

11-22-2013

Ethics & Engineering

Adam Liska

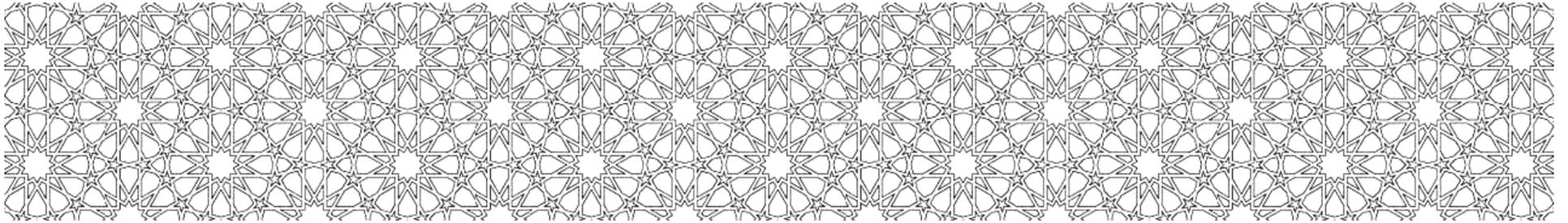
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Ethics & Engineering



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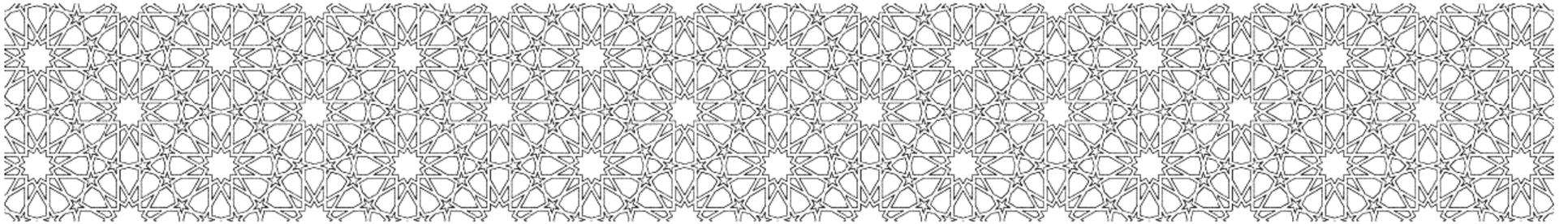
BSEN 470, November 22, 2013

Outline



- 1) How ethics works (4 slides)**
- 2) 7 general ethical principles (13 slides)**
- 3) Environmental ethics (2 slides)**
- 4) Meta-ethics, theories about ethics (3 slides)**
- 5) Laws & ethics (3 slides)**
- 6) Professional codes of ethics (2 slides)**
- 7) Conflict of Interest, etc. (4 slides)**
- 8) Opportunity costs in research & design (1 slide)**

How Ethics Works



Ethical problems & reasoning



- Ethical problems arise when **conflicting values or ethical views** give rise to **disagreement** over what to do, and how to act
- Ethical problems **can not be solved** using factual statements alone (ethics is ultimately beyond facts)
- Ethical understanding can be **self-generated**. The actions of individuals can be self-governed by consciously applying **abstract moral principles without the need for outside authority**—we are all involved in making ethical decisions
- Ethical questions & principles are not inherently about religion
- **Reason and argumentation** are essential for determining ethical judgments and **working through** ethical problems in conjunction with ethical principles (*“bring data to a problem”*)

Self-interest & other people



- Modern philosophers of ethics all see the **ultimate goal** of morality is to **increase human happiness** by applying rational methods to resolve disputes & guide actions

- **Most General Ethical Principle:**

To be ethical, you must regard the **interests of others** affected by your actions as **just as important** as your own self interests

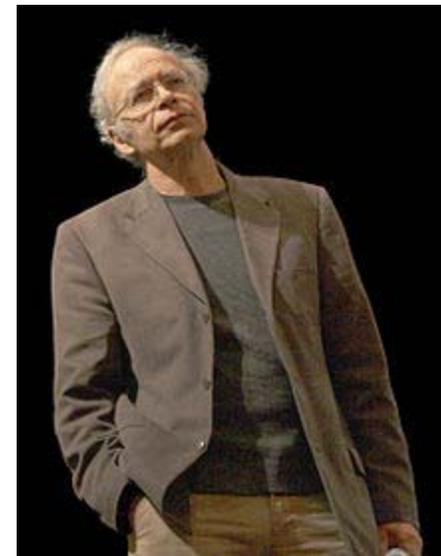
universal perspective in ethics

(“a perspective from outside of oneself”)



“...the notion of ethics carries with it the idea of something bigger than the individual. If I am to defend my conduct on ethical grounds, I cannot point only to the benefits it brings me. I must address myself to a larger audience. From ancient times, philosophers and moralists have expressed the idea that ethical conduct is acceptable from a point of view that is somehow universal.”

