grounding of rights.
- Be familiar with the debate over whether rights are natural or socially constructed.
- Understand the advantages and disadvantages of thinking of privacy as a right vs a value.
- Understand solutions that engineers have developed to protect privacy.

Essay Questions

*1. What is privacy, and why is it morally important?
2. Do we have a right to privacy online? Explain your answer.
*3. Is privacy an inviolable right or a moral value? Explain your answer.
4. Is privacy valuable in an intrinsic or instrumental sense? Explain your answer.
5. Is privacy a socially constructed right? Explain your answer.

Multiple-Choice Questions

1. In 1890 Brandeis and Warren published an article in *Harvard Law Review* entitled "The Right to Privacy" in which they argued that "Instantaneous photographs and newspaper enterprise have invaded the sacred precincts of private and domestic life." If we have a natural right to privacy, then

*a) we had that right long before Brandeis and Warren published their groundbreaking article.
b) the publication of Brandeis and Warren's groundbreaking article created this right.
c) this natural right was created when the courts began to recognize the right discovered by Brandeis and Warren.
d) None of the above (All the statements are false.)

*2. In 2010, a Spanish citizen won a case against Google to have what removed from the Internet searches?
a) Pictures taken of him in public without his permission
b) Video of him in public taken without his permission
*c) Public information about his foreclosed property
d) All of the above

3. After the court ruling that established the right to be forgotten in Europe,
a) thousands of Europeans requested their personal information removed.
b) Google removed over a million pages from its index.
c) Yahoo and Bing began removing personal information.
*d) All of the above

*4. The problem with recognizing privacy as a right is its potential conflict with
a) the power of law enforcement.
b) property rights.
c) surveillance.
*d) right to free speech.

5. Which of the following attempts to recognize a right to privacy as a freestanding right?
a) UN
b) Locke
c) Nozick
*d) Brandeis and Warren

*6. The UN Universal Declaration of Human Rights grounds rights in
a) the right to equality under the law.
b) freedom of speech.
c) the right to property.
*d) human dignity.

7. Philosophers have proposed two fundamentally different accounts about the origin and nature of moral rights.
*a) Some say that we have certain rights independently of any human conventions, while other say they are socially constructed.
b) Some say that rights are guaranteed by the Constitution and the legal system, while other say they are socially constructed.
c) Some say that we have certain rights independently of any human conventions, while other say that rights are guaranteed by the Constitution and the legal system.

d) Some say that rights vary from country to country, while others say that all humans are created equal and therefore have the same rights.

*8. Which of the following would ground the right to privacy in its benefits to society?
*a) a social constructivist
b) John Locke
c) UN
d) All of the above

9. Why might we conceive of privacy as a value instead of a right?
a) Rights are inviolable.
b) It may sometimes be appropriate to violate privacy.
c) Rights have a binary structure of either being possessed or not; values can be compared.
*d) All of the above

*10. The most fundamental natural right identified by Locke is
*a) the ownership right we have to ourselves.
b) the right to free speech.
c) our right to sell the fruits of our labor on a free market.
d) the right to be protected from aggressive enemy states.

11. What does it mean to say that privacy has intrinsic value?
*a) Privacy is valuable for its own sake, regardless of the consequences on our well-being or society.
b) Privacy is an essential element of autonomy.
c) Privacy is a socially constructed right.
d) a and b

*12. What does it mean to say that we have a natural right to privacy?
a) That an infringement on our privacy is a violation of our ownership of ourselves or something else that we own
b) That privacy is an essential element of autonomy
c) That privacy is valuable for its own sake, regardless of the consequences on our well-being or society
*d) All of the above

13. Utilitarians believe about that intellectual property rights are
*a) social constructions.
b) natural rights, justified by the mixing theory of labor.
c) natural rights, justified by the categorical imperative.
d) social constructions, which exist independently of their consequences for human well-being.

*14. What is the relation between privacy and autonomy?
a) There is no difference between privacy and autonomy.
b) If your autonomy is limited by the government, this will automatically violate your right to privacy.

c) Utilitarians believe that we have a natural right to privacy but not to autonomy.
*d) You cannot be fully autonomous unless you have some privacy; the lack of privacy sometimes reduces your autonomy.

15. The example of the politician only buying one bottle of wine at a time is an example of
a) how protecting privacy does not maximize utility.
b) a utilitarian argument for right to privacy.
*c) how autonomy can be limited by awareness that others are watching.
d) None of the above

*16. What is an advantage of treating privacy as a value instead of a right?
a) Values are easily violated for utility.
b) Deontologists don't care about values, only rights.
*c) Values can be weighed against other values like justice and freedom.
d) None of the above

17. What is the obstacle to grounding rights to privacy in a Lockean conception of rights?
a) Explaining the utility of privacy
b) Showing the contradiction in conception
*c) Grounding in self-ownership
d) All of the above

*18. The right to free speech in America could be used to justify
a) deciding cases of privacy on utility.
*b) allowing Google to leave search results as they are.
c) cooperating with Chinese government.
d) None of the above

19. What is an objection to attempting to ground the right to privacy in empirical facts?
a) This does not ground as many rights as a Lockean system.
*b) This would lead to different rights to privacy in different neighborhoods.
c) We understand rights before ever looking at data.
d) All of the above

*20. How might traffic cameras be adjusted by engineers to better protect privacy while effectively enforcing the law?
a) Place cameras only at the busiest intersections.
b) Only operate cameras during the daytime.
*c) Take photos of the license plate in back of the car.
d) All of the above

Weblinks

"The Right to Privacy" by Brandeis and Warren:
http://faculty.uml.edu/sgallagher/harvard__law_review.htm
A video about "the right to be forgotten":

https://www.youtube.com/watch?v=ceAM3ezW14c

Key Terms

Right to be forgotten   In the European Union, individuals have the right to ask search engines to remove links with personal information about them, and under certain conditions the search engines are obliged to comply.

Case Study: Does AI Signal the End of Privacy? The Surveillance State in China

China is increasingly using artificial intelligence (AI) facial recognition for everything from catching petty criminals to enforcing social norms and even checking in on students and teachers in classroom. CNN reports that over a short period of time, police in different cities nabbed suspects attending the concerts of Jacky Cheung using facial recognition technology at security checkpoints at the event. People in China are increasingly forced to submit to such AI facial scanning to perform everyday activities. This not only allows China to make it more difficult for nonconformists and criminals to avoid the state's authorities, it also intrudes into some of the most private moments of citizens lives.

     For example, traditionally Chinese have brought their own toilet paper to public restrooms, but as more foreigners visit the country for business and vacation, China has updated the bathrooms with toilet paper consistent with expectations of the tourists. This has turned out to be an inviting target for poor people who will steal toilet paper and take it home. The solution? The occupant of the stall must now look into a facial recognition device for a machine to dispense a few squares of toilet paper. However much the machine dispenses, the honest occupant had better make it work   the machine will not dispense more toilet paper to the same face again for more than nine minutes. While this may indeed make thieving toilet paper inefficient, it means that there is almost nothing that the government cannot know about its people and almost no aspect of life that AI cannot be used to regulate and control.

     Social interactions of various sorts are not exempt either. Some schools have implemented systems that constantly monitor the faces of students and alert the teacher if any facial expression are deemed by the AI to be "inattentive." This places incredible constraints on both student behavior and the teacher. Students must constantly perform for the AI so as not to attractive negative attention   attention that could be recorded and stored, forming part of a permanent record in a massive personal database another AI could scan in the future. Similarly, the teacher's methods and style now come under greater scrutiny as teachers with a higher than normal number of inattentive alerts might be subject to disincentives or firing in the future.

How might Chinese authorities justify these intrusions of privacy? Are the benefits worth the sacrifices of privacy and autonomy that people must make to conform? Is it socially beneficial for government to have this degree of knowledge of its people's activities and ability to restrict and control them?

Case study by Robert Reed

https://www.cnn.com/2018/05/23/asia/china-artificial-intelligence-criminals-intl/index.html

https://www.cnn.com/2017/03/20/world/china-toilet-paper-thieves-face-recognition-trnd/index.html

Chapter 12: The Problem of Many Hands: Who Is Responsible and Should Anyone Be Blamed?

