

Wednesday 1 June 2005

9.00 to 12.00

HISTORY AND PHILOSOPHY OF SCIENCE (1)

Classical Traditions in the Sciences

Before you begin read these instructions carefully:

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Classical Traditions in the Sciences

SECTION A

1. Were the sciences transformed by printing?
2. What roles did universities play in the conduct of the pre-modern sciences?
3. Did religion drive the study of nature?

SECTION B

4. What was a scientific instrument in the pre-modern period?
5. Were certainty and incontrovertibility sensible goals for ancient investigators to set themselves?
6. **Either** (a) Discuss the role of empirical observation in ancient Greek investigations of nature.
Or (b) Compare the methods and approaches of Theophrastus's investigations of nature to those of Aristotle.
7. Who practised mathematics in the ancient Mediterranean world? How do we know?
8. What effects did patronage have on the development of astronomy in the ancient and medieval Middle East?
9. **Either** (a) How did Avicenna pursue his ontological investigation?
Or (b) How did Alhazen resolve the dispute between the mathematicians and natural philosophers in his theory of visual perception?
10. What was astrology for?
11. 'The rise and subsequent rapid spread of the concept of the "Scientific Revolution" was an analytical tool expressly forged for grasping the essence of modern science' (FLORIS COHEN, 1994). Discuss.
12. When did the classical traditions end, and why?

END OF PAPER

Thursday 2 June 2005 9.00 to 12.00

HISTORY AND PHILOSOPHY OF SCIENCE (2)

Natural Philosophies: Renaissance to Enlightenment

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Natural Philosophies: Renaissance to Enlightenment

SECTION A

1. “The science of Nature has been already too long made only a work of the Brain and the Fancy: It is now high time that it should return to the plainness and soundness of Observations on material and obvious things” (ROBERT HOOKE, *Micrographia*). To what extent was Hooke’s recommendation taken up in the seventeenth and eighteenth centuries?
2. What was the effect of religious belief on the pursuit of natural knowledge in the seventeenth and eighteenth centuries?
3. Who studied natural history before 1800, and why?

SECTION B

4. **Either** (a) What were the differences between natural magic and natural philosophy in early modern Europe?
Or (b) Who practised magic in early modern Europe and to what ends?
5. “I should like my income to be from writing books” (GALILEO GALILEI). Were natural philosophers authors?
6. **Either** (a) How was the development of natural philosophy in the seventeenth and eighteenth centuries affected by communication between scientific academies?
Or (b) “An occult philosopher is essentially an intellectual deviant”. Discuss with reference to seventeenth century England.
7. **Either** (a) Was Newton’s natural philosophy heretical?
Or (b) “Newton was eminently distinguished by his deep searches into Nature herself; he was Nature’s Son: He seemed to understand all her Mysteries, and to be sent into the World on Purpose to lead Mankind into the highest notions of the Wisdom, Goodness and Power of the Great Author of Nature” (*London Journal*, 1732). Did Newton become a great hero because he was a great scientist?
8. “We can ask whether instruments define their respective sciences, or are defined by them. When we focus on instrumentation, rather than on theory, science appears to be determined by what instruments can do”. Discuss with respect to instruments used in the seventeenth and eighteenth centuries.
9. What was the significance of the conflicts over the adoption of Western astronomical learning in seventeenth and eighteenth century China?

OVER/

10. What was the relationship between commerce and collections in the seventeenth and eighteenth centuries?
11. Why did the generation of living beings excite such interest among eighteenth-century natural historians?
12. **Either** (a) “[Explorers are] the means of extending the sphere of human knowledge... ‘knowledge is power’” (JOHN BARROW, *Quarterly Review*, 1818). Examine the relative importance of science and politics in the age of Enlightenment’s drive for exploration.

Or (b) How representative of natural historical practice were heroic travellers before 1800?

END OF PAPER

Friday 3 June 2005 9.00 to 12.00

HISTORY AND PHILOSOPHY OF SCIENCE (3)

Science, Industry and Empire

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Science, Industry and Empire

SECTION A

1. How did relations between scientific practitioners and their audiences change in the nineteenth century?
2. How did the sciences become professionalized?
3. Is modern science a product of the nineteenth century?

