Qualifications and Curriculum Authority

Inter-subject comparability studies

Study 2a: A level biology, psychology and sociology

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Contents

1 Personnel

The team comprised seven reviewers, with as even a spread as possible across the three subjects in terms of their main subject. They were recruited primarily through advertisement but also included one found by approaching an awarding body from which syllabuses did not form part of the study. In addition there was an existing senior QCA consultant who was asked to act as lead consultant. All the reviewers were able to consider a pair of subjects in the study. The names of participants are provided in Appendix A.

2 Materials

The syllabuses reviewed were selected on the basis of the size of candidate entry.

Table 1 The syllabuses used for the study

	Biology	**Psychology**	**Sociology**
Awarding body and syllabus	OCR (3881/7881)	AQA (5181/6181)	AQA (5191/6191)

3 Methodology

3.1 Form A

Form A was used to provide a factual analysis of the syllabuses, question papers and mark schemes. A major modification to Form A was carried out in the light of suggestions made by QCA's expert group, which advises on QCA's work in monitoring standards and comparability. Previously, each reviewer had completed a detailed factual analysis of the syllabus and assessment materials, responding to prompts on Form A and logging their responses on the forms. For this study, the majority of the factual analysis was conducted by QCA staff as a desk research exercise and was printed on Form A. The resulting forms were reviewed by the lead consultant and reviewers then completed sections where comment was required. This modification was judged to be very successful as it enabled reviewers to spend their time and focus their attention on making judgements about issues relating to comparability.

Reviewers completed one Form A for each subject they considered.

3.2 CRAS analysis

The CRAS analysis was used to enable the reviewers to reach judgements about the cognitive demand of the question papers, based on the nature of the questions, rather than the subject content. Reviewers were asked to assess the extent to which question papers made demands in terms of:

- the *complexity* of the processes required to answer a question
- the extent to which the *resources* needed to answer the question were provided on the paper
- the level of *abstractness* of questions
- the extent to which candidates were required to generate a *strategy* in their answers.

To do this, they used a numerical scale and recorded their judgements on forms designed for the purpose.

When this method of analysis was originally used in QCA standards reviews, a four-point scale had been used. Inter-subject comparability studies 1a and 1b used a ten-point scale. For this study, the ten-point scale was judged to be unwieldy and unnecessary (its main purpose had been to encompass work ranging from GCSE foundation tier to A2) and the four-point scale was judged to be too narrow to enable meaningful distinctions to be made. It was decided to use a six-point scale, which gave sufficient scope for more finely tuned

judgements, while retaining the use of an even number scale to force reviewers to make clear decisions rather than choosing a middle point.

Reviewers were given a detailed explanation at the initial briefing about each aspect of the CRAS analysis and there was a general discussion about the ways in which the demands of a particular question could be manipulated by making adjustments to the question in terms of *complexity*, *resources*, *abstractness*, or *strategy*. Several examples were discussed.

For this study, the lead reviewer had prepared a study-specific additional briefing, using a number of selected questions to try to bring the team to a shared understanding about the application of the numerical scale. This pilot, which attempted to standardise reviewers' criteria for making judgements, was well received by reviewers, who found that it increased their confidence in making the numerical judgements. It was also largely successful in that the judgements of the individual reviewers showed no significant differences of opinion about the particular numerical ratings.

Reviewers commented positively on the initial meeting, arguing that it gave them a clearer, shared understanding of the nature of each of the criteria for the CRAS analysis and of the application of the numerical scale used in this study.

4 Findings of the review of examination materials

4.1 CRAS analysis

A summary of the CRAS analysis is found below.