Summary

Engineering projects are often performed jointly by several technical experts, meaning that the responsibility for negative outcomes is often shared by several team members. The problem of many hands arises in situations in which it is reasonable to conclude that a group of people is jointly responsible for an outcome although it is difficult or impossible to assign some responsibility to each individual member of the group. There is, so to speak, a "gap" between the responsibility assigned to the group as whole and the individual members of the group.

According to Aristotle, we are responsible for our actions just in case we *voluntarily decide* to perform an action and we are *aware* of what we are doing. Other have pointed out that the term "responsibility" often serves as an umbrella term for a wide range of slightly different notions of responsibility. Hart identifies four core notions of responsibility: (a) role-responsibility, (b) causal responsibility, (c) capacity-responsibility and (d) liability-responsibility.

Learning Objectives

After studying this chapter, students should:
- Be familiar with some major accounts of responsibility such as Aristotle's and H. L. A. Hart's.
- Understand the distinction between backward and forward looking responsibility.
- Be familiar with cases like *Titanic* and Therac-25, which illustrate the problem of many hands.
- Be familiar with the notion of a multiagent system and why they are important for discussions of responsibility.

Essay Questions

1. Can an engineer be1morally responsible for something he or she is not causally responsible for? Explain.
2. Who was responsible for the Hyatt Regency walkway collapse? Why?
*3. Who was responsible for the deaths caused by the Therac-25? Why?
4. What is the problem of many hands, and why is the *Titanic* disaster a good illustration of this?
*5 Discuss the idea that there is sometimes be a gap between the responsibility we assign to the group and to its individual members.

Multiple-Choice Questions

1. The explanation for the structural failure that led to Hyatt Regency walkway collapse is a
a) change in design by the builder to bolt instead of weld joints holding the walkway.
b) change in design which tripled the load on a nut holding the walkway.
*c) decision to opt for two steel rods instead of one holding the walkway.
d) All of the above

*2. The design change that led to the structural failure
*a) was proposed by the builder Havens Steel Company.
b) was officially approved by the designer Jack D. Gillum.
c) can be traced to a single responsible individual who approved it.
d) None of the above

3. Havens Steel's claim that they received verbal approval for the design change from an engineer at Jack D. Gillum with the understanding that a written request would be submitted is irrelevant because
*a) no written request was ever submitted.
b) the engineer who gave verbal approval was not qualified to make the decision.
c) the change that was approved by Gillum was not followed by Haven Steel.
d) None of the above

*4. *RMS Titanic* sank on its maiden voyage on April 14, 1912. This a good illustration of the problem of many hands because
a) the captain did not keep both his hands on the steering wheel.
b) the captain was solely responsible for the sinking of the ship.
*c) a group of people were jointly responsible for the negative outcome and it was difficult (or impossible) to assign responsibility to each individual member of the group.
d) All of the above

5. The main change in the Therac-25 over previous versions like the Therac-6 and Therac-20 is that the Therac-25
a) used a different source of radiation that is more dangerous to human health.
*b) had no mechanical interlocks to set the amount of radiation; radiation amount was controlled by software.
c) was much more difficult to operate properly.
d) None of the above

*6. The Therac-25 case primarily raises ethical questions about the
a) lack of adequate training and oversight of programmers and technicians.
b) moral permissibility of using radiation for medical treatments.
c) internal coherence of the NSPE Code of Ethics.
*d) None of the above

7. After a patient died of massive radiation overdose in a Therac-25 machine, the manufacturer
a) required all technicians to be retrained.
*b) tested the code but could not reproduce the error.
c) found the error but did not fix it after a cost-benefit analysis.
d) All of the above

*8. A technician named Fritz Hager revealed that
a) he had not received extensive training by the manufacturer.
*b) the error occurred only when the technician typed the commands in quickly.

c) the error was simple to fix but expensive.
d) All of the above

9. An investigation into the code revealed
a) all the code was written by a single programmer.
b) much of the code was in the form of modules lifted from previous version of Therac.
c) the faulty code did not cause harm in previous versions because of mechanical interlocks.
*d) All of the above

*10. What was the take-home message of the Therac 25 case?
a) Software engineers are never responsible for their actions.
b) Analogue technologies are always safer than digital ones.
*c) Bad software can kill people.
d) All of the above

11.Which of the following is a condition for Braham and Van Hees multiagent interactions?
a) For every action, there are at least two individuals who could have prevented it.
*b) There is no single individual who can adopt a course of action that will lead to that individual's chosen outcome irrespective of what others do.
c) For every outcome, it is not the case that one agent is responsible.
d) All of the above

*12. The fact that not all of Braham and van Hees's three conditions can be satisfied simultaneously does not mean it is impossible to coherently allocate moral responsibility for collective outcomes because we
a) can accept fragmentations in responsibility allocations.
b) can still make an assignment of responsibility after making a theoretical choice.
c) could deny that at least one individual is responsible for every state of affairs.
*d) All of the above

13. The problem of many hands occurs when
a) there is a gap in the distribution of responsibility within a group of agents.
b) engineers collaborating on a project do not communicate and a disaster occurs because of joint activity.
c) no single individual is responsible, yet we have reason to believe that someone did something he or she should be held responsible for.
*d) All of the above

*14. Aristotle maintains we are responsible for our actions just in case we
a) have deliberated about what to do.
*b) are able to voluntarily decide and be aware of what we are doing.
c) do what the phronimos would do in our situation.
d) None of the above

15. Legal philosopher H. L. A. Hart thinks we should think of responsibility in terms of
a) liability-responsibility.

b) role-responsibility.
c) causal responsibility.
*d) All of the above

*16. The common-sense notion of being morally responsible for an act assumes situations in which the
a) agent has causal responsibility.
b) agent has liability-responsibility.
c) act is voluntary.
*d) All of the above

17. In the case of the *Titanic*, the lookout and first officer had what sort of responsibility?
a) Causal responsibility
b) Liability responsibility
c) Backward-looking responsibility
*d) All of the above

*18. Which of the following led to the massive loss of life in the sinking of the *Titanic*?
a) An insufficient number of watertight bulkheads
b) An insufficient number of lifeboats
c) The decision to turn rather than maintain a straight course over iceberg
*d) All of the above

19. If we believe that a group is nothing over and above its members, and we believe that claims about guilt and blame should depend on claims about moral responsibility, then
a) we have the moral concepts necessary to coherently take on global warming.
*b) one can be guilty as a member of a group, but not guilty as an individual.
c) collective outcomes are susceptible to fragmentation of responsibility.
d) None of the above

*20. Which of the following has been proposed as a technical solution to smartphone addiction?
a) Phones that shame users for how much time they spend on them
b) More advanced notification settings
c) Phones that give users a weekly report on their activity
*d) All of the above

Weblinks

Some material about the problem of many hands:
https://ocw.tudelft.nl/course-lectures/1-4-problem-many-hands-responsible/?course_id=10674
A video about Hyatt Regency walkway collapse:
https://www.youtube.com/watch?v=98l3Us8IU-I\

Key Terms

Problem of many hands   A situation in which there is a "gap" in the distribution of responsibility within a group of agents. The total responsibility assigned to the individual members of the group may, for instance, not accurately reflect the magnitude of a disaster.

Case Study: Genocide by Facebook? Distributing Responsibility between War Criminals and Those Who Gave Them the Tools

On October 15, 2018, the *New York Times* printed a story on the genocide of the Rohingya people of Myanmar perpetrated by the Myanmar military. The Rohingya are ethnic minority that speak an Indo-Aryan language in the country of Myanmar dominated by the Bumar ethnic group who speak Burmese   a Sino-Tibetan language. Burmese are largely Buddhist, and Rohingya are largely Muslim. Amnesty International reported in December of 2016 that a project of ethnic cleansing had begun by the Myanmar military. Villages of Rohingya were attacked, the people were subject to arbitrary arrest, as many as a thousand were summarily executed without trial, and villages were burned down. These extrajudicial killings and destruction of homes created a panic that led to a mass exodus of Rohingya people in and from Myanmar.

By January 2017, 65,000 Rohingya arrived on the Bangladesh border, and more than 23,000 were identified as internally displaced within Myanmar, generating a massive refugee crisis. By February of 2017, Bangladesh had so many Rohingya refugees that it announced plans to relocate more than 200,000 to Thengar Char, an island in the Bay of Bengal. Bangladesh was not the only country where displaced Rohingya sought refuge; they fled to India too. But after anti-Rohingya protests in India, India announced plans to deport 40,000 Rohingya   even though 16,000 were registered with the UN as refugees. In all, it is believed that more than 700,000 Rohingya have fled Myanmar within a year of the beginning of military's attacks. They face an uncertain future as neither India nor Bangladesh desires to for them to stay and the face certain persecution in Myanmar.