--Peter A.D. Singer,
Professor at Princeton
(1946-present)



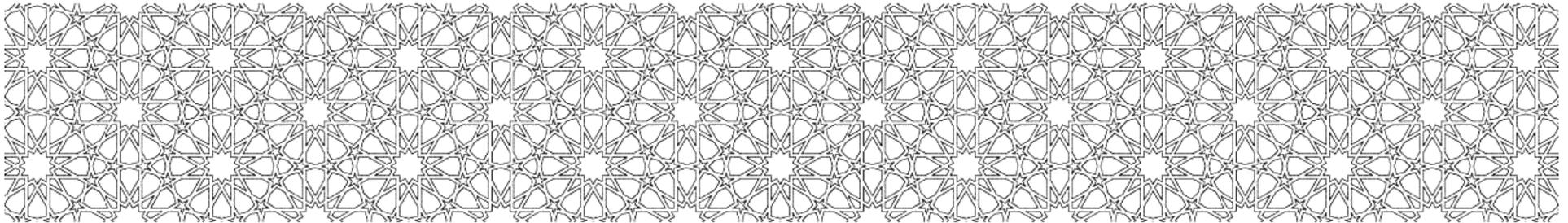
Source: Singer, P. 1992. *Practical Ethics*. Cambridge University Press.

Why more than one ethical theory?



- The history of philosophy focusing on ethics & morality can be thought of as a **set of imperfect models** that attempt to define proper social action
- These **models are symbolized in language** (*which is why this lecture is dominated by words*)
- All ethical theories appear to be **incomplete & imperfect** perhaps because:
 - *language, like numbers, is an abstraction to symbolize a much more complex reality, and*
 - inability of language to represent all social situations
 - we have constantly changing goals & a dynamic environment
- The nature of ethics requires different theories for **different situations**, overlap of theories, and allows for continuous development of moral philosophy
- Moral theories are generally divided into **teleological** (**goals, end points**) or **non-teleological** (**process specific**)

7 General Ethical Theories to Guide Action



Used interchangeably in our discussions of ethics:

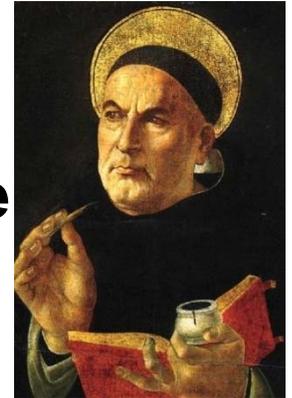
“ethical theory” = “ethical argument” = “ethical principle”
= “moral argument” = “moral philosophy”

Most theories are discussed in Peter Singer’s
A Companion to Ethics (Blackwell Publishing 1993)
Another book potentially helpful for biomedical students is
The Blackwell Guide to Medical Ethics (2007)

1) Natural Law (*oldest ethical theory*)



- Moral argument: **live in accordance with human nature**
 - Developed by Aristotle (Ancient Greece), Thomas Aquinas (medieval Europe), and Hugo Grotius
 - The concept of **Natural Law was developed by the Ancient Greeks to oppose different forms of conventional law; or laws in practice.** It was a search for a universal law above the whims of despotic rulers.
- Natural law is a general, vague idea, and it **does not provide specific maxims** governing human conduct
- “Natural law is the law of right or sane reasoning”
- *Example of the application of Natural Law:*
“contraception should not be used because it is unnatural”



TA 1225-1274



HG 1583-1645

2) Deontology

- Moral argument: **behavior should be guided by a set of rules, never to be broken (e.g. “do not lie” “do not kill”)**
 - Not just any rules, but rules about **your relationship to other people; more people**, e.g. general public
 - Easy to follow prescriptions, such as in the Holy Bible
- Argument against, 1: Deontological views **do not** consider the **impartial consideration** of other’s interests
 - For example, Deontology says that one person should **not** *be* harmed, even when harming that one person would **prevent** the harm of many more people
- Argument against, 2: Deontological recognition to avoid wrong-doing (“breaking rules”), **does not translate into an obligation to others**
- Depending on complex circumstances:
Breaking the “rules” could advance the well-being of more people than following the rules in some cases

