STUDY SKILLS IN PROJECT BASED ASSESSMENT

AT PRIMARY LEVEL

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ABSTRACT

Study skills in project based assessment at primary level

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The present study examines aspects of assessment and study skills at primary level through the production and evaluation of a set of project-based materials for 8 to 11 year olds. The materials, entitled The Prismaston File, were prepared for use in the Curriculum Provision in Small Primary Schools (PRISMS) Project, and represent an attempt to expand the curriculum coverage and range of assessment techniques available to primary teachers. In addition there was a need to extend study skills research into the primary age range and to provide a direct link between study behaviour and performance, thus avoiding past dependence on self-report methodology and examination results. The Prismaston File attempted to achieve these aims by adopting an integrating theme for a variety of multiple choice exercises and structured tasks and by permitting the study process to take place in normal classroom conditions. Acceptable levels of reliability and concurrent validity were achieved.

Data was collected from 418 lower and 544 upper junior school children in nine LEAs. Study behaviour was examined through children's tabulated records of their use of resources, friend and teacher help. Over half of the children were able to make these records appropriately, and the results showed that the vast majority of these could use the materials independently, especially in the upper age range. Classroom observation supported this interpretation but revealed some difficulties amongst the younger age group in assimilating unanticipated information.

Factor analysis of the multiple choice data revealed a wider range of factors than could be accounted for by tested achievement in basic skills alone. Four factors emerged from the analyses of both the upper and lower junior versions and were explained primarily in terms of study contexts. These factors represented different aspects of graphicacy and literacy, as well as different levels of task engagement. These results are discussed in terms of the importance of assessing children's performance in a wide range of topics, modes and curriculum areas, and of linking process and product by means of observation and children's own records. It is suggested that teacher-made project-based assessment linked to attainment targets can provide a vehicle for National Curriculum assessment in the primary classroom.

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CHAPTER ONE

Educational Assessment in the Primary Phase

Introduction

The decade prior to the introduction of the National Curriculum witnessed a marked increase in testing in primary schools. Studies of teachers' attitudes to testing during that period, revealed scepticism about the value of tests, especially where test results conflicted with teachers' judgements of children (Gipps et al., 1983; Steadman and Goldstein 1983). Recent proposals for a system of national assessment have increased anxiety about the potential uses of children's test scores for teacher appraisal if tests remain unrepresentative of what the teachers aim to teach (Dockrell, 1986). Thus, a potentially broad National Curriculum might be implemented narrowly so as to maximise positive results for accountability and appraisal purposes if it was linked to a national assessment system (e.g. Murphy 1987). Yet, despite calls for increased accountability, it is surprising that there has been a failure to develop alternative forms of assessment which could represent teachers' aims and cover a broad span of the curriculum in the twenty-five years since the demise of compulsory selection at eleven.

This introductory chapter will present a general historical background to the work to be described in the thesis. First, the prevalence of testing in primary schools in the decade preceding the National Curriculum proposals will be described, drawing on the recent survey by Gipps et al. (1983). Next, the reasons for this return to testing will be sought in the history of assessment and testing at primary level, moving from the events leading to the introduction of mental testing, through the rise and fall of the eleven-plus to the record-keeping approach of the 1970s. After this, the alternatives to testing at primary level and the recent initiatives in assessment at secondary level will be considered. The chapter will conclude with an outline of the rest of the thesis.

1.11 The prevalence of testing in primary schools in 1980

In April 1980, Gipps et al. (1983) issued a questionnaire designed to discover the amount of standardised testing being carried out in England and Wales. It was sent to 104 Local Education Authorities of which 89 responded and information was obtained from two more. The questionnaire study revealed that a considerable amount of testing was taking place. Follow-up interviews with senior staff in 33 LEAs, and with heads and teachers of secondary and primary schools in 20 LEAs revealed that some children could be tested by as many as three different agencies; their LEAs, their schools and their teachers. At <u>LEA</u> level, 82 LEAs were found to have a policy of testing in their primary and secondary schools; 77% of these tests were at primary level. At <u>school</u> level, of 80 primary heads, representing 20 LEAs, 86% used standardised tests with whole age groups as a matter of school policy. At <u>class</u> level, 75% of the 100 teachers interviewed, whose LEAs tested reading (the most popular subject for testing), administered an additional reading test. Thus, in a school year, children may have taken formal tests two or three times in the same domain (e.g. mathematics or language).