It turns out that Facebook played an important role in the military's operations against the Rohingya and the public support for the military's actions toward them. The *Times* reports that a campaign of propaganda on Facebook authorized at the highest levels of the military was daily perpetuated against the Rohingya people. Officials worked day and night in little bases around the capital city tending to an army of troll accounts on Facebook that posed as fans of celebrities and were engaged in posts critical of the government and spreading fake accounts of attacks by Rohingya   so-called fake news. The military's effort started years before the genocide and demanded the full-time work of more than 700 people to create and tend the fake news farm. The strategy was to create countless pages devoted to celebrities to attract followers and then subtly use those accounts to post false and slanderous stories about the country's Muslims. Armies of fake online trolls then engaged in an operation of both reposting and spreading the inflammatory content and attacking real users who questioned it. Some of the fake stories included made up massacres perpetuated by the Rohingya. In 2017, the fake accounts were used to spread fear throughout Myanmar that the Rohingya were preparing a widespread jihadist attacks on Myanmar. At the same, time, it spread stories of a Buddhist-nationalist protest to Muslim users to frighten them.

Facebook took some responsibility for the abuse of its platform, apologizing, and eventually took action against the fake accounts the military operated and shut them down. The company admitted that the deactivated accounts had more than 1.3 million followers. A story in the *Washington Post* from October 29, 2017 shows that Facebook did not merely create a

platform and stand by as it was used by the state; the company actively partnered with the state in 2016 to give subscribers to the state telecom company access to Facebook through a data plan in which Facebook activity would not count against users data amount. As a result of the cooperation between the state and Facebook, Facebook users in Myanmar went from 2 million in 2014 to over 30 million by 2017—increasing both the footprint of Facebook and the government's ability to manipulate public opinion.

The *Times* quoted an activist on the subject of Facebook's responsibility: "The military has gotten a lot of benefit from Facebook," said Thet Swe Win, founder of Synergy, a group that focuses on fostering social harmony in Myanmar. "I wouldn't say Facebook is directly involved in the ethnic cleansing, but there is a responsibility they had to take proper actions to avoid becoming an instigator of genocide."

No one thinks that Facebook intentionally or deliberately facilitated genocide, yet the propaganda efforts of the government would not have been nearly as successful without Facebook. Adding to the complexity, Facebook was not merely passively involved as a tool by the government but acted in concert with the government to make Facebook more available to the public *after* there was already substantial fake page/troll activity coming from military compounds.

What sort of responsibility does Facebook have for how its platform was used?

Chapter 13: Technology Assessments and Social Experiments

Summary

New technologies often have unforeseen effects on society. Some are beneficial but others are harmful in ways that are difficult to foresee. In this chapter, we consider two proposals for how to monitor and assess new technologies. The first is to formally assess technology prior to its introduction to society as practiced in the United States between 1972 and 1995. This assessment may include discussions of the ethical issues raised by the technology. The second proposal is to treat new technologies as ongoing *social experiments* that require continuous monitoring and assessment, even after introduction. This idea has never been formally tested, at least not in an institutionalized form, but several philosophers have suggested that this option has several advantages over the first. Rather than asking ourselves whether some technology X is ethically acceptable, which is a question we know to be difficult to answer, we could replace that question with a new one, which might be easier to answer: "Is technology X an ethically acceptable social experiment?"

Learning Objectives

After studying this chapter, students should:
- Be familiar with technology assessment and its purpose.
- Know some of the problems related to assessing new technology.
- Be familiar with the notion of new technologies as social experiments.
- Be able to reflect on the role of informed consent in social experiment.
- Be able to reflect on the relation between ethical questions about new technology and the ethical acceptance of social experiments.

Essay Questions

1. What is the purpose of a technology assessment, and why are such analyses morally important?
2. What is the role of informed consent when new technologies are introduced in society?
3. Should new technologies be treated as ongoing social experiments? Explain your answer.
*4. What is the best objection to treating new technologies as ongoing social experiments? Explain why.
*5. How should new technologies be introduced in society by morally conscientious engineers?

Multiple-Choice Questions

1. Which of the following is a clear example of a negative and unforeseen consequence of the use of cell phones?
a) People would stop using landlines as much.
b) There would be more automobile accidents.
c) People would use cell phone cameras to film people without their knowledge.
*d) None of the above

*2. In 1972 the United States created the Office of Technology Assessment performed a similar function to which federal agency?
a) FBI
b) NSA
*c) FDA
d) ATF

3. Which of the following best expresses the mission of the OTA?
a) To generate new technology for new generations
b) To ensure that the armed forces always have the most cutting-edge technology
*c) To assess the beneficial and adverse impacts of new technology
d) To increase America's ability to electronically eavesdrop on other countries

*4. How might we evaluate the government's assessment of the Internet?
a) Highly accurate;, predicted exactly how the technology would be used
b) Somewhat inaccurate; misidentified good consequences as bad
*c) Somewhat accurate; predicted many uses of the technology but not all
d) Highly inaccurate; missed crucial directions the technology would take

5. In 1989 the US Office of Technology Assessment wrote in a report that "the current Internet is, to an extent, an experiment in progress, similar to the early days of the telephone system. . . . Patterns of use are still evolving; and a reliable network has reached barely half of the research community." This quote
a) articulates a view about technological progress accepted by technological optimists.
b) articulates a view about technological progress accepted by technological pessimists.
c) articulates a view about technological progress that fits well with the Brundtland report on sustainable development.
*d) suggests that it is sometimes useful to think of new technologies as social experiments.

*6. If we think of the introduction of new technologies in society as social experiments, then which of the following criteria would be relevant for evaluating the moral permissibility of such experiments?
a) Is it possible to stop the experiment?
b) Have the participants given their informed consent to participating?
c) Are the potential hazards and benefits distributed fairly?
*d) All of the above

7. If we think of the introduction of new technologies in society as social experiments, then which of the following criteria would be relevant for evaluating the moral permissibility of such experiments?
a) Does the experiment give rise to any serious irreversible effects?
b) Have the participants given their informed consent to participating?
c) Have the risks of the experiment been minimized as far as reasonably possible?
*d) All of the above

*8. If we think of autonomous military robots as an ongoing social experiments, we could object that they are morally problematic because
a) we may not be able to stop the experiment if we so wish.
b) we have not given our informed consent to the experiment.
c) the potential hazards and benefits are not fairly distributed.
*d) All of the above

9. Which of the following concerns about autonomous military robots best expresses Russell's worry?
a) Criminals might use them.
b) The robots might turn against humans.
c) The technology might fall into the enemy's hands.
*d) One can launch deadly attacks without endangering one's own personnel.

*10. Some argue that the question "Is X an ethically acceptable technology" should be replaced by the question "Is X an ethically acceptable social experiment?" Which of the following is the best objection to this idea?
a) It is not clear what is meant by the term *social experiment*.
*b) The two questions are not equivalent: A technology can be acceptable even if it is not an acceptable social experiment.
c) It is much easier to answer the question "Is X an ethically acceptable technology" than the question "Is X an ethically acceptable social experiment?"
d) The term *ethically acceptable technology* is undefined.

11. Some ethicists think that rather than evaluating new technology as good or bad, we should evaluate it as a good or bad social experiment to try. Which of the following cases might show problems with treating technology as social experiment?
a) Stem cell therapy because it involves unethical experimentation
b) Cell phones because once the experiment begins, it cannot be stopped
c) Autonomous killer robots because we cannot control the experiment
*d) Truman dropping bombs on Japan because it would never satisfy requirements of ethical experiment but would satisfy criterion for acceptable military action

*12. The case of stem cells show that evaluating technology as a social experiment fails to solve the ethical questions because
*a) the debates between utilitarians and deontologists remain and are unresolved.
b) this sort of experimentation does not involve informed consent.
c) the length of the experiment is too long.
d) we already have moral agreement in this case.

13. One of the main criticisms of evaluating technology as a social experiment is
*a) research ethics is already quite strict and any consideration is taken seriously.
b) the long history of unethical research on humans in the United States.
c) the impossibility of informed consent.
d) the growing consensus that animal experimentation is wrong.

