

NATURAL SCIENCES TRIPOS

SENIOR EXAMINER'S REPORT

SUBJECT: History and Philosophy of Science

Senior Examiner: Dr Stephen John

Examiners: Professor John Forrester, Professor Hasok Chang, Dr Helen Curry,
Dr Natalie Kaoukji, Dr Tim Lewens

Structure of the examination:

The History and Philosophy of Science examination is composed of two written papers, of equal weight, History of Science (Paper 1) and Philosophy of Science (Paper 2). There is no practical component to this examination.

This year, 62 students sat both papers, four of these students took the exam as part of the Part II Physical Sciences Tripos. One student (for the Education Tripos) sat only Paper 1. There were two withdrawals. 10 candidates sat the exam at College or in a computer room.

Conduct of the Examination:

The running of the exam was very smooth, apart from one incident where a candidate fell ill during the Philosophy of Science exam. S/he completed the examination at College.

The timetabling was adequate, although we were left with quite a tight deadline for marking scripts: based on past experience, we had expected the exams might be held a week earlier.

In each exam, students must answer one question from Section A (q1 or q2) and ten questions from Section B (q3-12). The number of students taking each question are listed below.

History of Science

Question	1	2	3	4	5	6	7	8	9	10	11	12
No. of answers	38	25	6	11	29	22	8	45	15	4	34	12

Philosophy of Science

Question	1	2	3	4	5	6	7	8	9	10	11	12
No. of answers	13	49	26	22	31	3	7	36	16	7	20	19

Marking/Scaling:

Each paper was marked by two examiners, who then agreed an overall mark for that paper; the marks for each paper were then combined to give an overall mark for the entire paper. There was no divergence from pre-agreed marking and classing criteria.

The overall distribution of marks was as follows (excluding Part II Physical Sciences students and the one student who took only the History paper):

First	2i	2ii	Third
8	27	21	2

Average = 61.5; Standard Deviation = 7.8

There was a slight difference between the mean mark for History and Philosophy papers. However, the examiners were happy to note that, in general, there was a good correlation between performance on the two papers, and between the rankings for History and the rankings for Philosophy scripts. It was particularly noteworthy that of students who received a First overall the majority had received First Class marks in both papers.

Subject Examiners' Meeting:

The Subject Examiners' meeting, which was held on the morning of 12 June 2013, was attended by all examiners in full. There was no extended discussion of borderline candidates.

Administration:

We did not have any administrative problems and received very useful support throughout the process from staff in HPS and NST.

Detailed comments on examination performance

Overall, examiners for both History and Philosophy papers thought that this year's cohort of students was comparable to those in recent years. The overall distribution of grades was:

1 st	2i	2ii	3 rd
8	27	21	2

When disaggregated by gender, the mark distribution was

	Male	Female
1 st	6	2
2i	15	12
2ii	11	10
3 rd	2	0

When corrected for the overall numbers of male candidates (34) and female candidates (24), it seems that men were very slightly more likely to get a 1st or 2i than women (i.e. 61% versus 59%). It was interesting to note that two men but no women received a third.

As ever, however, many students fell into the trap of answering the questions which they wished had been set, rather than the questions which were set, and, often, students simply repeated material from lecture handouts, rather than using lecture material as a starting point for their essays. It was good to see that the best students not only avoided these flaws, but also interrogated terms and concepts used in questions, and this practice should be encouraged. It was notable that the best answers were not necessarily the longest: students should be encouraged to remember that they are rewarded for the soundness of their arguments and their use of examples, rather than for the amount of material they produced. Conversely, however, several students provided notes, rather than full essays in response to questions (most notably in the History paper): this may be a result of time management issues, but it is important to note that notes – however interesting – cannot be marked as equivalent to an essay. Finally, several students had very poor handwriting, which, despite the

examiners' best efforts, made it hard to judge their performance. Comments on each paper are below.

Paper 1: History of Science

Overall, the examiners were pleased with performance in the History paper, although the use of notes in place of full essays was more pronounced in this part of the assessment. Examiners also noted that the use of the term "development" in three of the twelve questions waylaid some of the more fastidious students.

Q1. This was the more popular of the two Section A questions. Examiners noted that a significant number of students had difficulty with the term "needs" and the question would probably have been better if it had more clearly directed students toward state- or market- level economics (rather than the financial imperatives of individual scientists). As compared to question 2, question 1 invited more varied and unexpected answers.

Q2. This was generally well-answered, with less variation than question 1, perhaps because it related more obviously to a set of lectures on the specific question of Universities.

Q3. Some students were confused by the phrase "make of" in the question but others used its deliberate ambiguity to good advantage in answering the question.