Gipps et al. (1983) found a dramatic rise in the the number of new testing initiatives in the late 1970s. In 1976, for example, there was a sudden rise in the testing of reading. In 1977, five LEAs introduced new testing programmes for mathematics; in 1978, twenty-six LEAs did so, and overall, the number of new testing initiatives was more than double the figure of the previous year. Gipps related this increase to the political and educational events of the time, such as the reorganisation of the LEAs in 1974; the publication of the Bullock Report on language in 1975; the start of The Great Debate in 1976; and the general concern about 'standards' in the late 1970s. In addition, the introduction of the Assessment of Performance Unit monitoring programme for mathematics (see A.P.U., 1980) and language (A.P.U. 1981b), and the problem of match revealed in the HMI primary survey (DES, 1978) may have further contributed to the increases.

These events could explain an increase in testing at any of the three levels: LEA, school, or class. Anxiety that standards were falling could have led all these agencies to try to find out the position of their schools, classes or pupils in relation to others. This would not explain, however, the need for all three to administer tests to the same children in the same domain, unless they had different reasons for testing. Gipps' survey showed that there were different reasons for testing but also that there was often a mismatch between the intended use of the test results, the purposes for which the tests were originally prepared, and the actual use of the results. The most frequently tested area was reading and the tests used and their purposes will be described next.

1.12 The purpose and usage of reading tests

The most common purposes stated for the testing programmes at LEA level were monitoring and screening, but a small number of LEAs said that they were used for pupil transfer purposes, allocation of resources and record-keeping. Typically, the same test would be used for all these functions. Many heads, however, saw accountability as an unspoken reason for the LEA testing.

Young's Group Reading Test (1968) was the most popular and was used by 33 authorities. Next in popularity, were the Edinburgh Reading Test (1972-7) and the Carver Word Recognition Test (1970) which were used by ten and nine LEAs respectively. Various NFER-Nelson tests featured prominently amongst those used by the rest of the LEAs, and seven authorities reported using a diagnostic test such as that of Daniels and Diack (1958).

On sampling policy, Gipps reported that 57 LEAs, of the 80 LEAs who provided the appropriate information, tested all children in the relevant age-range. This was referred to as blanket testing as opposed to light sampling, in which a small sample of the children at the appropriate age would be tested. Nine LEAs used either a light sampling or a voluntary policy, whilst 14 LEAs reported using both blanket and light sampling.

As Gipps et al. pointed out light sampling would satisfy the requirements of a monitoring programme, and yet blanket testing was being used in a large number of authorities. For screening purposes, on the other hand, blanket testing would have been appropriate. Screening, however, requires the use of criterion-referenced tests, but the survey showed that norm-referenced tests were in use. Although norm-referenced tests such as Young's test would indicate which children were well below their age-norms, follow-up testing using a diagnostic instrument would be essential to show specific deficiencies. The Daniels and Diack test (1958) would serve this purpose where it was used, but the Bullock Report (1975) had recommended that tests over ten years old should be discarded in favour of recently written tests. Nevertheless, a large number of authorities were using tests which were over ten years old. The use of tests to assist in the allocation of resources has further difficulties. The item selection process for tests such as Youngs, or the NFER tests would be geared to eliminate items which revealed systematic differences which could be accounted for by a poor catchment area, for example, which might be compensated by an increased allocation of resources. At school level, 80 per cent of the heads and teachers gave record-keeping as the main reason for testing, whilst screening and checking children's progress were those given by by between 25 and 60 per cent. If screening was important, the results of the LEA testing programmes ought to have sufficed, but about a quarter of the heads said that they had little or no use for the LEA tests. The NFER-Nelson tests were the most commonly used by the heads, perhaps, as one head indicated, because of their easy availability rather than of any inherent educational value.

At class level, 40 per cent of the teachers interviewed used Schonell's Graded Word Reading test (1955), 10 per cent used the Edinburgh tests and 4 percent used Young's test. This continued use of the Schonell (and Burt (1938)) tests was surprising. Many of the teachers admitted that they knew that such tests, of out-of-context word recognition, were of limited value. Furthermore, since the teachers were the only group in a position to act upon the information available from a tests, it was surprising that not more used a test like the Edinburgh Reading Test which would provide a profile of scores on well-defined subtests, such as vocabulary, comprehension of sequences, retention of significant details, use of context, comprehension of main ideas. The Schonell test, however, requires only one single sheet to test a whole class; it is simple to administer; it uses spoken responses and gives almost instant results. In contrast, the Edinburgh tests are expensive, and 'the administration of the Edinburgh tests is a complex and lengthy business, requiring detailed organisation and timing.' (Hewison, 1984, p. 136). These features probably militate against their use on a wide scale.

