HPS 1b Senior Examiner's Report

June 2009

1. Summary

The examination process went smoothly with minor exceptions. One medical incident was reported in an examination, but required no action by the examiners. One script for Paper 2 only arrived after marks had been submitted to the NST. This matter was referred to the Applications Committee. There was one "surprise" script, which was marked along with the rest and referred to the NST. Scripts were marked in a timely fashion and marks were agreed with the assistance of the External Examiner, to whom the Paper Examiners are grateful. Minutes of all examiners' meetings were agreed and kept as recommended in the 2004 Senior Examiners' Report and in the Guide to Senior Examiners issued by the NST.

2. Classes

Classes are not awarded by HPS 1b Examiners but the agreed marks fall into the following classes according to the NST classing criteria, shown here alongside previous years.

Class	2009	2008	2007	2006	2005	2004
1	15	7	16	13	13	9
(70-100)	18%	12%	27%	19%	13%	9%
2i	37	27	22	29	46	56
(60-69)	45%	46%	37%	42%	47%	52%
2ii	26	25	22	27	35	40
(50-59)	32%	42%	37%	39%	35%	37%
3	3	0	0	0	4	0
(40-49)	4%	0%	0%	0%	4%	0%
Fail	1	0	0	0	1	0
(0-49)	1%	0%	0%	0%	1%	0%
Total	81	59	60	69	99	107

Overall numbers were higher this year than they have been since 2004-5. These figures include four students taking papers by special leave, two taking papers not for honours, and one "surprise" student about whom no information was received.

The NST requires that 60% of candidates receive a mark of 60.0 or above, to one decimal place, with a deviation < 2 scripts. This requirement was met.

Since 2005 Senior Examiners' Reports have included a gender breakdown. This year's breakdown is as follows.

Class	2009		2008	
	M % of total	F % of total	M % of total	F % of total
1	10 12%	5 6%	2 3%	5 9%
2i	22 27%	15 19%	11 19%	16 27%
2ii	12 15%	13 16%	11 19%	13 22%
3	2 2%	1 1%	0 0%	0 0%
Fail	0 0%	1 1%	0 0%	0 0%
Total	46 57%	35 43%	25 42%	34 58%

(The surprise candidate is not included since their gender is unknown.)

Almost the same number of women took the course as last year, and achieved almost the same class distribution (after scaling). But the gender balance basically reversed this year. In addition, men achieved more firsts (though the highest first went to a woman) and fewer lower seconds. However, in a group of this size and volatility, caution should be exercised in attaching significance to these figures.

3. Answers

There were many competent scripts this year, but relatively few outstanding ones. Stronger answers combined an impressive degree of knowledge with analytic rigour and direct treatment of the question at hand. Weaker answers suffered from lack of relevance and an understandable but unfortunate tendency to regurgitate lecture material without properly engaging the question. Students need careful advice on this point. Clearly knowledge *is* necessary for a good answer, and the best answers appealed to considerably more material than the worst. However, the difference between a 2i and a 2ii answer often depends, not on the quantity of material employed, but *how well* that material is used to answer the question. This is especially the case when the same material is used by a very large number of students.

3. (a) History

General Remarks

We were pleased to see that many candidates deployed material from across the whole chronological range of the paper, especially in Section A questions. We would now welcome the introduction of lectures on ancient Greek science, both in its own right and as a means to helping students make better sense of the Early Modern period.

The vices and virtues of hypothetical questions

Not so strong students are seriously disadvantaged by these questions, since they lack the skills to deal competently with these questions. This may be regarded as a good way of distinguishing sheep from goats, but examiners should be aware that the ‘what

if' question (used frequently on this year's examination) is like an unexploded bomb in terms of the answers it receives.

Many students accused these hypothetical questions (e.g. "Would the history of medicine be different if Vesalius had anatomised dogs instead of humans?" or "Why did it take Charles Darwin to formulate the theory of evolution by natural selection?") of being explicitly or implicitly "Whiggish". What they appear to mean by this is that these hypothetical questions require taking distance from the actual facts of history and weighing up what was important or unimportant about these collocation of facts; at other times, they thought any judgement about history was inherently Whiggish, because it deploys criteria other than those available to the historical actors (necessarily so, in the case of counterfactual questions).