Table 2 Average CRAS ratings for biology

By unit	Complexity	Resources	Abstractness	Strategy
Unit 1	3	2.6	2.3	2.3
Unit 2	3	3	2.3	2.3
Unit 3	3	3	2.3	2.6
Unit 4	3.3	3.3	2.6	2.6
Unit 5	2.6	3	2.3	2.6
Unit 6	3.6	3	3	2.5
Overall				
AS units	3	2.8	2.3	2.4
A2 units	3.2	3.1	2.6	2.6

Table 3 Average CRAS ratings for psychology

By unit	Complexity	Resources	Abstractness	Strategy
Unit 1	3.6	3.6	3	3
Unit 2	3	3	3	3
Unit 3	2.6	2.3	2.3	1.6
Unit 4	5	4.3	4.6	4.3
Unit 5	4.6	4.2	4.3	4
Unit 6	Coursework			
Overall				
AS units	3.1	3	2.9	2.5
A2 units	4.8	4.2	4.4	4.1

Table 4 Average CRAS ratings for sociology

By unit	Complexity	Resources	Abstractness	Strategy
Unit 1	3.6	3.6	3	3.3
Unit 2	3.3	3.3	3.3	3
Unit 3	3	2.6	2.6	2.3
Unit 4	5	4.5	4.5	4.1
Unit 5	3.6	3.3	3.3	3.3
Unit 6	5.3	5	5	4
Overall				
AS units	3.3	3.2	3	2.9
A2 units	4.6	4.2	4.3	3.8

Table 5 Summary for AS units

	Complexity	Resources	Abstractness	Strategy
Biology	3	2.8	2.3	2.4
Psychology	3.1	3	2.9	2.5
Sociology	3.3	3.2	3	2.9

The summary from the CRAS forms suggests that the sociology question papers were the most demanding at AS level, followed by the psychology papers and then the biology papers. However, reviewers were concerned to point out that the biology question papers and mark schemes took a very different approach from those in psychology and sociology. The biology question papers and mark schemes were judged to be less demanding mainly because they were made up primarily of closed questions with limited opportunities for candidates to demonstrate higher level analytical and evaluative skills in extended writing. Reviewers argued strongly that this was balanced by the very high knowledge demand of the biology question papers.

Table 6 Summary for A2 units

	Complexity	Resources	Abstractness	Strategy
Biology	3.2	3.1	2.6	2.6
Psychology	4.8	4.2	4.4	4.1
Sociology	4.6	4.2	4.3	3.8

Again, reviewers emphasised that the biology question papers, although apparently less demanding in terms of CRAS analysis than the sociology and psychology question papers, had a very high knowledge demand. Demand in the psychology and sociology question papers was very similar, with psychology judged to be slightly more demanding.

Reviewers considered progression from AS to A2:

Table 7 Progression from AS to A2

	Complexity	Resources	Abstractness	Strategy
Biology	+0.2	+0.3	+0.3	+0.2
Psychology	+1.7	+1.2	+1.5	+1.6
Sociology	+1.3	+1	+1.3	+0.9

In terms of the increase in demand from AS to A level, the CRAS analysis suggested that the smallest step increase in demand was for biology and the most for psychology. In general, the small increase in demand in the biology papers reflected the fact that there was little change in approach to assessment between AS and A2. For biology, the increase in demand came from the knowledge dimension rather than style of assessment.

4.2 Assessment objectives

At AS level, biology had three assessment objectives (although one related specifically to practical work), whereas psychology and sociology had two each.

At A2, biology had four assessment objectives, whereas psychology and sociology had only two. Again, one biology assessment objective related specifically to practical work, while the fourth was concerned with synoptic assessment.

Overall, reviewers judged that, in spite of the differences in the number of assessment objectives, overall they were of similar demand.

4.3 Previous subject knowledge

There were clear demands for previous subject-specific knowledge in biology, but not in psychology or sociology. Reviewers judged that this did not necessarily impact on the overall demand of the subjects.

Reviewers did express concern that, in the case of sociology, it was possible to answer almost all of the two-mark questions on the basis of non-specialist knowledge. This was not the case for either biology, where even short-answer questions were judged to be very demanding in terms of specific subject knowledge, or psychology, where students could use knowledge of everyday situations in their responses, but had to make clear the link to psychological principles in order to receive credit.

While it was accepted that a small number of marks could legitimately be made available for very weak candidates, concern was expressed that, where grade boundaries were narrow, these marks could make a difference of a grade.