SECTION B

4. **Either** (a) “The past is always a fiction” (RICHARD FORTEY, 1997). Was this a problem for those promoting the scientific study of earth history in the nineteenth century?

Or (b) Did the nineteenth-century life sciences develop from natural history to biology?
5. Describe and explain the establishment, in the German universities, of laboratories for teaching and research.
6. **Either** (a) “At the present time, there are two sciences of electricity – one that of the lecture room and the popular treatise; the other that of the testing office and the engineer’s specification. The first deals with sparks and shocks which can be seen and felt, the other with currents and resistances to be measured and calculated” (JAMES CLERK MAXWELL, 1873). Were both these sciences important to Victorian physics?

Or (b) Examine the relations between new theories and experimental practices in British physical sciences between 1789 and 1914.
7. “Natural history was the most popular nineteenth-century science”. Discuss.
8. Did imperialism shape the nineteenth-century sciences or was it shaped by those sciences?
9. **Either** (a) If Darwin had never published *The Origin of Species*, would modern evolutionary theory be known as “Wallacism”?

Or (b) During the nineteenth century a wide range of media was used to promote scientific knowledge in the public sphere. Did the nature of the medium affect the science being presented?
10. “The ether is not a fantastic creation of the speculative philosopher, it is as essential to us as the air we breathe” (J.J. THOMSON, 1909). Why did the ether matter to British physicists?

OVER/

11. How did Victorians use collections of scientific instruments?
12. Did German National Socialism have “scientific origins”?

END OF PAPER

Saturday 4 June 2005 9.00 to 12.00

HISTORY AND PHILOSOPHY OF SCIENCE (4)

Metaphysics, Epistemology and the Sciences

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Metaphysics, Epistemology and the Sciences

SECTION A

1. What is the relationship between science and the philosophy of science?
2. 'From the philosopher's perspective, the similarities between the sciences are far more significant than the differences.' Discuss
3. Why does science work?

SECTION B

1. How does the question of what would have happened if event *c* had not occurred bear on the question of whether *c* caused *e*?
2. **Either** (a) Do all and only causes explain?
Or (b) How do functions explain?
3. Are laws of nature necessary truths?
4. Is testimony a generative source of knowledge?
5. Perceptual beliefs are typically formed without conscious inference. Can the same be said for testimonial beliefs?
6. 'General propositions do not decide concrete cases.' (OLIVER WENDELL HOLMES, Jr., 1905) If this is true, what is the point of having general propositions?
10. **Either** (a) Is the principle of natural selection a tautology? If so, is this a problem?
Or (b) Are evolutionary ideas applicable to the explanation of human behaviour?
11. **Either** (a) 'When it comes to induction, the rational is the same as the reliable.' Discuss.
Or (b) Is arguing that a theory is likely to be true because it has been empirically successful any better than arguing that my lottery ticket is likely to win because the first two numbers have come up?
12. Why does a white swan provide less reason to believe that all ravens are black than does a black raven?

END OF PAPER

Wednesday 1 June 2005

1.30 to 4.30

HISTORY AND PHILOSOPHY OF SCIENCE (5)

Science and Technology Studies

Before you begin read these instructions carefully:

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Science and Technology Studies

SECTION A

1. Whose technology is it anyway?
2. Is scientific knowledge socially constructed?
3. Why do scientists make measurements?

SECTION B

4. What can maps tell us about the social production of knowledge?
5. With reference to the history of contraceptives, assess the roles of designers and users in technological innovation.
6. Discuss the politics shaping the design and use of artificial insemination in the twentieth century.
7. Is finitism the central idea of the sociology of scientific knowledge?
8. What, if anything, is social about " $2 + 2 = 4$ "?
9. 'A new device merely opens a door; it does not compel one to enter' (LYNN WHITE, Jr., 1978). Discuss this statement with respect to the sociology of technology.
10. 'Agency is both evaporated and condensed in the investigative process' (PETER GALISON, 2000). Does this mean that individuals are not to blame for accidents?
11. **Either** (a) Is mathematics necessarily literate?
Or (b) 'The basis of the art of measuring lies in the experience of the agent' (FRONTINUS, c. 80 CE). Discuss.
12. **Either** (a) How illuminating is it to speak of 'indigenous' people and 'indigenous' knowledge?
Or (b) 'Scientists are white men in white coats'. Discuss.