3) Kantian Ethics (*Categorical Imperative*)



- Moral argument: **Act according to the rule-principle you wish everyone would also follow**
 - Have behavior that you think should be the **universal law** governing all human behavior
- Similar to **The Golden rule**: "Do unto others as you would have them do unto you"
- **Immanuel Kant** (1724-1804), German Philosopher, developed the *Categorical Imperative*.
- **First major attempt** to **free ethics** from religion-theology
- Argument against: criticized by many philosophers for not having a **sufficient theory of duty-obligation to others**



4) Ethic of Prima Facie Duties

Prima facie (fayshie)= “its first appearance” or “at first sight”



- Moral argument:

a) **we have many possible prima facie duties to others** 1877-1971
(examples): “help others, increase the welfare of others, keep our promises, repay acts of kindness, not let others down who depend on us”

lots of things matter, no complete list of morally significant features can be made (uncertainty #1)

b) **furthermore, no absolute ranking of possible duties exists, the importance of duties depend on the situation and moral judgment (uncertainty #2)**

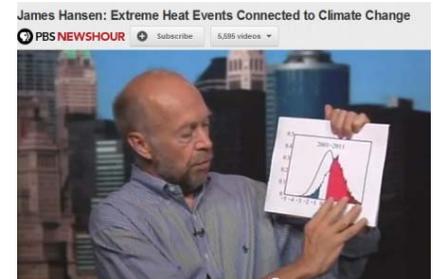
c) **prima facie duties need to be balanced against one another, depending on the specific situation**

- Developed by **Sir William D. Ross** in 1920's & 1930's at Oxford
- Ross says: “we have certain knowledge of moral principles, but no knowledge of **what we ought overall to do in any actual situation.**” “**Double moral uncertainty**” from the British Empire, *seems harmless ?*

Possible Prima Facie Duties for Scientists & Engineers



- **Educate the public** about **threats** that are understood with scientific knowledge
 - e.g. earthquakes, climate change, drought, energy security



- **Educate the public** about possible **solutions**
 - e.g. increased efficiency for reduction in energy use & emissions

- **Work to mitigate** threats using **scientific skills**
 - design more efficient & effective systems

- **Work to enhance** the standard of living

- **Work to serve more people,**
instead of less people

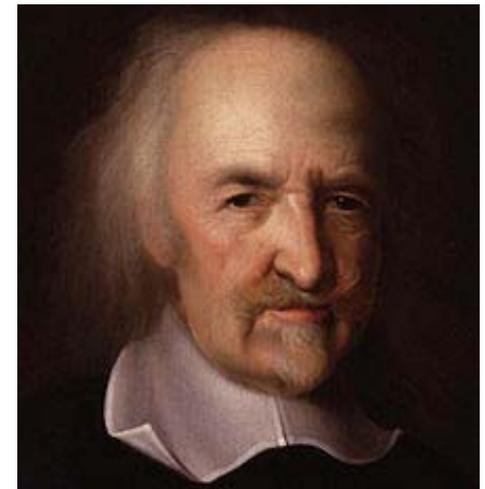


2007 Nobel Peace Prize for Climate Change, Al Gore, IPCC, Pachauri

5a) Social Contract



- Moral argument: **the demands of morality are fixed by the agreements that humans make to regulate their social interaction, & we should obey these demands because we have agreed on them**
- Obligations are conventional (e.g. laws) between people who are naturally equal
- Conventional obligations serve important human interests
- A community defines such “contracts” through bargaining, and negotiation
- Argument against the social contract: The **dominant individuals in a community** may impose negative circumstances on others (**all laws are not just**)



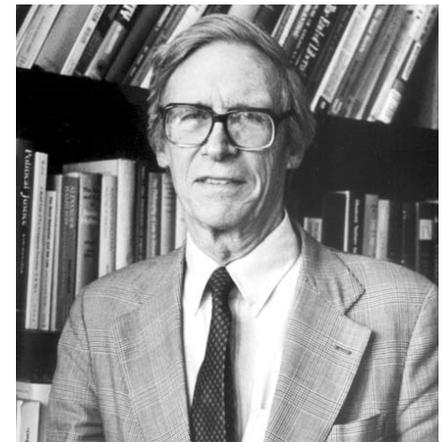
T. Hobbes 1588-1679,
first modern description

Source: Kymlicka, W. 1993. The Social Contract Tradition,
IN: ed. Singer, P. *A Companion to Ethics*.