*14. The best argument against replacing the question of the acceptability of technology with its acceptability as a social experiment is
a) most experiments are ruled unethical anyway.
*b) this approach does not replace the question of the acceptability of the technology.
c) social experiments are too easy to justify.
d) research ethics assumes deontology.

15. Which of the following is a principle of the Nuremburg Code?
a) The degree of risk to be taken should never exceed the humanitarian importance of the problem to be solved.
b) The experiment should be such as to yield fruitful results for the good of society.
c) The voluntary consent of the human subject is absolutely essential.
*d) All of the above

*16. The case of email being necessary for performing job functions in the 21st century counts against using the Nuremburg Code to evaluate technology as a social experiment because the
*a) fifth principle about the subject having liberty to end experiment is too strong.
b) second principle of yielding fruitful results is too vague.
c) fourth principle of protection from death is impossible to guarantee.
d) All of the above

*17. Martin and Schinzinger recognize it is impractical to obtain informed consent for new technology from everyone affected so they suggest we
*a) use a weaker principle that only requires that the information a rational agent would require has been widely disseminated.
b) limit social experiments to small towns.
c) inform the public and consumers immediately prior to use of the new product.
d) None of the above

18. Ibo van de Poel objects to Martin and Schinzinger's solution to the informed consent problem on what grounds?
a) We have no clear notion of a rational person.
*b) We can't tell a passenger about to board a plane about the risks and expect an informed decision.
c) We simply don't know enough about the effects of technology socially to give the proper information for informed consent..
d) No small town would agree to large-scale social experiments.

*19. Van de Poel responds to earlier attempts to determine whether technology is an acceptable social experiment with a more nuanced and forgiving set of criteria including which of the following?
a) During the course of the experiment, the human subject should be at liberty to bring the experiment to an end.
*b) The experiment is approved by democratically legitimized bodies.
c) The degree of risk to be taken should never exceed that determined by the humanitarian importance of the problem to be solved.

d) All of the above

20. Which of the following did the OTA predict about the Internet?
a) Researchers would eventually have access to digital libraries of journals and reference material.
b) Scientific communication would be supported by electronic mail, conferencing, etc.
c) Experimental devices like telescopes and seismographs would be able to be operated remotely.
*d) All of the above

Weblinks

All reports published by the Office of Technology Assessment:
http://www.princeton.edu/~ota/
New technologies as social experiments:
https://ieet.org/index.php/IEET2/more/Danaher20160319

Key Terms

Informed consent — The moral principle holding that it is morally permissible to do something to another person or impose a risk on another person only if the person affected by the act has been properly informed about the possible consequences and consented to them.

Nuremberg Code — An influential set of ethical principles governing research on human subjects adopted in the wake of World War II.

Social experiment — An experiment in which a large group of individuals in society participate as test subjects.

Technology assessment — A method for predicting and assessing the consequences of a new technology.

Case Study: Autonomous Cars as Social Experiment?

The proliferation of artificial intelligence (AI) in society is often a social experiment. This is because AI is generally employed to perform tasks that humans normally perform, and often these are tasks that occur in or have effects on the general public. The case of self-driving cars is perhaps the most obvious case. The Trump administration is planning to remove safety rules that require things like steering wheels and brakes in cars. The National Highway Traffic Safety Authority wants to enable companies like Uber and Waymo (owned by Alphabet, the parent company of Google) to field fully autonomous cars as soon as possible, and many designs have no human backup controls. Department of Transportation Secretary Elaine Chao argues that driverless cars have the potential to lower the fatalities on the nation's highways. Waymo intends to launch driverless taxi service in Arizona soon, but for the time being, those vehicles will be equipped with steering wheels and pedals as backup. Not all experts are enthusiastic about fast-tracking driverless cars, according to a Reuters article. The Center for Auto Safety thinks more

evidence is needed by the NHTSA that driverless cars are safe "before involuntarily involving human beings in their testing."

Autonomous cars make decisions that not only affect their drivers but also other vehicles on the road and pedestrians. An Uber self-driving car killed a pedestrian after the car's sensors failed to identify her as a human. She was detected a full six seconds before the crash but was classified as an unknown object. The system should have required the vehicle to slow down when it was confused, but it did not realize it needed to slow down until just 1.6 seconds before the impact. Experts worry that improvements to sensors can only go so far; there is a tremendous wealth of understanding that human drivers have that AI does not. For example, one expert, Raj Rajkumar at the Robotics Institute at Carnegie Mellon, told *Technology Review* that when a human sees a toy in the road, the human generally recognizes this means there could be a child nearby out of sight who might suddenly appear to retrieve the toy. It would not be easy to teach computers to interpret all the objects they detect and draw all the relevant conclusions. Nor could human engineers easily come up with a list of the items of significance that a computer might need to be taught to identify and all the possible relevant circumstances such objects might signify. Another expert at CMU, Herman Herman, talks about how the safety and predictability of the technology changes when scaled up. When there are just a few autonomous cars on the road, they might be quite safe. But what if most of the cars were autonomous; would they still be safe? Concerns remain about bandwidth required for this many autonomous cars, sensors interfering with one another's sensors in close proximity, and stakes of things such as software crashes. Another issue is that autonomous cars enter a road governed as much by social norms and game theoretic decisions by human agents as much as by traffic laws. Will autonomous cars be able to predict human driver behavior the way human drivers can? Or, will human drivers learn to take advantage of autonomous cars' social blindness and out-game them — for instance, not yielding the right of way on the understanding that the autonomous car will always stop to avoid the accident. Allowing autonomous cars on the freeway is indeed a social experiment that could change not only who drives but also the social norms governing the road. It is an experiment that few of us have consented to join.

Should the NHTSA view the introduction of autonomous cars as a social experiment? Why or why not? If autonomous cars are a social experiment, what should be done about the problem of consent? Finally, if viewed as a social experiment, what would count as success or failure? More lives saved? More human autonomy? A ratio of the two?

Case study by Robert Reed

https://www.technologyreview.com/s/612689/never-mind-killer-robotshere-are-six-real-ai-dangers-to-watch-out-for-in-2019/
https://www.reuters.com/article/us-autos-selfdriving/u-s-plans-to-rewrite-rules-that-impede-self-driving-cars-idUSKCN1ME1SP
https://www.technologyreview.com/s/602492/what-to-know-before-you-get-in-a-self-driving-car/
https://www.technologyreview.com/s/612251/waymos-cars-drive-10-million-miles-a-day-in-a-perilous-virtual-world/

https://www.washingtonpost.com/local/trafficandcommuting/waymo-launches-nations-first-commercial-self-driving-taxi-service-in-arizona/2018/12/04/8a8cd58a-f7ba-11e8-8c9a-860ce2a8148f_story.html?noredirect=on&utm_term=.71c0345a6c4d
https://www.technologyreview.com/s/610574/what-ubers-fatal-accident-could-mean-for-the-autonomous-car-industry/
https://www.economist.com/the-economist-explains/2018/05/29/why-ubers-self-driving-car-killed-a-pedestrian
https://theconversation.com/driverless-cars-might-follow-the-rules-of-the-road-but-what-about-the-language-of-driving-88824

Chapter 14: A Critical Attitude to Technology

Summary

According to *technological pessimists*, the overall value of technological progress is questionable. In this chapter, we take a closer look at technological pessimism and contrast it with *technological optimism*. Technological optimists stress that, all things considered, humans are much better off today than ever before, which is largely due to technological innovations. The optimist admits that not every single technology has turned out to be beneficial, but modern technology *as a whole* has brought us enormous benefits. Technological optimists believe that many problems we face in today's society can be solved by new technological innovations, or "techno-fixes." Critics of technological optimism do not deny that modern technology has enabled us to improve our living conditions, but they question the claim that we are much better off than our ancestors. They also question the idea that the negative side effects of modern technology can be solved with techno-fixes.

The *critical* approach to technology is an intermediate, less extreme position in this debate. Rather than making bold claims about the positive or negative value of technology as such, defenders of the critical approach argue that we should evaluate each and every new or existing technology individually. We can, of course, suggest design improvements or take other measures whenever that is motivated, but we should refrain from making general claims about the value of technology as such. A restaurant critic should praise or criticize individual restaurants (and sometimes individual dishes on the menu), but it would be pointless to praise or criticize all restaurants in the world collectively.