4.4 Syllabus content

In terms of the content to be covered, given the combination of intellectual and practical skills required for biology, the syllabus was judged to be the most demanding. Further, each unit required candidates to have studied a range of topics, putting additional pressure on teaching time. The nature of the question papers, with all questions being compulsory, meant that centres had to ensure that they covered all content, in appropriate depth and detail.

Psychology and sociology were judged to be less demanding, in terms of the volume of content to be covered and the fact that candidates had some choice in the questions they answered might reduce some of the pressure to cover all the content in depth and detail.

However, reviewers reached these judgements with a clear caveat. In the case of biology, candidates were building on a body of subject knowledge from GCSE and the question papers, both at AS and A2, gave some credit for GCSE knowledge. In the case of sociology and psychology, no previous subject-specific knowledge was assumed and it would be very unlikely that candidates had studied either subject at GCSE.

In the case of sociology, candidates could receive credit for non-specialist knowledge (as discussed below), which might reduce the demand. This was not the case, however, for psychology, where all responses had to be couched in clear psychological terms. This, it was judged, would make psychology demanding, as all the content would, effectively, have to be learned as ‘new’ by the candidate.

Content in AS units

The AS level in sociology offered candidates a choice of subject areas in Units 1 and 2 and then a choice of coursework or a written examination in Unit 3. The majority of centres chose 'Families and households' for Unit 1, 'Education' for Unit 2 and the research methods coursework for Unit 3. This was judged to be potentially rather narrow.

Psychology also offered candidates a choice of questions from different topic areas, but it was judged that, in comparison with sociology, psychology candidates would need to demonstrate a wider and deeper knowledge of psychological principles to gain credit at AS level.

At AS, the biology syllabus demanded a considerable breadth of specific biological knowledge and the lack of choice in the question papers made the knowledge demand of biology very high.

It was judged that, in terms of the language used, the biology and psychology syllabuses could be very challenging for candidates. Candidates were expected to be familiar with a range of technical terms. In the case of sociology, at AS level, there was less emphasis on technical language.

Biology used a large number of short, structured questions and sociology used data-response type questioning, based on short passages. Both approaches guided candidates in their selection of material for a response. In the case of biology, reviewers judged that, as long as candidates had learned the necessary material, the questions should enable them to demonstrate their knowledge and understanding. In the case of sociology, although some concern was expressed about some of the short-answer questions demanding no more than comprehension of the passage, it was judged that the question should enable candidates across the ability range to demonstrate their knowledge.

Overall, reviewers judged that the content of the sociology and psychology syllabuses were appropriate for AS level, they judged that the content of the biology syllabus was very demanding and this demand was increased by the fact that, across AS papers, there was no question choice.

Content in A2 units

Concern was expressed about the possibility of candidates offering and being given credit for GCSE knowledge in responses to A2 biology questions, whereas candidates responding to psychology and sociology questions on A2 papers would be addressing unfamiliar material. This potential problem was mitigated, however, by the very high demand of the remainder of the A2 biology content. Again, while reviewers judged that the syllabus content demands for both sociology and psychology were appropriate for A2, they judged that the syllabus content demand for biology was high.

Overall content

All syllabuses gave clear indications of the content for each unit. In terms of breadth of content, reviewers found that biology was the most demanding, with some reviewers suggesting that it was overly demanding.

When taking into account breadth *and* depth of content, reviewers judged that psychology was the most demanding.

Overall, however, reviewers judged that all three syllabuses had an appropriate depth of content.

4.5 Progression from AS to A level

The CRAS analysis showed that the biology papers were not significantly more demanding at A2 than at AS. In terms of the structuring of the questions, there was very little difference between AS and A2, but reviewers judged that this was balanced by the demand of the content. So the outcomes of the CRAS analysis need to be seen in tandem with the nature of the subject content. Reviewers argued strongly that the issue was not that biology was less demanding than sociology or psychology at A2, but that it was probably rather too demanding at AS, where its relatively similar demand in terms of CRAS rating made no allowance for the very demanding content.