Endemic errors

- Most candidates wrote that the mechanism of Lamarckian evolution was the inheritance of acquired characteristics.
- 'Science' did not exist before the C19. A number of students stated that 'science' was invented by Whewell.
- Misuse of the term 'Whiggish'.
- The Royal Society was a gentleman's club from its inception and remained so into the C19 and beyond. The Royal Society was the first scientific society.
- Listing is nearly always a 2.2 trait.

Question-specific comments

SECTION A

1 Have institutions or individuals played the greater role in the history of science? (55 answers)

The most interesting answers displayed the complex interplay between institutions and individuals, and distinguished between different kinds of institutions and their positive and negative roles. Many middling candidates spent far too much time trying to resolve the puzzle that institutions are constituted by individuals; the weakest saw individuals and institutions as a simple dichotomy.

2 "Science knows no country" (Louis Pasteur). How has science travelled? (24 answers)

The best answers disputed the thesis by showing the close links between nation, empire, place, and scientific endeavour. Poorer answers focused exclusively on the technologies of translation and communication, often deteriorating into lists.

SECTION B

3 Who was involved in the production of knowledge in ancient and medieval Iraq? (18 answers)

The best answers acknowledged royal and divine involvement along with the practitioners and saw that knowledge production could take many different forms, which could involve rote learning and practices. The weakest omitted or conflated one or more of the periods specified in the question and/or took a arbitrarily restricted view of knowledge.

4 Would the history of medicine be different if Vesalius had anatomised dogs instead of humans? (12 answers)

One good answer emphasised that Vesalius's acheivement was not so much refutation of Galen but rather the production of high-quality, detailed images that became exemplary. Middling answers over-emphasised the break with Classical tradition, viewing Vesalius' refutation of Galen as his crucial contribution.

5 **Either** *(a)* Who observed the heavens in Early Modern Europe, and why? (8 answers)

There were no outstandingly strong or weak answers to this question. The best gave a wide range of examples, including courtiers, astrologers, astronomers, and navigators. Many candidates thought that learned astronomers (in particular Copernicus) never made any observations of the heavens until Tycho, despite having written about the systematic achievements in astronomy of the Abbasid court many centuries earlier.

Or *(b)* Was there anything novel about the uses of experiments and instruments in the seventeenth century? (32 answers)

Good answers, of which there were a number, emphasised "twisting the lion's tail" and the institutional context of the new experimental practices. They also explored continuities and disjunctions between earlier alchemical and magical experimentation on the one hand and measuring instruments on the other. The weakest gave an unreflective narrative account of the early Royal Society. Most candidates used Bacon and the Royal Society as their principal example.

6 **Either** *(a)* When, where and how did science become a profession? (19 answers)

Weak answers sometimes stated that the term 'science' was invented by Whewell in the 1830s – they confused 'science' and 'scientist'; they also appeared not to realize that this emphasis on the introduction of the term 'scientist' has historical significance principally in connection with the development of the scientific profession. They did not distinguish between being paid and being a professional. The better answers emphasised state funding (France) and the research training supplied by university (Germany). Clearer teaching on the historical sociology of professionals (doctors, lawyers, priests etc.) would be helpful here.

Or *(b)* "During the nineteenth and early twentieth centuries, the study of life moved from the garden and the field to the laboratory and the hospital." Do you agree? (9 answers)

Almost no students understood the historical significance of the term 'garden', and almost none addressed the early twentieth century. The question might have been more intelligible to students if its time frame had been specified as "the *late* nineteenth and early twentieth centuries…". Answers that devoted much space to the French hospitals of the early nineteenth century were not often satisfactory answers to the question.

7 "New social relations produce new views of disease." Discuss with reference to nineteenth-century medicine. (12 answers)

No candidate failed to produce the account of a shift from eighteenth-century medicine to early nineteenth-century hospitals, but candidates didn't often deal well with the relationship of the hospital to the lab in the late nineteenth century.

8 Why did it take Charles Darwin to formulate the theory of evolution by natural selection? (45 answers)

The form of the question provoked many candidates to rather mediocre historiographical commentaries, seeing "Whiggism" in the very wording of the question. Better answers always made use of Wallace to highlight the issues raised by the question, and gave good accounts of early nineteenth-century theories of evolution, as well as Darwin's social context.