END OF PAPER

Friday 3 June 2005 1.30 to 4.30

HISTORY AND PHILOSOPHY OF SCIENCE (6)

History and Philosophy of Mind

Before you begin read these instructions carefully:

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History and Philosophy of Mind

SECTION A

1. Why have the mental sciences made such fitful progress?
2. Is the mind private?
3. What determines the subject matter of psychology?

SECTION B

4. What are the main differences between the eighteenth-century concept of 'neurosis' as developed by William Cullen and the early twentieth-century one as developed by Freud? How did these differences arise?
5. How did Freud persuade patients and readers of the correctness of his views?
6. What lessons can be learned about the development of the twentieth century sciences from the fate of the psychoanalytic movement?
7. **Either** (a) Which of the two world wars had most impact on medical psychology in Britain?

Or (b) How useful is it to ascribe theories and practices of the sciences of the psyche to a concept of 'governmentality'?
8. **Either** (a) Outline the two most important objections that Turing anticipated and discussed in his paper, 'Computing machinery and intelligence' (*Mind*, 1950), placing his discussion in historical context.

Or (b) 'Our evidence for human intelligence is intelligent behaviour, so if a computer exhibits intelligent behaviour then only prejudice would keep us from allowing that it too is intelligent.' Discuss.
9. When and why should the explanation of your behaviour take into account your beliefs about why you do things?
10. **Either** (a) 'Strictly speaking, there is no such thing as an unconscious mental state'. Discuss.

Or (b) Are states of the brain the only unconscious mental states that there are?
11. Does the Knowledge Argument make a cogent case for dualism?
12. In what senses, if any, is it true to say that 'meanings ain't in the head' (PUTNAM, 1975)?

END OF PAPER

Saturday 4 June 2005 1.30 to 4.30

HISTORY AND PHILOSOPHY OF SCIENCE (7)

Medicine from Antiquity to the Enlightenment

Before you begin read these instructions carefully:

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Medicine from Antiquity to the Enlightenment

SECTION A

1. 'From Greek Antiquity to seventeenth-century Europe, the chief weakness of medical practices of all types was the lack of a recognized institutional base.' Discuss
2. How would the history of medicine before 1750 have been different had women been educated at universities?
3. 'The best physicians provide good advice and little medicine.' Discuss this view in relation to the historiographic notion of a medical marketplace.

SECTION B

4. If you had fallen ill in the fifth century BC in Greece, by whom would you have preferred to be treated, and why?
5. 'Byzantine medicine had become a tradition, a burial of talents. The culture of the mistress of the world in this period was imitative, hoarding and stereotyped.' Discuss.
6. "With the arrival of the plague in Europe, medical expectations outstripped medical realities." Discuss.
7. Compare and contrast the ways doctors and patients communicated in 1640 and 1375.
8. Compare and contrast the medical responses to melancholy and pregnancy in early modern Europe.
9. How and why did the relationship between clergymen and healers change between 1300 and 1700?
10. What was the definition of a cure in early modern Europe?
11. If Harvey's discovery of the circulation of the blood was the most important discovery in anatomy and physiology, why did almost no-one accept it at the time?
12. **Either** (a) [See over for portrayal of riot at Royal College of Physicians, 1767] What does this portrayal of the "riot" at the Royal College of Physicians in 1767 tell us about the structure of professional medical practice in London in the mid eighteenth century?
Or (b) Compare the structure and functioning of traditional Catholic hospitals on the Continent and the voluntary hospitals of eighteenth century Britain.

OVER/



“THE SIEGE OF WARWICK-CASTLE; OR THE BATTLE BETWEEN THE FELLOWS & LICENTIATES.”

Portrayal of riot at Royal College of Physicians, 1767

Speech bubbles read as follows: (a.) “These Northern Locusts want to Govern every where”; (b.) “My fingers itch to be at them”; (c.) “D_m their Scot’s Pills! They have ruin’d the Constitution of England”; (d.) “They pretend to cure the King’s Evil”; (e.) “St George’s Composing Pills prepared by Dr Gillam”.