In the case of sociology and psychology, the demands of the A2 assessment materials were significantly higher than the demands of the AS assessment materials, both in terms of the structuring of the questions and the demand of the content.

Reviewers were concerned, however, about the possibility of sociology candidates being able to repeat material from the AS Unit 3 in the A2 Unit 5 and that this would have a negative impact on the overall demand of the assessment.

4.6 The nature of the assessment materials

Reviewers judged that it was difficult to make comparisons between the biology question papers on the one hand and the sociology and psychology papers on the other. As had been raised at the initial briefing, using the notion of a hierarchy of skills, from knowledge/understanding, through analysis, to evaluation, the biology question papers were judged to be less demanding than the sociology and psychology papers. Further, using the CRAS analysis, the biology questions were again found to be less demanding, particularly in terms of *abstractness* and *strategy*, as the biology question papers tended to use more concrete, short-answer questions and gave fewer opportunities for extended writing.

Reviewers judged, however, that the biology papers were, in fact, very challenging. While the short-answer structure of many of the biology questions was held to be helpful to candidates, the high level of very detailed and specific subject knowledge required, combined with a prescriptive mark scheme and the fact that all questions were compulsory, made the biology

papers very difficult. The structure of the questions did make them accessible, but candidates had to have very clear and specific knowledge to answer them.

In terms of accessibility, sociology and psychology question papers were judged to be broadly comparable, with clear attempts having been made to ensure a range of question types to allow candidates from across the ability range to access the paper and demonstrate their knowledge and skills. The more open nature of the questions and the mark schemes in both sociology and psychology meant that candidates were able to select their own material to use when responding. This could be judged to be less demanding than for biology, as sociology and psychology candidates could, in some sense, 'hide their ignorance'. Reviewers judged, however, that weaker candidates would be unlikely to be able to do this and, in the case of psychology, the stringent demands of the mark schemes for candidates to couch their responses in appropriate psychological terminology and theory should prevent this. Overall, reviewers judged that the sociology question papers and mark schemes were the least demanding. This judgement was made on the basis of the proportion of marks available for non-subject specific knowledge and, in the case of data-response questions, comprehension.

In terms of the language demand of questions and, where appropriate, source materials on question papers, reviewers judged that biology and psychology were broadly comparable in terms of demand, with biology students having to deal with more demanding numerical and graphical material, and psychology students having to deal with a range of materials of different types, with a high technical language demand. Reviewers found that sociology question papers were marginally less demanding at AS, although broadly comparable at A2 in this respect.

In terms of the language required of candidates in their answers, sociology and psychology both made heavy demands of candidates, with a mixture of short answers and extended writing required. This made both subjects demanding in terms of candidates' ability to select information and organise ideas. In biology, there was no great emphasis on the skills of extended writing, even in the case of essay questions, where the focus of the mark scheme was on content and 'marking points', with relatively little emphasis on and very few marks available for the quality of written communication.

The biology mark schemes were extremely prescriptive and this was a function of the style of questioning. They were very precise, with specific guidance about the responses expected from candidates and the concepts that should be included. This could be helpful to teachers, as they can use published mark schemes to give them very clear indicators about how they

should prepare their students for examinations. Students should also be able to use previous question papers and mark schemes as revision aids.

The sociology and psychology mark schemes were less prescriptive, but, again, this was a function of the type of questioning. Where candidates were asked to produce extended writing as a response, examiners used 'levels of response' mark schemes and found the best-fit mark band. While this approach was entirely appropriate for marking purposes (assuming there was adequate standardisation of markers), it meant that the mark schemes were less useful for teachers as teaching aids and less useful for candidates as revision aids.

Further, in the case of biology, where there was very limited choice on the question papers and mark schemes were very prescriptive, candidates' responses were, generally, either right or wrong, and candidates either knew the answer or did not. In the case of sociology and psychology, however, with more open questions and mark schemes, candidates could select their questions on the basis of their knowledge and, in some cases, structure their answers to ensure that they could display their knowledge and, as far as possible, hide their ignorance.