5b) Social Contract: John Rawls's *A Theory of Justice* (1971)



- Moral argument: **A contract can give equal consideration to each of its contractors, but only if it is negotiated from a position of equality...**
- “People must agree on **principles of justice** under a ‘**veil of ignorance**’ – without knowing...what position they will occupy in society.”
- You put yourself in everyone else’s shoes, and ask:
what principles are best to govern our action?
- Principles **chosen in this way** are thought to advance **everyone’s** well being and interests, and will be the most ethical for society



1921-2002

Source: Kymlicka, W. 1993. *The Social Contract Tradition*, IN: ed. Singer, P. *A Companion to Ethics*. Blackwell Publishing;
Singer, P. *One World*, Yale University Press.

5c) Social Contract: Peter Singer (2004) Global Theory of Justice

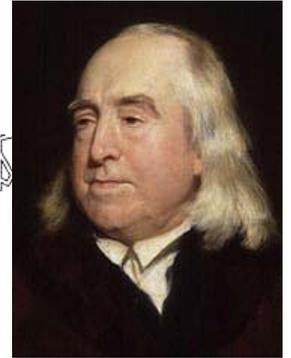


- Rawls' *Theory* only applied to action ***within*** nations
 - Peter Singer proposes that Rawls' *Theory* should be applied ***globally to all nations***
- Moral argument:
 - a) ethics developed from emotions when humans began to justify their actions toward other members of the group
 - b) if the group is a tribe or nation, the ethics developed was in relation to those groups
 - c) **with global communication revolution, our audience is now also global and we now need to justify our behavior globally, to people in different countries that are affected by our actions**
- By choosing principles to support all people, we would act to benefit those in the developing world (e.g. Asia, Africa)



1946-present

6) Consequentialism



1748-1832

- Moral argument: **we ought to do whatever has the best consequences for the most people**
- Utilitarianism is an example (J. Bentham)
“the good is whatever brings the **greatest happiness to the greatest number of people**”
- The **main value** to promote in consequentialism is variable:
 - happiness, well-being, freedom, or environment
- Argument against: By focusing on **ends**, it does not forbid **negative means**, such as killing, as long as it resulted in the best consequences for the most people
- Argument for: It is a **simple theory** that recognizes **inherent values** (e.g. freedom, well-being) in ethical theories and it is committed to **impartial consideration of other’s interests**

Peter Singer is a consequentialist

7) Rights



- Moral argument: **Rights are self-justifying, based on common human needs**
- Basis of rights is based on natural law (ethical theory #1)
- Human Rights “provide an accepted international currency for moral and political debate”
- Earlier versions of Rights were **protective** and **negative** (e.g. don’t restrict human freedom), contemporary rights are also **positive** (e.g. access to health care)
- Ex: United Nations’ Declaration of Human Rights (1948)
 - contains one *absolute* right = **not to be tortured**
 - other rights are qualified based on national issues
- Argument against: cultures based on religion (e.g. Islam) may argue that Rights theories don’t respect other cultures
- Rights provide a framework for law under any regime

7a) “Rights from Wrongs” (Dershowitz, 2004)