Learning Objectives

After studying this chapter, students should:
- Be familiar with three attitudes to technology discussed in this chapter: pessimism, optimism, and the critical attitude.
- Know arguments for and against the three attitudes toward technology.
- Understand Hans Jonas's imperative of responsibility.
- Be able to consider imperative of responsibility in comparison with past principles.

Essay Questions

*1. Does modern technology make us better off? Why or why not?
2. Are engineers better equipped to criticize new technologies than others? Explain.
*3. Should we accept Hans Jonas's "Imperative of responsibility"? Explain.
4. Should we fear technological disasters? Explain.
5. Will your children be better off because of the technologies that are being developed today? Explain.

Multiple-Choice Questions

1. Which of the following describes some common general attitudes toward technology?

*a) Technological optimism, technological pessimism, technological determinism, and a critical attitude toward technology
b) Technological optimism, technological pessimism, technological solipsism, and technological constructivism
c) Technological optimism, technological pessimism, technological universalism, and technological constructivism
d) Technological optimism, technological pessimism, technological universalism, and technological realism

*2. One consideration in favor of technological optimism is
a) nuclear weapons.
b) social media.
c) the automobile.
*d) vaccines.

3. According to technological pessimists,
*a) the overall value of technological progress is likely to decrease in the future.
b) technological progress has no intrinsic value.
c) technological progress has no instrumental value.
d) b and c

*4. Technological optimists stress that, all things considered, humans are much better off today than ever before, which is largely due to technological innovations. The optimist believes that
*a) not every single technology has turned out to be beneficial, but modern technology as a whole has brought us enormous benefits.
b) technology is valuable in an intrinsic sense.
c) technology is valuable for its own sake.
d) technology has final value: It is the endpoint of a chain of instrumentally valuable entities.

5. Technological optimists believe that
a) all things considered, humans are much better off today than ever before, and this improvement is largely due to technological innovations.
b) modern technology as a whole has brought us enormous benefits.
c) many problems we face in today's society can be solved by new technological innovations.
*d) All of the above

*6. According to the critical attitude to technology,
a) technological pessimists are too cynical and gloomy while optimists are too naïve.
b) while it is true that some technologies sometimes have negative effects on society, this is not true of all, or even most, technologies.
c) we should make negative remarks only when appropriate, typically at an early stage when the technology is still in the design phase, but we have no reason to make negative or positive remarks about technology as such.
*d) All of the above

7. If we take a critical attitude to technology, we should

a) emphasize the negative effects of modern technology in society.
b) criticize modern technology and highlight its negative intrinsic and instrumental value.
c) do what we can to not use modern technology whenever possible; ancient technologies are almost always better.
*d) refrain from making negative or positive remarks about technology as such. Some particular technologies are good, and others are bad, just as some restaurants are good and others are bad.

*8. The Tesla fatal autonomous driver accident was caused by
a) a bug that the engineers had not worked out.
b) poor programming of the computer.
c) purely human error.
*d) overreliance on the autonomous system.

9. The IEEE advocates that AI should be designed and operated so at to respect and fulfill human rights, freedoms, dignity, etc. This is an example of a response to
a) transhumanism.
*b) the value alignment problem.
c) the Tesla accident.
d) Skynet.

*10. According to Hans Jonas, modern technology has created a situation in which
*a) no previous ethical system is sufficient to guide us.
b) humanity's fate is now certain.
c) humans are happier than ever.
d) humans have become sustainable.

11. According to Hans Jonas, one of the most important differences between modern and primitive technologies is
*a) the power to alter the human condition.
b) our technology is not sustainable.
c) we are closer to human immortality.
d) we have generated more human freedom.

*12. Which claim of Jonas's might utilitarians contest?
a) Duty is the central moral concept.
*b) Previous moral theories are anthropocentric.
c) Kant was right.
d) Sustainability is our primary concern.

13. Jonas's ethical principle is a natural extension of
a) ethical egoism.
b) utilitarianism.
*c) Kantian duty ethics.
d) social constructivism.

*14. The imperative of responsibility holds that

a) we should halt technological progress until we can do so responsibly.
b) humans are responsible for the environment.
*c) we should act so that the effects of our actions are compatible with permanent human life.
d) we should adopt human happiness as primary responsibility.

15. Which of the following is an important criticism of Jonas?
a) The earth has plenty of resources.
*b) Humans will go extinct eventually.
c) There is more to ethics than happiness.
d) Technological progress is inevitable.

*16. How do technological pessimists respond to technofixes like CDR and SRM?
a) Technology causes global warming it can't fix it.
b) We don't have sufficient control over the environment.
c) We don't know what other problems this technology might cause.
*d) All of the above

17. Which of the following is *not* an example of a proposed technofix to one of society's serious problems?
a) Troll Hunter
b) SRM
*c) Tesla Roadster
d) Robots to take care of old people

*18. Technological optimists favor measures like robots caring for the old. Which of the following questions might van de Poel think we should ask before using technology like this?
a) Have users given informed consent?
b) Are there any irreversible effects of this technology?
c) Can users stop using the technology?
*d) All of the above

19. The Amish restrict telephones because they
a) do not trust multinational corporations.
b) wish to remain independent from the outside world.
*c) worry it will undermine social cohesion.
d) are worried about it stealing their souls.

*20. How do the Amish explain the difference between their use of technology and ours?
a) Modern technology is intrinsically evil and so they avoid it.
b) Modern technology causes more problems than it solves.
c) Modern technology makes us less human.
*d) Technology is to be assessed for instrumental value for human purposes, and Amish have different purposes.

Weblinks

A documentary about the Amish:
https://www.youtube.com/watch?v=m64X1hMCJoE

Key Terms

Critical attitude to technology The view that technology as such is neither good nor bad, although some particular technologies may sometimes warrant criticism. Cf. technological optimism and pessimism.

Case Study: Legacy or Liability? Technological Progress as a Ticking Time Bomb

On January 2, 2019, *Aeon* published a provocative piece entitled "Time-Bombing the Future" by Rebecca Altman, on the subject of the legacy of polychlorinatedbiphenols (PCBs). Altman begins the story by recounting an event in September 1938 that encapsulated the technological optimism of the day. Westinghouse was burying a time capsule to be opened 5,000 years in the future. The contents of the capsule were the latest cutting edge chemical technology. Altman reports that the publicist for Westinghouse, G. Edward Pendray considered calling it a "time bomb" instead of "time capsule," and while the latter name stuck, the former better expressed the significance of the technological achievements contained inside.

　　The capsule was loaded with discoveries of chemistry from DuPont, Westinghouse, and other companies—synthetics such as tungsten filaments and nylon. The sealing of the capsule was an event marked by speeches, and the general atmosphere was one of triumph for the current age's technological innovators and optimism about what future technology would bring. Altman then explains that the capsule was sealed using 500 pounds of a sealant made from PCB. The PCB was the true time bomb.

　　PCBs are now recognized as carcinogens that affect basic human development and both neurological and reproductive function. They have been banned in the United States since 1979 but were found in so many products that many doubtlessly remain—power transformers are one common place to find them, along with fluorescent light ballasts, old hydraulic oil, and many electrical components such as capacitors and voltage regulators. Unfortunately, artifacts and products are not the only places PCBs persist. They remain in biological systems permanently until death and are passed down in childbirth. The chemicals were engineering to be enduring and they are—PCBs do not break down inside the body and continue their disruptive activity perpetually, sometimes leading to cancer in addition to the other problems. The PCB problem of today is that compounds are already in the water we drink and found in plants and animals we eat. They are now a permanent part of the biosphere and food web. The effects on testosterone leading to infertility among both humans and animals are already well known as is their potential to cause cancer—classified as a Level 2B carcinogen by the International Agency for Research on Cancer.

　　Altman effectively notes that no time capsule need be opened; humans 5,000 years in the future will in all likelihood bear the witness of PCBs in their bodies: "The implications are disturbing. Change a ship's course by one degree, and in a decade, a century, a millennium, that ship will be sailing through entirely different waters. Subtle alterations barely perceptible today could mean profound changes in the lives of Pendray's futurians and beyond."

　　Technological pessimists believe that technological change is generally harmful. The response of the critical attitude toward technological pessimism is to agree only that technology

can be harmful to humans, but harm can only be known on a case-by-case basis. It is open to technological pessimists to agree that final evaluations of whether a new technology is harmful or not must be made on a case-by-case basis, but that past experience shows that often irreversible and unforeseeable harm is done before we know it. A technological pessimist could argue that cases like PCBs justify adopting a *pessimistic stance* toward new technology — analogous to the pessimistic meta-induction in philosophy of science.