END OF PAPER

NATURAL SCIENCES TRIPOS Part II

Thursday 2 June 2005 9.00 to 12.00

HISTORY AND PHILOSOPHY OF SCIENCE (8)

Modern Medicine and Biomedical Sciences

Before you begin read these instructions carefully:

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Modern Medicine and Biomedical Sciences

SECTION A

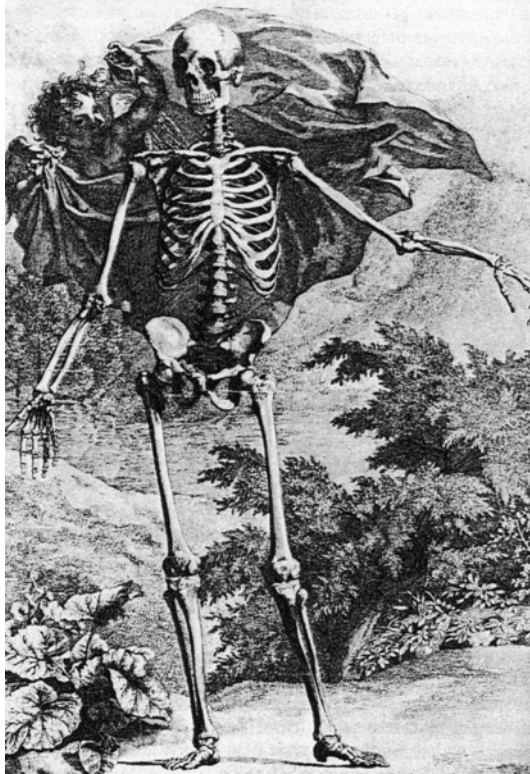
1. 'Soap and painkillers were the most revolutionary innovations of nineteenth century medicine.' Were they?
2. 'Illness may be socially constructed, but disease is a biological fact.' Draw on the history of medicine in the nineteenth AND twentieth centuries to assess this claim.
3. 'All professions are conspiracies against the laity' (GEORGE BERNARD SHAW, *The Doctor's Dilemma*, 1906). Does your understanding of the history of modern medicine support this view?

SECTION B

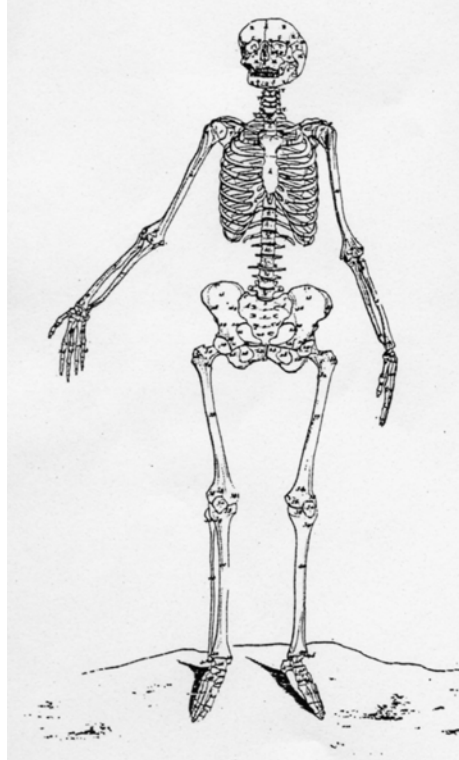
4. Why do disciplines change? Discuss with reference to the career of anatomy between c. 1780 and c. 1820.
5. '[T]he most powerful of [all remedies] ... consists in the art of subjugating and taming the alienated ... by placing him in a strict dependency upon a man who, by his physical and moral qualities, is apt to exercise on him an irresistible empire and to change the vicious chain of his ideas.' (PHILIPPE PINEL, Year IX) Is this conception the foundation of all psychiatry, then and now?
6. With reference to **Either** pictures 6a and 6b **Or** picture 6c [shown on the next page], discuss how and to what extent science constructed 'difference' (sexual, racial, ethnic, class, etc.) in the eighteenth and nineteenth centuries, and what social ends these representations served.
 - 6a. 'Human skeleton' by Bernard Albinus (1747);
 - 6b. 'Female skeleton' by Thiroux d'Arconville (1759);
 - 6c. 'Faces of criminality' by Cesare Lombroso (1889).
7. How, and with what consequences, did anatomists create representations of human embryonic development?
8. Were doctors natural advocates of the poor? Discuss with reference to the history of public health in mid-nineteenth-century Britain and Germany.
9. What were the roles of gender in the making of modern medical professions?
10. 'In the second half of the nineteenth century major surgery was made safe.' How and by whom?
11. How did agendas of 'national efficiency' affect medical policy in interwar Britain?
12. 'Challenge authority!' (bumper sticker). How and why has modern Western medicine been challenged since 1960?

