Nature as Technology: A Philosophical and Historical Investigation

HIPS 29508 / HIST 29305 / ENST 29507 – Spring 2008

Instructor: Trevor Pearce (CHSS, CEB)

Course Description

This seminar explores the historical development of philosophers' and scientists' analogies between technological artifacts and products of nature. Beginning with Plato's suggestion that divine *technē* produces natural things, we will examine the claim, which extends from ancient philosophy to present-day science, that nature is a kind of technology. For thinkers like Descartes and Leibniz, God was a divine engineer; likewise, some modern biologists and philosophers have interpreted natural selection as a kind of engineering or tinkering. Once we have analysed these various historical perspectives, we will be in a better position to discuss recent debates in biomechanics and engineering over the pros and cons of a technology that attempts to mimic nature.

Texts

Vogel, Steven. *Cats' Paws and Catapults: Mechanical Worlds of Nature and People* (1998). (some copies available at the Seminary Co-op, otherwise only $13 on Amazon)

All other texts will be distributed in a course packet, available in Week 1.

Requirements

10% Participation: Each week, and for each assigned text, a student (selected the previous week) will arrive with several questions to open discussion. The 10% also includes general participation and mandatory attendance.

10% Abstract: In Week 5, students must hand in an abstract (~250 words) of their proposed paper topic. I will have individual meetings in Week 6 with each student to discuss these abstracts, offer suggestions, etc.

80% Final Paper: The final paper, which should be 3500-4000 words (~15 pages), will be due on June 11 at 12pm (June 2 in class for graduating seniors). Students are welcome to meet with me at any time during the quarter to discuss their paper.

Office Hours

Mondays, 4:30pm-5:30pm (Fishbein Center / Social Science 205) and by appointment.

Schedule

(Note: although this may look like a lot of reading, it's no more than 40-50 pages per week)

Week 1: Introduction

- no reading

Week 2: Aristotle and his followers

- Aristotle, *Physics*, Book II, Chapters 1-3 & 7-8
- Aristotle, *Meteorology*, Book IV, Chapter 3
- Avicenna, *Book of the Remedy*, excerpt
- Hermes, *Book of Hermes*, excerpt
- Pseudo-Geber, *Summa Perfectionis*, Sections 7-10
- Bacon, *Description of the Intellectual Globe* (1612), Chapters 1-3

Week 3: God as engineer, nature as machine

- Descartes, *Discourse on Method* (1637), Part V
- Descartes, *Principles of Philosophy* (1644), Part IV, §§203-207
- Hobbes, *Leviathan* (1651), Introduction
- Boyle, *Free Enquiry into the Vulgarly Received Notion of Nature* (1686), Section I
- Leibniz, "New System of the Nature of Substances and their Communication" (1695)
- Leibniz, "Principles of Nature and Grace Based on Reason" (1714)

Week 4: Kant and the *Technik* of nature

- Browne, *Religio Medici* (1643), Section 16
- Kant, "First Introduction" (~1789), Parts IX-X
- Kant, *Critique of the Power of Judgment* (1790), §61, §§64-66, §§71-72, §§77-78

Week 5: Romantic nature and art

- Goethe, "Simple Imitation, Manner, Style" (1789)
- Schiller, *On the Aesthetic Education of Man* (1795), Letter VI
- Schiller, "On the Naïve" (1795)
- Schelling, *System of Transcendental Idealism* (1800), Parts V-VI

Week 6: Chemistry and organic synthesis

- Sennert, *Chymistry Made Easie and Useful* (1662), Chapters 1-2 & 11
- Cudworth, *The True Intellectual System of the Universe* (1678), pp. 155-157
- Berzelius, *Traité de chimie*, (1831), Volume 5, pp. 1-14 (excerpts)
- Dumas & Liebig, "Note sur l'état actuel de la Chimie organique" (1837)
- Berzelius, *Traité de chimie*, (1849), Volume 5, pp. 5-7
- Berthelot, *Chimie organique fondée sur la synthèse* (1860), xi-xii, xvii-xxviii

Week 7: Evolution and complex systems

- Simon, "The Architecture of Complexity" (1962)
- Jacob, "Evolution and Tinkering" (1977)
- Dennett, *Darwin's Dangerous Idea* (1995), Chapter 8
- Manne & Pimm, "Ecology: Engineered Food Webs" (1996)

Week 8: Functions

- Wright, "Functions" (1973)
- Cummins, "Functional Analysis" (1975)
- Lewens, "Adaptationism and Engineering" (2002)

Week 9: Comparative Biomechanics

- Lauder, "The Argument from Design" (1996)
- Vogel, *Cats' Paws and Catapults* (1998), Chapters 1-2, 11-14

Week 10: Biomimicry

- Choose two articles from list (to be provided)