How should technological optimists and critical attitude theorists respond to such a hypothetical challenge from the technological pessimist? Do cases like PCBs support a technological pessimistic metainduction? If not, how might a technological optimist or critical attitude theorist explain the lesson of PCBs for a stance toward new technology in the future?

Case Study by Robert Reed

https://aeon.co/essays/how-20th-century-synthetics-altered-the-very-fabric-of-us-all
https://en.wikipedia.org/wiki/Polychlorinated_biphenyl

Chapter 15: The Ethics of Artifacts

Summary

What is the role of technological artifacts in ethics? Are they morally neutral and inert objects that play no significant role in moral reasoning whatsoever, or do technological artifacts have moral properties of their own? According to the common sense view, technological artefacts are neutral means to an end. Defenders of the strong view dismiss the idea that technological artifacts are morally neutral or inert objects. They believe that technological artifacts play a much more prominent role in ethics.

According to Winner, the fact that technological artifacts are intentionally designed objects support the conclusion that the artifacts themselves literally *embody* the designer's moral and political values.

French sociologist Latour believes that artifacts, together with human beings, form a special kind of hybrid agents, which he calls "actants."

According to one of several possible interpretation of Heidegger, technological artifacts are morally relevant in the sense that they give us access to new options for action that were unavailable to us before the technology became available. For instance, the development of modern airliners made it possible to travel long distances quickly at a low cost, which was not possible at the beginning of the 20th century. Similarly, the development of nuclear weapons made it possible to kill more people than ever before.

Learning Objectives

After studying this chapter, students should:
- Be familiar with debates over the moral status of artifacts.
- Be familiar with arguments that address the role of intention in discussions of artifacts.
- Be familiar with the concept of "technological mediation."
- Be familiar with Bruno Latour's theory of mediation and actants.
- Be familiar with Heidegger's theory of mediation and the concept of "standing-reserve."

Essay Questions

1. What is technological mediation? What is the moral relevance of this phenomenon?
*2. Did Lee Harvey Oswald and his rifle kill John F. Kennedy? Or was it just Lee Harvey Oswald? Explain your answer.
3. Which view is most plausible, the strong view or the common sense view? Explain why.
4. Does the designer's intention influence the moral properties of a technological artifact? If so, how?
*5. How should we understand Latour's notion of an "actant"?

Multiple-Choice Questions

1. President John F. Kennedy was assassinated in Dallas on November 20, 1963. According to defenders of the strong view, he was killed by
a) Lee Harvey Oswald's rifle.

*b) Lee Harvey Oswald and his rifle.
c) Lee Harvey Oswald.
d) someone else.

*2. President John F. Kennedy was assassinated in Dallas on November 20, 1963. According to defenders of the common sense view, he was killed by
a) Lee Harvey Oswald's rifle.
b) Lee Harvey Oswald and his rifle.
*c) Lee Harvey Oswald.
d) someone else.

3. The furnaces used by Nazis in the death camps were
a) used by the Nazis without the awareness of the designers.
b) refitted for use in the camps for a purpose different from their design.
*c) designed and sold with knowledge of how they would be used in the camps.
d) poorly designed and engineered.

*4. The invention of the telephone to help hard of hearing people might be used as an example of
a) the adage that necessity is the mother of invention.
b) how we have too many technological mediators governing our communication.
*c) how technological artifacts take on a life of their own beyond the intentions of their designers.
d) an actant.

5. The word *mediate* literally means "placing in the middle." Which of the following represents a strong view of technology as mediating action?
*a) A speed bump that slows down cars
b) A pair of blue glasses that make everything look blue
c) A television which allows us to witness world events as they happen from our homes
d) A microscope that enables us to see tiny things

*6. Robert Moses is said to have designed bridges with low overpasses
a) to save on construction costs.
b) for aesthetic value.
*c) to keep lower class and blacks out who rely on public transportation.
d) All of the above

7. Langdon Winner believes that the low overpasses on Long Island designed by Robert Moses "embody a systematic social inequality, a way of engineering relationships among people that, after a time, becomes just another part of the landscape." This quote can be used to exemplify the
a) neutral (or weak) view.
b) moderate view.
c) deterministic view.
*d) strong view.

*8. On Winner's view, technological artifacts come to

a) mediate our activity in the world.
b) nothing; they are completely inert.
*c) embody values.
d) reveal standing-reserve.

9. The apartheid system in South Africa ended with the release of Nelson Mandela in 1990. The apartheid regime built separate schools, healthcare units and restaurants for White and non-White people. Langdon Winner and other advocates of the strong view would say that
a) engineers in the South African society had a second-order responsibility to redesign the public buildings designed by the apartheid regime.
b) engineers in the South African society had a first-order responsibility to redesign the public buildings designed by the apartheid regime.
*c) the social values of the apartheid system were engineered into nearly all public buildings in the South African society.
d) the public buildings designed by the Apartheid regime were morally neutral means to an end.

*10. The French sociologist Bruno Latour asks us to consider an example in which "the driver modifies his behavior through the mediation of the speed bump: he falls back from morality to force . . . on the campus road there now resides a new actant that slows down cars." This quote can be used to exemplify the
a) neutral (or weak) view.
b) moderate view.
c) deterministic view.
*d) strong view.

11. Sociologist Bruno Latour ask us to consider a "speed bump that forces drivers to slow down on campus. . . . The driver modifies his behavior through the mediation of the speed bump . . . on the campus road there now resides a new actant that slows down cars." Latour does not claim that the speed bump itself is a moral agent or "actant." It is not the speed bump that performs the action of slowing down cars. Latour's view is, rather, that
a) the people who design and use the speed bump slows down cars.
*b) it is the combination of the speedbump and the people who design and use it that together slows down cars.
c) engineers have a first-order responsibility to design speed bumps that are safe and respect the driver's autonomy.
d) engineers have a second-order responsibility to design speed bumps that safe and respect the driver's autonomy.

*12. Which of the following might be an objection to Winner's view?
a) Technology is active in our lives whether designers intend it or not.
b) Technology reveals what actions designers have set for us.
c) Technology determines our actions in accordance with wishes of designers.
*d) Technology cannot hold values unless we know intentions of designer.

13. Which would of the following would count as further explanation of the strong view of technology?

a) The claim that technology cannot mediate our actions
b) The claim that there are no agents or actors but humans
c) The claims that moral responsibility is in rational agents
*d) The claim that technology reveals certain activities to us

*14. Which of the following views technology and humans as forming hybrid agents?
a) Winner
b) Heidegger
*c) Latour
d) None of the above

15. What is an advantage of actor-network theory?
a) It explains why we should regulate the Internet.
b) It explains how technological networks reveal actions for actors.
*c) It explains that technology matters in ethical discussions because it is not passive.
d) It explains that technology should be regulated by a network of scientists.

*16. The Chinese government banned Google search engines so as to
a) prevent users in China from obtaining information that is politically dissident.
b) prevent users in China searching about Tiananmen Square.
c) control the information that users can access in China.
*d) All of the above

17. Latour might interpret the Chinese firewall as a(n)
a) mere tool being used improperly by the Chinese.
*b) new technological actant that mediates perception of the world.
c) example of why Communism should be opposed.
d) example of how technology promotes political stability.

*18. Martin Heidegger argues that "an airliner . . . stands on the taxi strip only as standing-reserve, inasmuch as it is ordered to insure the possibility of transportation." Which of the following is the most plausible interpretation of his claim?
*a) Airplanes reveal activities we can perform.
b) Airplanes merely give us access to new options.
c) Airplanes are moral agents.
d) Airplanes are morally irrelevant objects.

19. Illies and Meijers think technology
a) mediates our knowledge of the world and should be viewed with suspicion.
b) reveals ways we can use artifacts and so influences our activity.
c) is entirely inert and so not a proper subject of moral concern.
*d) creates more possibilities for action which is always better.

*20. Illies and Meijers think engineering is special because engineers
a) determine how reality is mediated through technology.
b) generate new actants.

c) reveal the world.
*d) have second order moral responsibilities to increase our morally good options.

Key Terms

Actant   According to French sociologist Bruno Latour, an actant is a technological artifact that performs actions. Example: a speed bump that slows down cars.

Actor-network theory   A theory proposed by French sociologist Bruno Latour, according to which no sharp distinction can be made between objects (the external world) and subjects (human beings).