4.7 Coursework

Although it was beyond the scope of this review to consider coursework in detail, reviewers noted that there were potentially significant differences between the subjects in this area. Psychology had mandatory coursework at both AS and A2, whereas sociology allowed candidates to choose between a coursework option and a written paper option.

The psychology syllabus gave very clear guidance to candidates about how marks were allocated for the Unit 6 coursework, enabling centres to guide their candidates.

Reviewers judged that the combination of independent research skills in coursework and the assessment of practical skills made biology slightly more demanding than sociology and psychology. While there was some concern that the high level of guidance given to psychology candidates in the syllabus might reduce the demand of the coursework option, the need for candidates to demonstrate analysis and evaluation in both qualitative and quantitative contexts would probably maintain the rigour. The coursework demands for sociology were judged to be appropriate.

4.8 Optionality

For biology candidates, with the exception of some choice in the essay question, all questions on all papers were compulsory. Sociology and psychology candidates could choose a route through the papers.

In the case of sociology, concerns were raised about the most common route through the AS papers: 'Families and households' for Unit 1 and 'Education' for Unit 2. It was suggested that both of these units would present candidates with material which, because of their own recent personal experiences, would be familiar to them. This could lead to candidates being credited for non-specialist, experiential knowledge.

In the case of psychology, it was judged that although some of the more potentially demanding areas in terms of content (for example, physiological psychology) could be avoided through a careful choice of options, there was no clear 'easier' route through the syllabus.

Reviewers were concerned, however, about the possibility of both sociology and psychology candidates having studied a relatively narrow range of content, depending on the route through the syllabus selected by the particular centre. This was not possible for biology. On the one hand, this might leave sociology and psychology candidates less well prepared for progression to a psychology or sociology degree course than biology candidates for progression to a biology degree course. On the other hand, however, given that neither sociology nor psychology degree courses require potential undergraduates to have studied the subject to A level, this might not be an issue.

4.9 Time

Reviewers judged that, although candidates for biology had to answer a considerable number of questions, the relatively limited requirement for extended writing meant that the time available for each paper was appropriate. The same was the case for sociology which, although it had a greater reading demand in terms of volume than either biology or psychology, gave candidates sufficient time. Reviewers found that psychology was the most demanding in terms of time pressure per question.

4.10 Synoptic assessment

In the case of both psychology and sociology, the synoptic units required candidates to make links between different aspects of the course. However, reviewers were concerned that the level of choice in the non-synoptic units meant it was possible to select a relatively small range of subject areas and, effectively, ignore others. This meant that candidates could receive credit for demonstrating knowledge of the subject as a whole, while not addressing important aspects. Further, because the synoptic unit had to be accessible to candidates who had studied a range of different units, the questions tended to be generic. Reviewers were

concerned that these generic questions would become very predictable and lead to prepared responses.

In the case of biology reviewers judged that the synoptic unit made appropriate demands in terms of the coverage of material from the non-synoptic units. Candidates had to select this material and apply it in a given context and reviewers judged this to be demanding for candidates.

4.11 Overall syllabus and assessment materials comparison

Overall, reviewers judged that biology demanded the greatest breadth of detailed knowledge, requiring students to demonstrate high levels of recall. It did not, however, make the same evaluation/interpretation demands as sociology or psychology.

Sociology was judged to be, potentially, very demanding, because of the requirement to contextualise judgements in appropriate theory. Reviewers were concerned, however, that non-contextualised, commonsense responses could receive too much credit and also that the most popular route through the AS would give candidates too much opportunity to write uncritically, from their own experience. The lack of prescription and apparent leniency of the mark schemes added to overall concern.

Psychology did not give candidates credit for anecdotal knowledge, but, instead, the mark schemes made clear demands for candidates to use correct technical terminology and couch their answers in appropriate psychological theory. Reviewers judged that psychology was technically demanding.

In the case of psychology and biology, the question papers made use of complex concepts, from which candidates could neither infer nor guess answers and this rigour was maintained by demanding mark schemes. This was not clearly the case in sociology.