9 **Either** *(a)* “We will no longer tolerate intimidation by white-coated gods, antiseptically directing our lives” (Washington D.C. Women’s Liberation, 1970). What difference has feminism made to science, technology and medicine since the 1960s? (no answers)

No candidates answered this question.

Or *(b)* “In technological change users are more important than designers.” Discuss with reference to the history of nuclear weapons, oral contraceptives, or both. (21 answers)

There was no inherent advantage in focusing on one topic or on two. The strongest answers addressed change as well as technology, and revealed some of the complexities in the designer-user relationship. Several of the better users highlighted the gap between intended and actual users of the pill; interestingly no candidate suggested that it was the inhabitants of Hiroshima and Nagasaki who were the ultimate 'users' of ‘the Bomb’ on analogy with the consumers of ‘the Pill’.

10 **Either** *(a)* Why were physicists so well funded in the decades immediately after the Second World War? (30 answers)

The weakest answers restricted themselves to narrative accounts of the rise of 'big science' in the 20th century, declaring that Big Science arrived with the Manhattan Project. Some of the strongest saw that the question was about physicists rather than physics, and addressed the move of physicists into the life sciences after the Second World War and the development of a funding-savvy culture in physics. Other good answers distinguished between different subdisciplines of physics, and/or contrasted the USA with the UK and Europe.

Or *(b)* Why wasn’t the structure of DNA discovered before 1953? (16 answers)

There were two sorts of good answer to this question. One type focused on the twin histories of molecular biology and genetics; the other gave sophisticated accounts of the technological developments, institutional contexts and interpersonal relationships around the key figures in the discovery. Some weak answers answered the question in the style of the introductory historical remarks to a molecular biology textbook. Students should be made aware in lectures and supervisions of the possible dangers of deploying their scientific knowledge in this way, while recognizing that such use of their scientific knowledge can be extremely useful and could be encouraged more generally. A litmus test for the relevant kind of historical sensitivity in relation to this question was awareness of the difference between ‘classical’ genetics and ‘molecular biology’.

11 How have drugs changed the treatment of mental disorders since the 1950s? (16 answers)

The question provoked a very wide range of types of answers. One type of successful answer placed the introduction of psychotropic drugs in the context of a review of the history of treatments going back to the early nineteenth century. Those that focussed solely on the period from 1950 to the present often risked forgetting that the question was about history, albeit recent history, and sliding into a critical commentary – sometimes extremely well-informed – on contemporary psychiatric drug cultures. Sometimes these answers degenerated into a self-opinionated rant and were marked down accordingly.

12 To what extent do environmental science and environmental politics have separate histories during the twentieth century? (no answers)

No candidates answered this question.

3. (b) Philosophy

General Remarks

This year's performance was not especially strong, with few performances regarded by the examiners as first class and no exceptional performances. Section A questions were not particularly well answered, and often invoked a generalised essay about Popper, Kuhn, Lakatos and Feyerabend. In Section B, questions on Michaelmas Term topics proved popular. The most popular question was 9 ("Compare Popper and Kuhn's view of scientific progress"). There was a general tendency to employ the same examples in certain contexts, although some originality even in quite bad scripts in choice of examples for questions on causation and induction. The better scripts displayed a reasonably impressive grasp of important concepts and a wide range of relevant knowledge.

Question-Specific Comments

Section A

1 "It is a capital mistake to theorise before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts" (Sherlock Holmes). Is this good advice for scientists?

38 answers. Good answers took this question in various directions, but generally proceeded beyond a literal interpretation of the advice in an effort to identify and evaluate an underlying methodological principle. Bad answers did not progress beyond the point that Holmes' advice is impossible to follow if interpreted literally; or else progressed only by claiming that the advice was good despite being impossible to follow. Another trait of bad answers was an indecisive conclusion, failing to be clear whether or how the advice was good for scientists.

2 Is philosophy of science about what science is, or what it ought to be?

43 answers. Many answers to this question referred to the views of Popper, Kuhn, Lakatos and Feyerabend. This was a reasonable though unimaginative interpretation of the question. Some answers noted that the question *itself* could be answered in either a descriptive or a normative way, though this was rare. Bad answers simply dumped material on the views of actual philosophers and concluded that some thought one thing while some thought another. Better answers attempted an argument,

for example relating actual methodological positions to suggested functions that philosophy of science might perform.