Thus in reading at least, Gipps found that LEAs, schools and teachers provided different reasons for testing and used different, but often inappropriate tests chosen for pragmatic rather than educational reasons.

1.13 Testing in other curriculum areas

In the rest of the curriculum, the most commonly tested areas were arithmetic and English, perhaps suggesting implicitly, that any other curriculum areas were not considered worthy of testing. This emphasis on the basic skills must partially explain the undue emphasis placed on 'pure' language and mathematics skills according to the HMI survey (DES, 1978).

The narrowing effect on the curriculum of restricting curriculum content to what can be tested had been recognised in the 1890s. Seventy years on, in 1967, the Plowden Report commented that the eleven plus tests ...."lead to a narrowing of the primary curriculum, an excessive emphasis on the acquisition of measurable skills and rigid streaming" (Plowden Report, 1967, para. 412, p. 153). Unfortunately, even twenty years after Plowden, and the demise of the eleven-plus, teaching and testing were still focussed on a narrow range of activities.

1.14 The use of test results for accountability

Although the LEAs did not make this explicit, their concern to monitor standards was thought by many heads to relate to attempts to find the weakest spots both among and within their schools. About a quarter of the heads in Gipps survey said that they used both LEA and school test results for feedback on teachers' performance. Thus, the LEAs were using test results to measure school effectiveness and the heads were using them to appraise their teaching staff.

These implicit uses were also shown to be ill-served by the tests chosen. As far as school effectiveness was concerned, Madaus et al. (1980) pointed out that..." the norm-referenced nature of standardised achievement tests detracts from their usefulness in making inferences about about school, or program effectiveness, which involve inferences about group performance." (p.139). Firstly, the tests were designed to have maximum applicability across schools to ensure a sales market wide enough to meet the enormous costs of test development. Secondly, the tests are designed to inform the assessor about the results in relation to a nationwide standard. Tests were therefore required to stress skills taught and practised nationally. A test which was biassed in favour of item types practised in very few schools, or taught by a few teachers, would represent a local standard, have limited applicability and would be economically unviable. A standardised test of wide applicability would give little useful information about any particular school's or teacher's individual effectiveness in achieving their individual aims.

Dockrell (1986) takes up this point in relation to the use of tests of pupil achievement in the appraisal of teacher effectiveness. One of the examples he presents concerns the use of scores on Schonell's Graded Word Reading Test taken at the end of the infant school or beginning of junior school stage, which was when most of the reading tests were typically administered. If the teachers' fundamental aims at this stage, were to enable children to devise and carry out their own work plans, then to appraise the teachers on the basis of a test of their children's word recognition or sight vocabulary would seem inappropriate. The head, or local authority would gain some limited information about reading levels in that class, but would have no measure of a teacher's, or school's effectiveness in teaching planning skills.

To summarise this extended section on the use and abuse of tests, it is clear that tests are still much in evidence in primary education; that the children may be tested by three different agencies; and that the same tests are required to serve a variety of purposes, each of which would be better served by a separate different test, or other form of assessment geared specifically to those purposes. The current reliance on tests as a 'standard' or objective measure of performance, despite the much broader aims of primary school teachers and widespread recognition of the limitations of tests, is a paradox. It may result in part from the lack of any established alternative to testing, and also from a failure to examine the contemporary relevance of methods devised to solve problems existing nearly ninety years ago. In the next section, the history of this paradoxical state of affairs will be described.

1.2 The origins of assessment at primary level

When first introduced, tests were often an improvement on the methods they replaced. However, the practice of testing was then perpetuated until long after the original reasons for its introduction applied. The Revised Code of 1862, for example, and the 'Payment by Results' system, were introduced following the recommendations of the Newcastle Commission in 1861, to 'secure the regular attendance, sounder teaching and a wider curriculum for older pupils' (Barnard, 1969, p. 110). The schools' finances were contingent on good results in the annual tests. In spite of the injustices inherent in that model, the test results provided, in theory at least, a more just method of selection for 'good' jobs (such as minor civil service appointments) at a time when appointments were largely nepotistic. This was seen by politicians as a way to encourage people to send their children to school, and thereby to maximise the return on the ever-increasing expenditure on education.

