

THE FOURTH INTERNATIONAL CONFERENCE ON ETHICAL ISSUES IN BIOMEDICAL ENGINEERING

April 20-22, 2007
SUNY Downstate Medical Center
Polytechnic University
Brooklyn, New York

BIOMEDICAL ENGINEERING ETHICS AND CULTURAL SPECIFICITY

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Biomedical engineering ethics, like all ethics, must ultimately address specific issues, out of which will emerge ethical tenets about risk, professional independence and responsibility, about obligation to avoid unwarranted technicism—technology for the sake of technology, etc., which have been discussed elsewhere. Different cultures approach ethical problems differently, starting, e.g., with the difference between the deductive approach, often religion-derived, versus the inductive approach, in which ethical resolutions are laboriously built on the basis of experiences of specific cases. There are, however, some fundamental species-wide rather than culture-specific aspects that could become the base of a global biomedical engineering ethics for our species.

In a comparison of biomedical engineering ethics in different cultures to seek to identify the elements of a species-wide biomedical engineering ethics, four major sets of ethical questions need to be addressed.

1) Framework questions:

- How far should we modify and manipulate living systems to understand them? For instance, the questions of cloning and of limits to experimentation on living subjects? What are the ethical implications for our species? What is the ethical responsibility of humans to other living systems? In the spectrum between biological organisms and machines—that is, engineered artifacts—how far toward one or the other should biomedical engineering push the interface between the two?
- To what extent should biomedical engineering interventions be undertaken which present extraordinary risks, for instance, those associated with a genetically modified species, or with the biological and environmental impacts of nano-particles introduced by new materials technology with potentially ever

wider applications in biomedical engineering? What are the acceptable biological and social side effects of biomedical engineering advances? How does one weigh the benefits versus costs?

2) Questions of focus and research. In the endeavor to improve health care, if resources are scarce, what are the ethical issues arising from focusing on a particular segment of the problem, e.g., high end versus low end technology, or common diseases versus rarer ones?

3) Questions of advocacy. How aggressively should biomedical engineers advocate improvement in health care practices, such as genetic medicine, or advances that would result from a better systems approach to health care delivery? To what extremes should they pursue their advocacy in the face of cultural or government resistance, or of some entrenched interests?

4) Questions of responsibility. As the integration biology-machine becomes increasingly close in biomedical engineering, what does this mean in terms of the ethical responsibilities of the biologist, the medical doctor, and the biomedical engineer? How will they overlap in interventions on living systems? Would it be ethically desirable or acceptable to merge them in an integrated conception of biomedical engineering and of the related responsibilities? The question of responsibility also emerges when biomedical engineering is in service of commercial enterprises or under government control.

We need to understand how different cultures approach these major biomedical engineering ethics sets of questions to find their points of convergence in the guiding of interventions on living systems. This is ultimately the most fundamental ethics challenge for biomedical engineering, a challenge that is critical to human progress and survival.

Biomedical Engineering Ethics

Specificity versus The Absolute

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Biomedical Engineering

- **As Engineering**, it is about the modification of nature
- **As Biology**, it is about understanding nature
- **As Medicine**, it is about promoting or restoring health

Ethics

“A Science which shews those rules and measures of human actions which lead to true happiness...”

N. Bailey’s Dictionary (1730)

“The doctrine of morality; a system of morality”

“Morality; the doctrine of the duties of life”

Samuel Johnson dictionary (1755)

“The morality of an action is founded on the freedom of that principle, by virtue of which it is in the agent’s power, either to perform or not perform [an action]”

Ibidem, Quoting South’s Sermon

Origins of ethics

- **Ethimological**: ← character
- **Evolutionary**: Darwin: Ethics \leftrightarrow Cooperation
 - Advantages
 - Kin-relatedness
- **Innate**: Huxley: Rebellion against our animal nature
- **Modern**: cooperation even with low relatedness

Ethics: the science and practice of moral duty

- Ethics toward whom? or what?

Nature?	Group?
Species?	Family?
Nation?	Others?
	Individual?
- On what “authority?”
Ethics *versus* Law?

- How do we harmonize different authorities?
- How do we harmonize them across different cultures?

Kant: *Ideas of happiness or well-being not the same for all people*

40,000 years of cultural evolution have produced very different views of “authority” in different cultures

Is there an overriding absolute ethics at the top of an ethics pyramid?

- An absolute good?
- A categorical imperative?
- What is its “authority”?

- **Religion is a powerful authority, but an ethics based on religion is not absolute, as it would vary from religion to religion.**

e.g.