OVER/

6a. 'Human skeleton' by Bernard Albinus (1747)



6b. 'Female skeleton' by Thiroux d'Arconville (1759)



6c. 'Faces of criminality' by Cesare Lombroso (1889)



END OF PAPER

NATURAL SCIENCES TRIPOS Part II

Thursday 2 June 2005 9.00 to 12.00

HISTORY AND PHILOSOPHY OF SCIENCE (9)

Images of the Sciences

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Images of the Sciences

SECTION A

1. Why have people claimed that science is pure and disinterested?
2. Has the history and philosophy of the sciences been useful to scientists?
3. 'The scientific culture really is a culture, not only in an intellectual but in an anthropological sense... there are common attitudes, common standards and patterns of behaviour, common approaches and assumptions.' (C.P. SNOW, *The Two Cultures*, 1959). Discuss.

SECTION B

4. In what senses can a philosophy of science be counted as an ideology? Discuss with reference to one or more of a) the positivism of Comte and Mill; b) nineteenth-century German scientific materialism; c) the logical positivism of the Vienna Circle.
5. Is it permissible for historians of science to appeal to present-day scientific knowledge in interpreting and analysing past works of the sciences?
6. **Either** (a) In what sense, if any, can Kant be said to have been a scientific realist?
Or (b) How do we know about the interactions of bodies? Discuss with reference to Hume and/or Kant.
7. Discuss some of the ways in which sociologists and social historians related science to society prior to World War 2.
8. Photography presents 'only the plain unvarnished truth; the actual is absolutely before us' (*Art Journal*, 1858). Were photographs trusted to provide reliable evidence?
9. **Either** (a) 'There is no *first truth* to be discovered here; there are only *first errors*... I am the limit of my lost illusions...' (GASTON BACHELARD, 1934). Is the history of science the history of errors?
Or (b) 'It is comforting, however, and a source of profound relief to think that man is only a recent invention, a figure not yet two centuries old, a new wrinkle in our knowledge, and that he will disappear again as soon as that knowledge has discovered a new form' (MICHEL FOUCAULT, 1966). Discuss.

OVER/

10. 'The price of metaphor is eternal vigilance.' Discuss with respect to evolutionary conceptions of the sciences.
11. '... as it is impossible for me to see or feel anything without an actual sensation of that thing, so it is impossible for me to conceive in my thoughts any sensible thing or object distinct from my sensation or perception of it' (BISHOP GEORGE BERKELEY, 1710). Discuss.
12. What are the main difficulties of a purely empiricist theory of personal identity such as Locke's?

END OF PAPER

Thursday 2 June 2005 1.30 to 4.30

HISTORY AND PHILOSOPHY OF SCIENCE (10)

Science and Technology from the First World War

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Science and Technology from the First World War

SECTION A

1. Is the twentieth century better described as the century of the Bomb or the century of the gene?
2. Does it matter who funds science?
3. 'Science in itself is not political, only the applications of science'. Is this true of the twentieth century?

SECTION B

4. **Either** (a) Was the founding of corporate research laboratories in the early 20th century a case of vertical integration?
Or (b) Account for the emergence of cybernetics as a discipline.
5. Are "totalitarian science" and "totalitarian technology" useful concepts?
6. Is the modern evolutionary synthesis best described as a marriage between Mendel and Darwin; between Mendelism and Darwinism; between laboratory and field science; or, between Soviet and American fruit-flies?
7. **Either** (a) Did the change in public attitudes to science in the 1960s have a bigger impact on the physical or life sciences?
Or (b) Which has had the greater impact on the conduct of science since the 1960s, social movements or journalists?
8. Which animal or plant had the greatest impact on twentieth-century biology?
9. What is the precautionary principle and can it be justified?
10. Why did Ba'thist Iraq invest so heavily in science?
11. **Either** (a) Are consensus conferences the right way to involve the public in decision making about science and technology?
Or (b) Is every citizen an expert in questions of science policy?
12. Is the distinction between treatment and enhancement an ethically significant one?

END OF PAPER