Artifact   A manmade object or thing. Example: a speed bump.

Hybrid agent   A moral agent comprising human as well as technological parts.

Technological mediation   The claim that technological artifacts sometimes change or enhance our perception of the world or our actions.

Case Study: Are Screens and Social Media Mediating Our Face-to-Face Social Interactions Too?

As more information emerges about the effects of screen time, whether in the form of TV, phones, Ipads and tablets, or more traditional laptops and nonmobile computers, many parents have become concerned about the effects on their children's brains. Victoria Dunckley, writing for *Psychology Today,* explains that the phenomenon of children using screens is affecting their social lives in ways that extend beyond their time on the screens themselves. Almost everyone knew already that screens can change a teen or child's social life simply by virtue of giving the child access to other people at great distances and enabling instantaneous communication. The ways in which social media via screens have shaped these social interactions are well-known: bullying has become easier and more difficult to escape; children can spend vastly more time communicating with their peers; children can communicate thoughts and feelings to friends instantly instead of after intervals of being away from friends, thereby losing the time to reflect upon or develop and analyze their thoughts; and children are losing the time and space by which to develop themselves apart from constant peer-monitoring. Children come to value the likes on Instagram or Facebook such that they are feeling pressure to perform before an ever-present online audience. More can be said, but suffice it to say, there is no question but that social media

technology has altered the way in which young people, both children and teens, interact socially as so much of that interaction is now mediated through screens connected via Internet.

What is new is the growing realization that the screen-mediated social interactions also affect the nonscreen-mediated social interactions. Or perhaps another way to put it is that screen-mediated social interaction *may indirectly mediate* social interaction even in face-to-face encounters. *Psychology Today* explains that socially awkward teens are driven to more social interaction via the Internet, and this, in turn, makes them more socially awkward — it is a self-reinforcing cycle. Thus, children who are "socially incompetent are at a particularly high risk for developing dependence upon electronic media." Dunckley tells us that a shy child without screens can overcome social anxiety and awkwardness whereas a socially awkward teen who "hides behind a screen" becomes more socially awkward. Social anxiety might be a normal part of childhood, but in the past, the desire for social interaction was strong enough to get children to seek out social interaction anyway and to then develop social competency. Screen time can give many of the benefits of social interaction without the risks and without developing the competency that all must develop through practice. She gives signs of screen-related social anxiety, such people "tend to make poor eye contact, seem distracted or 'not present,' or squirm with discomfort."

Among those most likely to limit screen time because of its social and cognitive consequences are the very engineers in Silicon Valley who develop social media and the screens that enable it. The *New York Times* reports a "dark consensus" of Silicon Valley parents in the tech world who do not allow kids to have access to screens at all and reports on the economic and class disparities in screen restriction: lower-income children and the children of racial minorities spend more time on screens than affluent, and while private schools are kicking screens *out of the classroom*, public schools are still bringing them in.

Consider now the common sense view of artifacts, which holds that artifacts are morally neutral and inert tools that merely expand our range of choices, and the strong view, which claims that technology mediates our perceptions and acts in the world. How might the two explain the previous case about social media and social interaction? Think back to Heidegger's claim that technology does not merely create an option but reveals and recommends a way of acting in the world. What might Heidegger say about screens and social media? Illies and Meijers make a sharp distinction between first order responsibilities to select good options and second order responsibilities of engineers to create good options; how might be applied to the previous case? What would it mean to try and conceive of teens and screens as forming "hybrid agents" in Latour's sense? If artifacts could embody social values, what social values would screens and social media embody?

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Chapter 16: Sustainability

Summary

Why should the planet's natural resources be preserved? Some philosophers believe that natural resources have instrumental value. Instead of being valuable for their own sake, their value depends upon what humans (and possibly other sentient beings) can do with them. While some natural resources have instrumental value for nearly all of us, others have less value. We all need stable access to safe drinking water as no one could survive for more than a day or two without it. However, it is not the naturalness of the water that matters. We could produce artificial freshwater from desalinated seawater, although this is an expensive and energy intensive process.

Other philosophers argue that nature has noninstrumental value. On this view, nature is valuable for its own sake, irrespective of its instrumental value *to us*. The moral value of a natural resource such as freshwater, oil, or the poisonous plant *Mandragora officinarum* does not depend on the health, welfare, or monetary values we can obtain from those resources. All these resources, and perhaps entire ecosystems, are valuable for their own sake.

The "tragedy of the commons" teaches us that there are situations in which the market will fail to reach what many would consider to be morally acceptable solutions. Fully informed and fully rational decision makers sometimes reach solutions to environmental problems (as well as many other types of problems) that are worse for everyone. Environmentalists appeal to this example for explaining the need for regulations that control the market forces.

Learning Objectives

After studying this chapter, students should:
- Be familiar with major environmental cases relevant to sustainability.
- Be familiar with various notions of sustainability.
- Understand the most important arguments for preserving natural resources.
- Be familiar with arguments for and against the value of the natural environment.
- Be familiar with the tragedy of the commons and how it applies to sustainability.

Essay Questions

1. What is sustainability?
2. Do engineers have a moral obligation to always design sustainable technologies? Explain.
*3. Is the natural environment valuable in an intrinsic or instrumental sense? Explain your answer.
*4. Do we have a duty to preserve the planet for future generations? Explain your answer.
5. Should we fear a Global Manhattan? Explain your answer.

Multiple-Choice Questions

1. The *Deepwater Horizon* case primarily raises ethical questions about the
a) lack of adequate training and oversight of the crew working on the platform.
*b) moral permissibility of using fossil fuels.
c) moral permissibility of using nuclear power.

d) internal coherence of the NSPE Code of Ethics.

*2. The decision in the *Deepwater Horizon* case to drill without the centralizers was made on what basis?
a) They could always put centralizers in later.
b) The drilling engineer thought they were not necessary in this situation.
*c) The risk of drilling without centralizers was worth the reward of saving money.
d) Centralizers were an unnecessary environmental requirement.

3. Which of the following was a consequence of the blowout?
a) *Deepwater Horizon* sunk.
b) Eleven people died.
c) 4.9 million barrels of oil spilled, devastating wildlife.
*d) All of the above

*4. Which of the following definitions of "sustainable development" best fits the notion of sustainability endorsed by the EPA in the past?
a) Development that makes everyone in all generations happy.
b) Development that is fully virtuous in an Aristotelian sense.
c) Development that does not compromise the ability of future generations to meet their needs.
*d) Development that meets the needs of the present without compromising the ability of future generations to meet their needs.

5. Broad and weak sustainability are best described as sustainability that
a) maximizes the well-being of the present.
*b) permits significant long-term depletion of natural, social, or economic resources so long as the total aggregated value it preserved.
c) does not permit losses in one dimension of resources to be compensation by gains in other dimensions.
d) meets the needs of the present without compromising the ability of future generations to meet their needs.

*6. Broad and strong sustainability is best described as sustainability that
a) maximizes the well-being of the present.
b) permits significant long-term depletion of natural, social, or economic resources so long as the total aggregated value it preserved.
*c) does not permit losses in one dimension of resources to be compensation by gains in other dimensions.
d) does not permit significant long-term depletion of natural resources.

7. Narrow sustainability is best understood as sustainability that
a) meets the needs of the present without compromising the ability of future generations to meet their needs.
b) permits significant long-term depletion of natural, social, or economic resources so long as the total aggregated value it preserved.

c) does not permit losses in one dimension of resources to be compensation by gains in other dimensions.
*d) does not permit significant long-term depletion of natural resources.

*8. For hundreds of years, *Mandragora officinarum* (a poisonous plant) was widely used for curing a variety of diseases. Today you can, however, find plenty of equally good or better synthetic medicines in your local drug store. Let us imagine, contrary to the historical facts, that some new technology had been introduced 20 years ago that we knew would kill all Mandragora plants. Would that have been of any concern to us if we knew that no sentient being would ever need the plant again for medical (or any other) purposes?
a) The answer to this question depends primarily on how much money we would have been willing to pay for preserving Mandragora.
b) The answer to this question depends primarily on how much happiness or well-being Mandragora created for us.
*c) The answer to this question depends primarily on whether Mandragora was valuable in an intrinsic or instrumental sense.
d) The answer to this question depends primarily on whether Mandragora was valuable in a Kantian or utilitarian sense.