- **Tenets about killing**
- **Tenets about the environment**
- **Tenets about the place of women**

Quests for Absolute Ethics

- **Reason (Kant)**

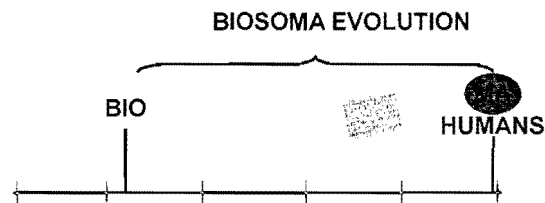
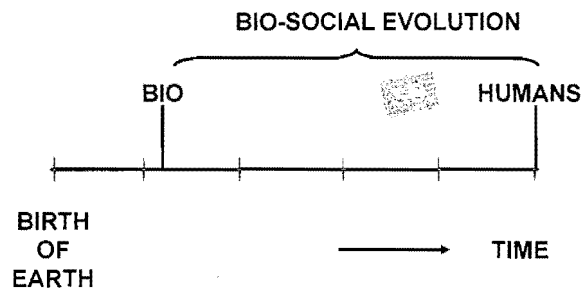
- **Evolutionary Ethics**

**e.g., Hauser's Organic Ethics
deWaal**

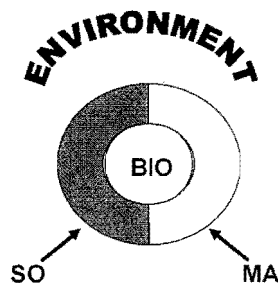
**Search for traits common to several species
(e.g., empathy, sense of fairness, community concern)**

- **Biosoma Ethics**

Bio-Social and Bio-Socio-Machine (BIOSOMA) Evolution



Biological organisms (humans), their Society and Machines have come to form an indissoluble synthesis: the BIOSOMA



Biomedical Engineering:

- Is the biosoma activity *par excellence*
- Is well positioned to develop a possible framework for:
 - an absolute ethics
 - addressing specific ethics questions
 - connecting the absolute and the specific

Some absolute Biosoma Ethics questions

- What authority stems from the bio-socio-machine evolutionary synthesis?
 - How far
 - What role
 - Responsibility to
- } machines in modifying life?
- { •other species?
•environment?

Some specific questions for biomedical engineering

BIO-SO:

- Vaccination
- Screening
- Triage
- Quality of life
-

BIO-MA:

- Technical virtuosity
- Tissue engineering
- Ergonomics
- The handicapped
- Urban environment
-

Some specific questions for biomedical engineering (cont'd)

SO-MA:

- Patents
- Reliability
-

BIO-SO-MA

- Activism, advocacy ad intellectual responsibility
- Efficiency of health care
- Medical *versus* industrial purposes (conflicts of interest)
- Hospital design
- Safety factors in design
-

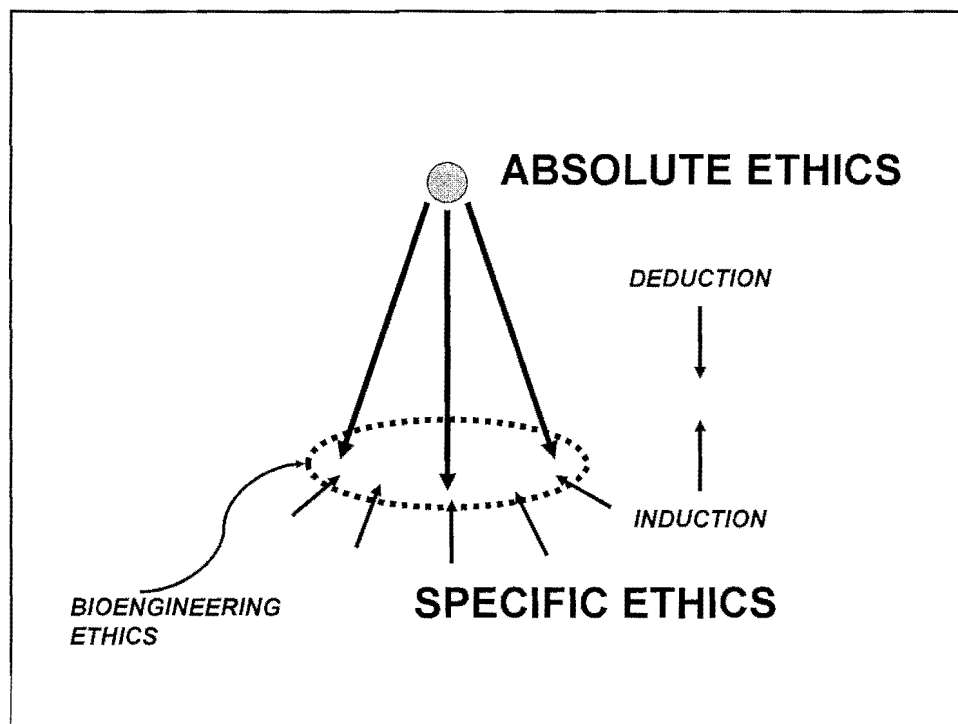
Absolute Ethics

1. May not provide *deductively* guidance for all specific situations

e.g., issues of risk
issues of empathy *versus* law

2. Need to be complemented by a set of specific ethics that:

- Address specific situations
- Case by case lead *inductively* to build new principles



Narrowing the gap between absolute and specific ethics:

- 1. Better understanding of points of conflict**
- 2. Broadening connections among specific ethics**
 - e.g., Hippocratic Oath - patents
 - Hippocratic Oath - engineering ethics
- 3. Which cultural ethics differences can be harmonized without conflict?**

The need to harmonize some issues of engineering and medical ethics

A professional engineer is not ethically obligated to make the public aware of some side effects, unless specifically asked.

**(National Society of Professional Engineers
Board of Ethics)**

- **“No morality when there is no free agency” (Kant)**
- **“Morality may...consist...in the courage of making a choice” (Blum)**
- **“Morality knows nothing of geographical boundaries or distinctions of race” (Spencer)**