5 Findings of the review of candidate work

5.1 Materials and methodology

Awarding bodies provided the complete examination work of candidates who had been awarded just a grade A and just a grade E overall. At AS, this meant candidates who had gained 240 and 120 uniform marks in total, with even performance across the units. For the A level candidates, the specification for the work was that it should comprise candidates who had gained 240 and 120 uniform marks in their A2 units, irrespective of the overall grades obtained. Because coursework was not included in the review, the specification for the selection of candidates indicated that their performance should be at the relevant pro rata uniform mark scale scores on the externally assessed units. (Although it does not represent a separate qualification, A2 material was used partly for pragmatic reasons and partly because it is graded to a distinct standard, different from both A and AS levels.)

It should be noted that the sociology scripts supplied for the study were from candidates whose results were somewhat better than those gained by other candidates. It is unclear what effect this might have on the judgements that the reviewers were required to make.

The final factor to bear in mind is that the nature of the assessments for sociology and for biology were very different. This is made clear in Section 4 of this report: reviewers were clear that much of the demand in the biology examinations lay in the large volume and high cognitive level of the subject knowledge required. In this study, the question papers for biology were found to be relatively undemanding in the CRAS analysis. This accurately reflected differences in the approach to assessment, but the reviewers stressed that this did not fairly reflect the actual impact of the examinations on the candidates, because the factors used in the CRAS analysis did not address subject content. However, although the reviewers recognised this, it is hard to know what impact it had on their judgements.

5.2 Outcomes at AS and A2

Because the work seen was, broadly, at each of the two key grade boundaries, the analysis focused on outcomes at those grade boundaries rather than comparing performance across a range of marks.

Once the analyses were complete the outcomes were standardised to make it possible to evaluate them. The process involved comparing the points on the mark range judged to be equivalent using the standard uniform mark scale (UMS). In this case, biology was treated as the anchor subject, so that work gaining just an E or just an A in biology (deserving 40 and 80 per cent UMS respectively) was compared to the uniform mark that work judged to be of

comparable standard in the other two subjects would have been awarded. In Table 8, candidates producing work of the same standard as that which would gain just an E at AS biology would have gained marginally more uniform marks in both psychology and sociology, although the differences were very slight.

Table 8 shows the uniform percentage marks gained by candidates judged to be equivalent across the three subjects at AS.

Table 8 Percentage marks judged to be equivalent across three AS subjects

Subject	Equivalent mark at E	Equivalent mark at A
Biology	40.00	80.00
Psychology	40.99	79.89
Sociology	40.46	79.11

The table shows that there was very little difference in standard across the three subjects at either grade. Any differences were well within the reliability of operational marking and, more importantly, the confidence limits of this study.

Table 9 shows the uniform percentage marks gained by candidates judged to be equivalent across the three subjects at A2.

Table 9 Percentage marks judged to be equivalent across three A2 subjects

Subject	Equivalent mark at E	Equivalent mark at A
Biology	40.00	80.00
Psychology	37.36	79.30
Sociology	43.87	88.62

Table 9 shows that the position at A2 was rather less consistent. At grade A, sociology candidates were judged to be weaker than those in the other two subjects, which were virtually in line. At grade E, sociology candidates were again slightly weaker, while those in psychology were slightly stronger. The differences at grade E were small, however.

Quite how much weight should be placed on the findings for sociology is hard to establish, especially in the light of the reservations expressed previously. What is perhaps more interesting is the fact that the analysis suggested that standards in biology and psychology were very well aligned across the grade range in both the AS and A2 examinations. Given that the initial impetus for this work was the suggestion that students were turning away from conventional science and mathematics to psychology because it was perceived to be the soft

option, the study suggests that this perception has little basis in fact, at least in terms of the demand of the examinations and the grading standards set.

Appendix A: Reviewers

Teresa Keogh (lead consultant)

Rita Chinnery

Sue Hocking

Fiona Jones

Mike Kilbride

Wendy Shepperson

Janet Smith