Q4. This question was well answered in general, with better answers giving a full context for the eminence of the university at Padua.

Q5. This was a popular question. Good answers first identified multiple reasons why natural philosophers might have performed experiments, and then explored each of these in turn. The best answers set their responses against Aristotelian understandings of experiments. Weaker answers assimilated experiment and observations and stronger answers articulated why that assimilation is valid.

Q6. Some candidates had difficulty with the term "role": it was variously understood as the role of the astronomer, the role of astronomy, and the role that historians have given to astronomers. Very few candidates, surprisingly, dealt with astrology.

Q7. This was not a very popular question and answers were relatively poor. Many students used it as an occasion to relate all of their knowledge about Newton, without specific attention to the aims of the question.

Q8. This was by far the most popular question, but responses were relatively uniform. Students were too ready to regurgitate prepared material about Darwin. Many were confused about Wallace, specifically where he fitted into this history and his knowledge of Malthus.

Q9. Many of the better answers to this question identified the different audiences who would have been the target of bacteriologists' efforts, and understood this to be a significant part of the question. There were weak answers which included a variation on the claim that bacteriologists convinced audiences of the reality of disease-causing germs because it was true that germs cause disease.

Q10. This was not a very popular question, and answers showed some confusion about what is meant by "applied science." Stronger answers identified both eugenic and agricultural applications of early genetics.

Q11. The answers to this question tended to be overly formulaic, especially with regards to the relationship between physics and biology after the bomb. Some students responded with reference

to the ethics of science/technology (and of individual scientists), or the effects on science/technology in general, neglecting the request for answers tied specifically to "scientific disciplines."

Q12. Responses to this question were competent but not outstanding.

Paper 2: Philosophy of Science

Overall, the examiners were pleased by the performance of this year's cohort. However, it was notable that students often confused different terms, and should be reminded of the importance of coherent and clear terminology in answering philosophical questions.

Q1. In general, this question was not well-answered, although the best answers did some interesting work in problematising the assumption that it is possible to distinguish different sciences in the first place.

Q2. This question was competently answered by many candidates, with a wide range of different answers to the question suggested. The very best candidates excelled by distinguishing different ways in which philosophy might have "lessons" for scientific practice.

Q3. This was a popular question, but too many answers were unfocussed, simply listing different solutions to the demarcation problem, rather than arguing for which was best.

Q4. Again, it was notable how many candidates seemed to ignore the question's request for "the best" argument, instead listing several arguments and counter-arguments from the literature.

Q5. This was a popular question, with some very good answers. The best candidates scored well by distinguishing different forms of commensurability and different senses of progress. The worst answers tended to define incommensurability and progress in very non-standard ways.

Q6. This question was not at all popular, with wide variation in the answers received.

Q7. Again, this was not a particularly popular question, but when answered, it was answered well. It was notable, however, that very few students fully discussed the nature of "observational studies" to focus instead on Randomised Control Trials, although the question specifically asked for a comparison.

Q8. This was the most popular question and was usually answered well. Some students let themselves down, however, by writing an essay on flaws with Popper's claim that science doesn't use induction, without linking this concern explicitly to the question asked. Furthermore, many students seemed to use technical terms- rationality, justification, knowledge – in idiosyncratic ways.

Q9. There were some very good answers to this question. Weaker students tended to discuss issues of observability and measurement in general, rather than problems arising in modern physics specifically, despite the question's focus on the latter.

Q10. There were few answers to this question, all of which were uniformly weak: students often failed to focus on the concept of rationality as employed in modern economics, preferring to engage in open-ended metaphysical speculation.

Q11. This was a very popular question, to which there were some excellent answers. The very best students brought in material not covered in the lecture course, and were rewarded for such displays of understanding.

Q12. Answers to this question ranged widely. Students often failed to focus on the question of *sufficiency* specifically. Also, many students seemed to confuse problems of implementing informed consent procedures with problems for claiming that truly informed consent is sufficient for research to be ethical.

Conclusions and Recommendations:

Overall, examining proceeded smoothly this year. We do not have any recommendations concerning the conduct of the examinations. Future subject examiners should be aware of the fact that there was significant “bunching” in the questions answered this year, and may wish to take this into account in setting exam scripts in future. Furthermore, the practice of having two examiners’ meeting – an informal meeting to agree provisional marks for each paper and then the formal meeting where we consider the overall markbook – worked very successfully this year. We have no recommendations to take forward to the NST Management Committee, nor any for the Board of Exams.

Date:

(Additional information may be required by Faculty Boards (e.g. question level data); this is not needed by the Chairman of Examiners but can be included if it is easier to provide one report. Faculty Boards may publish certain information and may therefore require content to be presented in a particular format.)