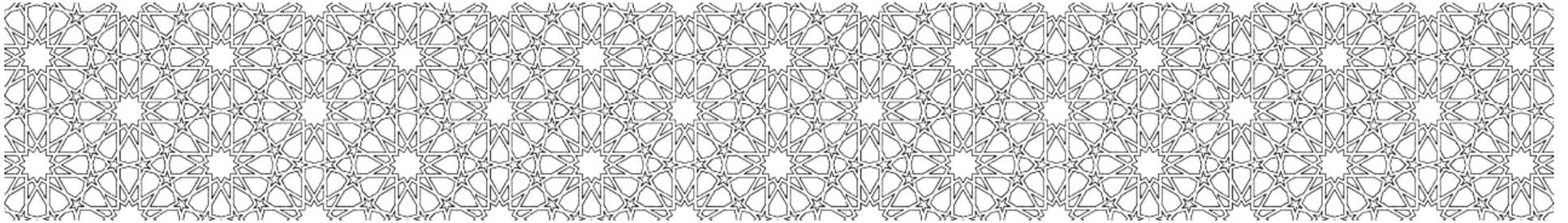


- Moral argument: **Based on the experience of wrongs, rights can be designed to prevent the recurrence of such wrongs in the future**
- “I would bet there is wide agreement that we never want to see a recurrence of the Holocaust, the Stalinist mass murders, the Cambodian and Rwandan genocides, slavery, lynchings, the Inquisition, or the detention of 100,000 Japanese Americans.”
- “It is more realistic to try to build a theory of rights on the agreed-upon **wrongs of the past** that we want to avoid repeating, than to try to build a theory of rights on idealized conceptions of the perfect society about which we will never agree.”



1938-present

Environmental Ethics



Human-centered environmental ethics

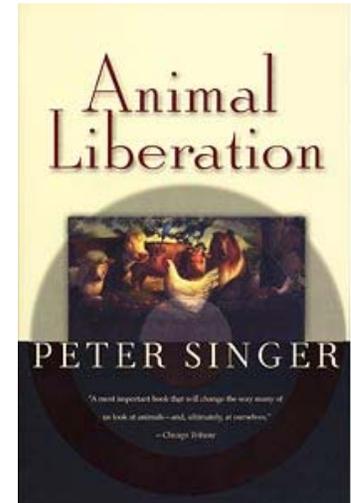


- The argument: **Environmental considerations should be judged solely based on how they affect humans**
- Environment should be managed to **meet human needs**
- This ethic only treats humans as morally considerable
- Environmental damage may cause people to be unhappy about biodiversity loss, aesthetic loss, harmful consequences: climate change, water quality, ozone destruction, toxic waste, etc.
- International environmental policies are in accordance with this ethic

Animal-centered environmental ethics



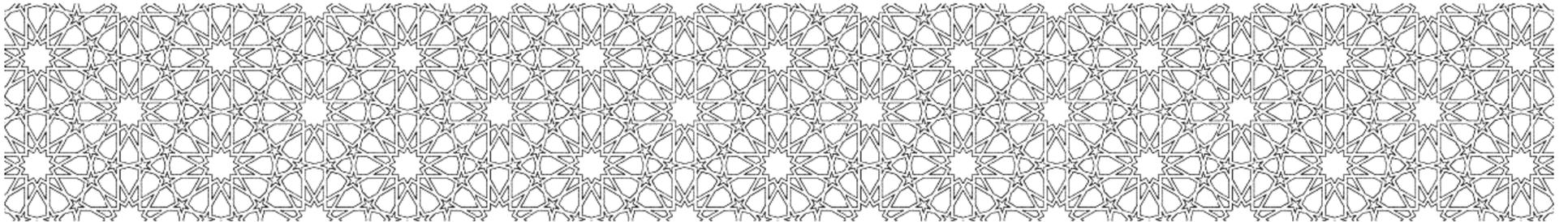
- The argument: **both humans and all other animals as moral considerable**
- Animals can feel pain and pleasure and thus have interests
- Individual animals are given importance; whereas whole species (population of distinct organisms) are only considered relative to individuals
- Different animal-centered ethics do not necessarily rank species equally
- Avoiding arbitrariness in ethics suggests that all animals should be treated equally
- Buddhist and Hindu religions have similar ethics toward animals (Callicot 1997)



1975 book

Source: Elliot, R. 1993. Environmental Ethics, IN: *A Companion to Ethics*,
Singer, P. (Ed.), Blackwell; Light and Rolston, 2003. *Environmental Ethics*

Meta-Ethics: Theories of the Nature of Ethics



Meta-Ethics is theories *about* ethics, not theories *of* ethics

Most theories are discussed in Peter Singer's

A Companion to Ethics

(Blackwell Publishing 1993)

Emotivism



- One of the most influential theories of ethics of the 20th century
- The argument about ethics:
**Moral language is used to influence people's behavior.
Moral disagreements are disagreements about attitudes based on emotions**
- Argument against: Emotivism does not consider reason in moral arguments
- General rule in ethics: **all moral judgments require backing by reason (“bring data”)**
- Argument against: The process of “*thinking through*” the various facts (“data”), arguments, and other considerations surrounding a moral issue can change the way a person feels, **thus feelings are not primary in making judgments**

Ethical Subjectivism



- Moral judgments must connect to emotions & reason

- Modern formulation:

“Something is morally right if it is such that the process of thinking through its nature and consequences would cause or sustain a feeling of approval toward it in a person who was being as reasonable and impartial as is humanly possible”

=

- Simplified formulation:

“The morally right thing to do is whatever a completely reasonable person would approve.”