Section B

3. 36 answers across these two questions.

Either *(a)* Is any regularity theory of causation defensible?

Good answers set out the regularity theory well and took the discussion beyond stock objections, either defending a regularity view or developing some more decisive objection and defending another view (usually counterfactual). Bad answers included a lot of material on counterfactual theories without sufficiently indicating its relevance.

Or *(b)* Evaluate the "best system" account of laws of nature.

Good answers set the best system account out clearly, distinguishing it from naïve regularity views, and linked it to the role of laws in explanation. Bad answers focussed excessively on the naïve regularity view of laws and stock objections, at the expense of evaluating the best system account.

4 Is induction rational if it is reliable?

53 answers. Surprisingly few students appeared able to parse this question despite its popularity. Some good answers addressed the question directly, taking induction to be reliable and asking how this bore on its rationality, usually by considering whether the reliabilist justification of induction made it rational to use induction. Another good strategy was to argue that induction was rational regardless of whether it was reliable. Bad answers simply rehearsed (or attempted to rehearse) reliabilist justifications of induction, and took it for granted that induction was rational if it was reliable.

5 Do all of an event's causes explain it?

25 answers. Good answers discussed contrastive theories of explanation, with a surprising degree of nuance. Bad answers included a lot of irrelevant material on the DN model, along with stock objections to that model, and cited causal explanation as a desirable alternative while ignoring the question.

6. 38 answers across these two questions.

Either *(a)* Does evolutionary psychology provide good reasons for thinking there is a single human nature?

Answers to this question were generally quite well done, although choice of examples was limited. Good answers engaged comprehensively and critically with the evidence. Bad answers cited the opinions of participants in the debate without much critical analysis.

Or *(b)* Does inference to the best explanation demand assent to the intelligent design hypothesis?

This question was generally well done. Every essay used the same example (the bacterial flagellum), which was a pity, but this could have been due to its prominence in the literature. Good answers made a comprehensive and compelling case, invariably against assent. Bad answers drifted into irrelevant discussions of the merits of IBE and cited stock arguments against ID in an unconvincing way. Only one answer recommended assent to ID.

7. **Either** *(a)* Do social interests explain what is accepted as scientific knowledge?

Or *(b)* Faced with the sociology of scientific knowledge, is it rational to become an epistemic relativist?

4 answers across these two questions. Numbers are too small to make generalisations about performance.

8. **Either** *(a)* What, if anything, does the Experimenters' Regress show?

Or *(b)* Can knowledge be both scientific and tacit?

5 answers across these two questions. Numbers are too small to make generalisations about performance.

9 Compare Popper's and Kuhn's views of scientific progress.

58 answers. The most popular question, answered fairly but not imaginatively. This was a difficult question to do very well on. Good answers achieved a thorough comparison and noted that neither view has an obvious place for a notion of progress. Bad answers simply dumped material on Popper and Kuhn, with superficial comparison.

10 How can Platonists know mathematical truths?

5 answers. Numbers too small to make generalisations, although examiners were generally impressed that students attempted this question.

11 Why is Poincaré said to be a conventionalist about physical geometry?

3 answers. Numbers to small to make generalisations, although examiners were generally impressed that students attempted this question.

12 "The only ethical problems in science concern its application." Discuss.

15 answers. Good answers explored the various ways that ethical problems feature in various parts of the scientific process. Bad answers were less subtle, failing to make (or attack) a meaningful distinction between science and its application, and running through stock ethical problems associated with science in a disorganised way.

4. Other matters

The NST 1b Guide for Senior Examiners and the Department's own Guide are both useful documents. Nevertheless, there are certain features of the process that are both specific to both HPS and 1b examining. Accordingly it might be helpful for future 1b Senior Examiners to have a simple document listing the procedures and timeframe of the 1b examining process. I would be happy to provide a draft if the Board wishes.

The Examiners also had fruitful and wide-ranging discussions about the educational emphasis of HPS at 1b level. Since these concerned teaching as well as examining, I have documented them in a separate Appendix.

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