9. Someone who believes that nature has intrinsic value might say that the intrinsic value of the poisonous plant *Mandragora Officinarum*
a) depends on the effects that *Mandragora Officinarum* has on the health or welfare for human beings.
*b) is independent of the effects that *Mandragora Officinarum* has on the health or welfare for human beings.
c) supervenes on the effects that *Mandragora Officinarum* has on the health or welfare for human beings.
d) is caused by the effects that *Mandragora Officinarum* has on the health or welfare for human beings.

*10. Someone who believes that nature has instrumental but no intrinsic value might say that the instrumental value of the poisonous plant *Mandragora Officinarum*
*a) depends on the effects that *Mandragora Officinarum* has on the health or welfare for human beings.
b) is independent of the effects that *Mandragora Officinarum* has on the health or welfare for human beings.
c) supervenes on the intrinsic properties of *Mandragora Officinarum*.
d) depends entirely on the nonrelations properties of *Mandragora Officinarum*.

11. If the natural world is valuable only in an instrumental sense, then
*a) nature is not valuable for its own sake.
b) nature's value depends on what humans (and possibly other sentient beings) can do with them.
c) natural resources can be permissibly bought and sold on a free market.
d) All of the above

*12. If the natural world is intrinsically valuable, then

a) nature's value depends on what humans (and possibly other sentient beings) can do with them.
*b) nature is valuable for its own sake.
c) natural resources can be permissibly bought and sold on a free market.
d) None of the above

13. In the last man case, Routley has us imagine that, due to some disaster, there is only one man remaining on earth but plenty of plants and animals and life will go on after the last man's death. Routley thinks that we would intuitively judge it morally wrong for the last man to go on a killing spree of plants and animals. What does he think this judgment shows?
a) The virtue of temperance is morally serious.
b) Cruelty is a vice.
c) Nature has only instrumental value.
*d) Nature has intrinsic value.

*14. The distant nuclear fireworks example has us consider the last man on a spaceship watching as Earth is about to crash into the Sun, killing all the life on it. The last man can delay this inevitable event by five years by firing a missile from the spaceship. The authors think our intuitive moral judgment should be that the last man has no such obligation. What would this show?
*a) The vice of wrath does all the moral work in the original last man case.
b) Nature has intrinsic value.
c) Nature only has instrumental value.
d) Nuclear power is environmentally friendly.

15. Comparing the two cases, why might one judge the man destroying nature in the original last man case to have done something wrong, but the man standing back watching Earth fall into the Sun not to have done anything wrong?
a) Inaction is never morally wrong, only action.
b) Nature has no value if it is about to be destroyed.
*c) We find aggressive destruction to be incongruent with virtues.
d) There is no duty to protect, only a duty not to destroy.

*16. In the case where students can save a little time walking to class by taking a shortcut through the lawn, why is it rational for every student to take the shortcut even if they value the health of the lawn?
a) Walking on the lawn does not harm it at all.
*b) The damage to the lawn is imperceptible, while the benefit of time saved is perceptible.
c) The students do not truly value the health of the lawn.
d) If the lawn will be destroyed anyway by others, it no longer matters.

17. Which of the following environmental issues is an issue like the lawn where one has a perceptible reason to perform an action that contributes imperceptible harm?
a) Spilling oil into the ocean
*b) Emitting greenhouse gases by driving one's automobile
c) Dumping untreated wastewater into the river
d) Electing not to replace leaking petroleum storage tanks at gas stations

*18. "The tragedy of the commons" is a type of
a) tragic outcome in which everyone is harmed by not acting according to the NSPE Code of Ethics.
b) tragic outcome in which everyone is harmed by not acting according to the TEPA.
*c) situation in which everyone is acting independently and rationally according to their own self-interest, but the outcome is worse for everyone than it would have been if the agents had cooperated.
d) All of the above

19. If the present generation has a perfect duty to preserve the planet for future generations, it has to be true that the
a) present generation will be able to meet its needs without compromising the needs of future generations.
b) present generation cannot rationally will that the planet is destroyed, because such a future would be extremely undesirable.
*c) present generation cannot rationally will that the planet is destroyed, because that would be conceptually impossible or contradictory.
d) cost for this would be morally acceptable according to a cost-benefit analysis.

*20. The lesson of prisoner's dilemmas for sustainability is:
a) The most rational thing is for everyone to choose not to cooperate.
b) What is rational is purely subjective.
c) Most people are not capable of being rational.
*d) Cooperation is rational, but this requires enforcement mechanisms.

Weblinks

The US EPA's website on sustainability:
https://www.epa.gov/sustainability
A website about the concept of sustainability:
https://www.sustain.ucla.edu/about-us/what-is-sustainability/

Key Terms

Anthropocentric ethics   The view that the primary concern of ethics is the interests, needs, or well-being of human beings, not the interests, needs, or well-being of animals, plants, or ecosystems.

Global Manhattan   A thought experiment in which the entire planet is covered with highways, skyscrapers, airports, factories, and a few artificial parks for recreation.

Instrumental value   Something is valuable in an instrumental sense just in case it is valuable as a means to an end, rather than valuable for its own sake. Example: money.

Intrinsic value   Something is valuable in an intrinsic sense just in case it is valuable as a means to an end, rather than as a means to an end. Example: happiness.

Narrow sustainability   The view that sustainability can only be achieved by eliminating all forms of significant long-term depletion of natural resources.

Tragedy of the commons   This is a version of the prisoner's dilemma with more than two agents.

Case Study: Can Agroforestry Serve Economics and Ecology? Capturing Carbon with Crops

Han de Groot of the Rainforest Alliance writes for *Scientific American* that trees are our best technology to use against global warming. Sometimes nature gives us all we need. The alarm over global climate change is being sounded now louder than ever. The IPCC warns that effects from global warming of 2° Celsius could be catastrophic. Policymakers typically emphasize solutions such as reducing carbon emissions or even expensive machinery that captures carbon from the atmosphere. De Groot argues that forests are actually the most efficient "carbon-capture technology" we have. In fact, this method of carbon capture could be responsible for achieving 37% of the climate target   massive results could be achieved by a natural solution as simple as reforesting. A single tree can store 48 pounds of carbon in a year, and large forests can store the equivalent of the emissions of entire countries   Columbia is given as an example. What stops us from reforesting? Not surprisingly, it is often economics.

Rather than replanting forests and so that they will grow and recapture carbon, we are seeing forests cut down, often for agricultural purposes. Many of the crops are specialty commodities (e.g., cocoa trees) that end up competing with the world's great forests for space. Yet, de Groot argues that maintaining forests so that they can capture carbon need not represent an economic disaster   ecological and economic interests can both be accommodated: "It is estimated that increased investment in the multi-strata agroforestry area could help sequester up to 9.28 gigatons of carbon dioxide, while saving a net $709.8 billion by 2050. In production landscapes where large-scale tree cover increases are difficult, agroforestry serves as an attractive compromise."

Agroforestry produces crops but using a blend of different trees mixed together, each representing a different layer of the forest. For example, tall trees like macadamia can be grown with coffee and cacao in the shade. While producing crops with economic value, an acre of agroforest sequesters approximately 2.8 tons of carbon a year. In addition to carbon capture, it also protects the land from water erosion, restores groundwater, restores soil, and supports biodiversity.

De Groot points to success stories such as community-managed forests in Guatemala which have seen a zero percent deforestation rate over more than a decade. He directs our attention to the Bonn Challenge adopted by 56 countries, which has the goal of restoring 150 million hectares of natural landscape by 2020 and 350 million by 2030. This is given as an example by de Groot of both an ecological and economic gain:

Landscape restoration promises an unparalleled return on investment, in terms of ecosystem services and carbon sequestered and stored. Landscape restoration could potentially sequester up to 1.7 gigatons of carbon dioxide every year,

according to the International Union for Conservation of Nature. Reforestation projects can also intersect neatly and positively with human systems—restored forests provide a renewed resource base and new economic opportunities for communities.

Which sort of sustainability does de Groot's proposal for reforestation using investment in agroforestry best exemplify? Broad, weak, narrow? How does his approach to sustainability view the relationship between the value of nature and economic goods? Are they commensurable?

Case study by Robert Reed

https://blogs.scientificamerican.com/observations/the-best-technology-for-fighting-climate-change-isnt-a-technology/
https://www.drawdown.org/solutions/food/multistrata-agroforestry
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