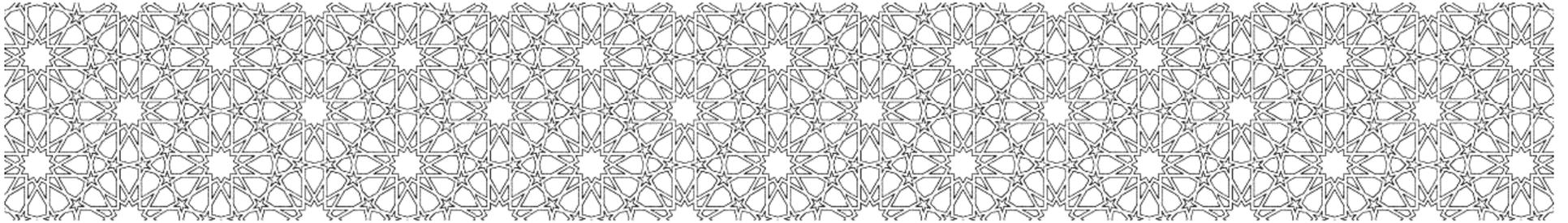
- Yet, where in this Meta-Ethical theory is duty and obligation?

Ultimately, why act morally?



- Are ethics ultimately in one's **self-interest alone**?
 - Many have tried to propose this: Plato, Aristotle, Aquinas, Spinoza, Butler, Hegel. But reason alone does not appear to defend this position
- What makes **people happy**? Friendly and loving relationships.
 - **Maintaining relationships** requires values such as benevolence and sympathy
- **Does life have a meaning**? Religion may provide an answer. But:
 - "most of us would not be able to find happiness by deliberately setting out to enjoy ourselves without caring about anyone or anything else"
 - "Ethics allows us to see our lives as possessing significance beyond the narrow confines of our own conscious state."
- Philosophers cannot answer "why act morally" conclusively.
- We will always need **law/social pressure to coerce** some behavior.

Laws Governing Practice & Professional Codes of Ethics

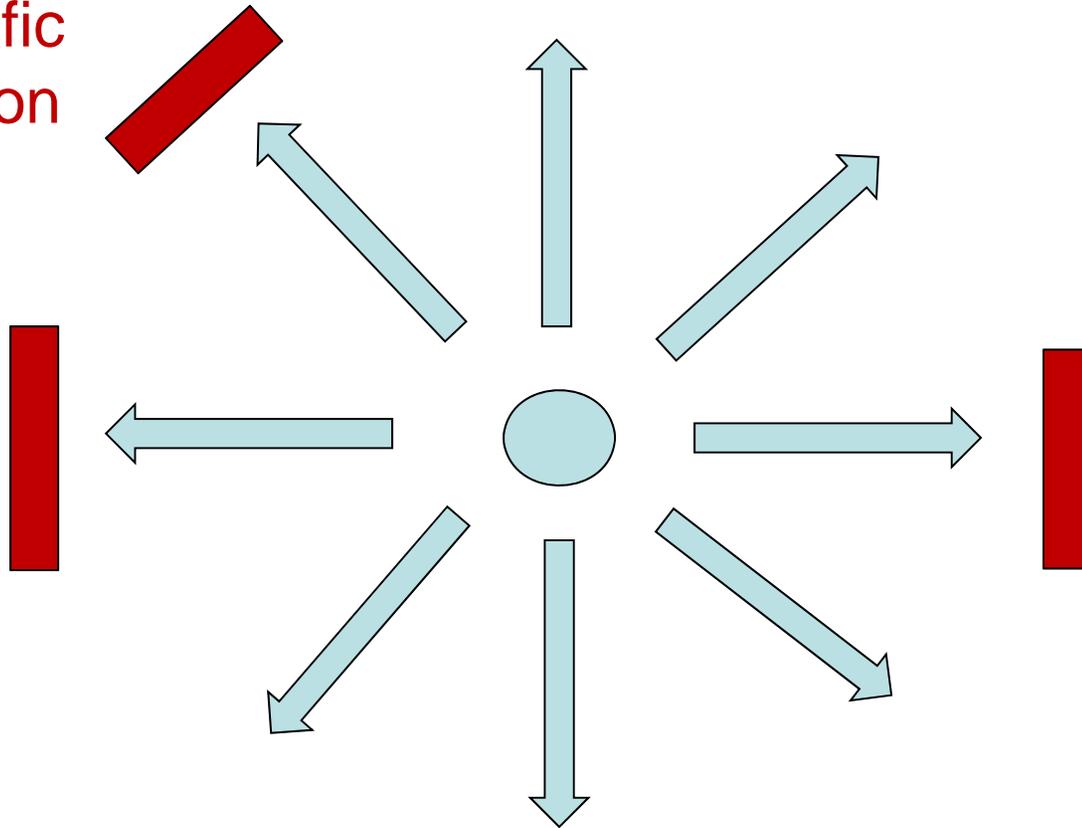


Conflict of Interest, etc.

Ethics exist to guide human action in the gap between **total individual freedom & societies laws (absolute prohibition)**

Laws block
some specific
human action

Directions of human action



Just because these other **actions are legally possible**,
does it mean that we should do them?

Ethics helps to address these questions

FDA (Food and Drug Administration)



- The Food and Drugs Act of 1906 was the first of more than 200 laws that constitute one of the world's most comprehensive and effective networks of public health and consumer protections.
- Today, the FDA **regulates \$1 trillion worth of products** a year. It ensures the safety of **all food** except for meat, poultry and some egg products [USDA]; ensures the safety and effectiveness of **all drugs, biological products** (including blood, vaccines and tissues for transplantation), **medical devices**, and **animal drugs and feed**; and makes sure that cosmetics and medical and consumer products that emit radiation do no harm.

Laws enforced by EPA (Environmental Protection Agency)



Air

- 1955: Air Pollution Control Act PL 84-159
- 1963: Clean Air Act PL 88-206
- 1965: Motor Vehicle Air Pollution Control Act PL 89-272
- 1966: Clean Air Act Amendments PL 89-675
- 1967: Air Quality Act PL 90-148
- 1969: National Environmental Policy Act PL 91-190
- 1970: Clean Air Act Extension PL 91-604
- 1976: Toxic Substances Control Act PL 94-469
- 1977: Clean Air Act Amendments PL 95-95
- 1990: Clean Air Act Amendments PL 101-549

Water

- 1948: Water Pollution Control Act PL 80-845
- 1965: Water Quality Act PL 89-234
- 1966: Clean Waters Restoration Act PL 89-753
- 1969: National Environmental Policy Act PL 91-190
- 1970: Water Quality Improvement Act PL 91-224
- 1972: Federal Water Pollution Control Amendments
- 1974: Safe Drinking Water Act PL 93-523
- 1976: Toxic Substances Control Act PL 94-469
- 1977: Clean Water Act PL 95-217
- 1987: Water Quality Act PL 100-4
- 1996: Safe Drinking Water Act Amendments of 1996

Land

- 1947: Federal Insecticide, Fungicide, and Rodenticide Act
- 1964: Wilderness Act PL 88-577
- 1968: Scenic Rivers Preservation Act PL 90-542

- 1969: National Environmental Policy Act PL 91-190
- 1970: Wilderness Act PL 91-504
- 1977: Surface Mining Control and Reclamation Act PL 95-87
- 1978: Wilderness Act PL 98-625
- 1980: Alaska National Interest Lands Conservation Act PL 96-497
- 1994: California Desert Protection Act PL 103-433
- 1996: Food Quality Protection Act
- 2010: California Desert Protection Act

Endangered species

- 1946: Coordination Act PL 79-732
- 1966: Endangered Species Preservation Act PL 89-669
- 1969: Endangered Species Conservation Act PL 91-135
- 1972: Marine Mammal Protection Act PL 92-522
- 1973: Endangered Species Act PL 93-205

Hazardous waste

- 1965: Solid Waste Disposal Act PL 89-272
- 1969: National Environmental Policy Act PL 91-190
- 1970: Resource Recovery Act PL 91-512
- 1976: Resource Conservation and Recovery Act PL 94-580
- 1980: Comprehensive Environmental Response, Compensation, and Liability Act ("Superfund") PL 96-510
- 1982: Nuclear Waste Repository Act PL 97-425
- 1984: Hazardous and Solid Wastes Amendments Act PL 98-159
- 1986: Superfund Amendments and Reauthorization Act PL 99-540
- 2002: Small Business Liability Relief and Brownfields Revitalization Act ("Brownfields Law") PL 107-118

ABET code of ethics for engineers



Derived from fundamental ethical principles to some degree

THE FUNDAMENTAL PRINCIPLES

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

- using their knowledge and skill for the enhancement of human welfare;
- being honest and impartial, and serving with fidelity the public, their employers and clients;
- striving to increase the competence and prestige of the engineering profession; and
- supporting the professional and technical societies of their disciplines

http://wadsworth.com/philosophy_d/templates/student_resources/0534605796_harris/cases/Codes/abet.htm

ABET code of ethics for engineers



THE FUNDAMENTAL CANONS

Derived from fundamental ethical principles to some degree

Engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties.

Engineers shall perform services only in the areas of their competence.

Engineers shall issue public statements only in an objective and truthful manner.

Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.

Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.

Engineers shall act in such a manner as to uphold and enhance the honor, integrity and dignity of the profession.

Engineers shall continue their professional development throughout their careers and shall provide opportunities for the professional development of those engineers under their supervision.

Conflict-of-interest



- “occurs when an individual or organization is involved in **multiple interests** [**“Prima Facie duties”**], one of which could **possibly corrupt the motivation** for an act in the other.”
- “A conflict of interest is a set of circumstances that creates a risk that professional judgment or actions regarding a **primary interest (public)** will be unduly influenced by a **secondary interest (private, employer)**.”

http://en.wikipedia.org/wiki/Conflict_of_interest

- Example: an academic biomedical engineer could serve to **promote a product** for the interests of a company, when this product has a probable chance doing harm to the public.
- S. Krimsky 2003. *Science in the Private Interest: Has the Lure of Profits Corrupted Biomedical Research?* Rowman & Littlefield.

Overutilization: “Conflict-of-interest”, making profit over serving the public interest



- Encouraging some unnecessary medical procedures increases **harm** done to patients (even death)
- **Overutilization** (also unnecessary health care or unnecessary care) **refers to medical services that are provided with a higher volume or cost than is appropriate**. In the United States, where health care costs are the highest as a percentage of GDP, overutilization is the predominant factor in its expense. Similarly, **overtreatments** are unnecessary medical interventions.
- **“Hospital Chain Inquiry Cited Unnecessary Cardiac Work”**
NY Times, 2012
- In one hospital, an invasive diagnostic test known as a cardiac catheterization was performed on **1,200 people without significant heart disease**
- In 2003, Tenet Healthcare agreed to pay **\$54 million to settle allegations that unnecessary cardiac procedures** were being performed over six years and billed to Medicare and Medicaid

“Justice Dept Hammers BP For Gross Negligence In Gulf Oil Spill”

-Sept 5, 2012 Forbes



“**Conflict-of-interest**”: making profit over serving the public interest

“Whether or not BP was grossly negligent will be a huge issue in the government’s case against the oil giant [in trial in Jan. 2013]. If **gross negligence** is found, it would quadruple the base damages that BP could be forced to pay under the federal **Clean Water Act** [\$5.5 billion to \$21 billion].

“[BP engineer] Guide explained in one email that Macondo was a very difficult well, that the drilling crew was “**flying by the seat of our pants**” under a “**huge level of paranoia**” that was “**driving chaos.**”

BP oil spill, 2010



“[BP engineer Guide said] But, who cares, it’s done, end of story. **Will probably be fine.**”

Better risk assessment is needed

Why act morally? Good Business Practice



Instill confidence in your customers:

- that you are a **fair and reliable** practitioner, and that your patron will get there money's worth in your service
- you will take care in your work, and **reduce the probability (risk)** that you will harm others by **mistakes or negligence** in your actions
- you will **reduce the probability** that you will harm others and **bring lawsuits** against your patrons

Opportunity costs in science & engineering



- Moral argument:
 - a) **“Knowledge is power”**, Sir Francis Bacon (1561–1626)
Engineering is power to change things
 - b) **Opportunity costs exist**: limited resources exist (time, money, material, energy), every scientific problem is acted on **at the expense** of another **potentially more morally significant problem**
(we can't do everything)
 - c) **A choice must be made** by every scientist & engineer to pursue one problem among many