The system of 'payment by results' lasted for almost forty years, until block grants were introduced, but, although it was dropped nearly ninety years ago, it has had lasting effects on primary teaching. Firstly, far from broadening the curriculum, it led teachers to concentrate on the 'grant-earning subjects to the detriment of other areas of the curriculum and encouraged mechanical methods in teaching' (Barnard, 1969). Recent reports such as the Inspectorate's Primary survey (DES, 1978), Barker-Lunn (1984) and the PRISMS report (Galton et al., 1987) found that basic language and computation skills still account for the major part of the primary curriculum. Secondly, according to Sutherland (1984), "Payment by results.... signalled the invasion even of the lowly elementary school by the passion for formal examinations which had been steadily gaining ground in England since the end of the eighteenth century." (p. 97).

1.21 Introduction of Mental Testing

The introduction of compulsory schooling in 1880 resulted in the accumulation of a large group of older children who could not pass the Inspectors' tests and who therefore remained in 'standard 1' with the youngest children. In 1889, the Egerton Commission recommended the setting up of special classes, or schools, for the 'feeble-minded'. The first of these was established (in Leicester) in 1892 and by 1897, 1300 children were attending special schools as other Boards followed suit (Sutherland, 1984). The problem of 'discriminating first between educable and non-educable children and then between children who could attend an ordinary elementary school and those who should be at a special school' became the subject of further government enquiry. This committee, rejecting suggestions that 'curved fingers, arched palates and lobeless ears' were indicators of mental defect, had its attention drawn to the use of mental tests.

The late nineteenth century had witnessed great interest in the measurement of physical and mental attributes. In Germany, Wilhelm Wundt was measuring perceptual thresholds and 'just noticeable differences' amongst sensory stimuli. In England, Francis Galton was measuring physical attributes such as weight, arm span, and breathing capacity, sensory characteristics such as colour discrimination, auditory thresholds, and psychological features such as judgements of length and reaction time in a search for the correlates of 'Hereditary Genius', or natural ability. Neither of these approaches, however, was very successful in identifying mental deficiency, but Galton's contributions to data analysis were of great importance. His application of the Gaussian or 'normal' curve to the distribution of mental characteristics in a population, and his development of the technique of correlation, which he expounded to the Royal Society in 1888, profoundly affected the future of psychological and educational testing.

The breakthrough in mental testing came at the beginning of the twentieth century. Spearman published ' "General intelligence" : Objectively Determined and Measured' in the American Journal of Psychology in 1904. He described his work on the determination of the structure of human abilities and the development of his method of factor analysis, to identify factors or dimensions underlying sets of correlations between different tests of mental ability. He identified a common factor underlying all the tests, which he called 'general intelligence', or 'g', as well as a number of individual factors, which he labelled 's', implying a series of specific intellectual abilities.

At the same time, in France, Alfred Binet and Victor Simon were developing mental tests which directly involved higher mental processes as a means of distinguishing children in need of special education. Their tests included vocabulary, spatial perception, memory, deductive and inductive reasoning and moral sense, and were carried out individually using spoken responses. The first set of tests was published in 1905 after various revisions, in which the children's scores were validated against teachers reports (an interesting contrast to the present status of teacher judgements). Sutherland records that Binet was sceptical of Spearman's 'g' and that he tended to stress the complexity of each individual's intellectual profile. Sutherland goes on, 'His measure of normality was for him essentially a rough-and-ready device for identifying those children who might need special help, not a definitive judgement, not a tool to discriminate between one 'normal' child and another.' (Sutherland, 1984, p. 127).

In 1909, Kerr drew attention to the work of Binet and Simon in a report for the London County Council (LCC) Education Committee and their work was taken up in England by Cyril Burt, then working in Liverpool. In 1913, the LCC created the first ever official post of psychologist, to which Burt was appointed, part-time, to 'assist in the examination of children nominated for admission to schools for the mentally defective' (Sutherland, 1984, p.55, quoting LCC committee minutes).

Between 1910 and 1920, mental testing grew rapidly, and ironically in view of Binet's views, it was quickly generalised to the testing of 'normality'. William Stern, a German, devised the 'intelligence quotient' as a simplified expression of the relationship between mental age and chronological age, and, to quote Sutherland once more, 'It was just too easy to treat the child's I.Q. as his share of 'g' precisely quantified' (p.127). Burt, in England, set about producing English norms and experimented with the production of a pencil and paper version for group administration. He administered the Binet-Simon tests to hundreds of children and published extensively on them. Meanwhile, Terman, in California, produced an American adaptation of the tests known as the Stanford-Binet tests which, some versions later is still in use.

These early developments set the scene in mental and educational testing, for the next seventy years or more. Binet's original one-to-one oral and practical tasks were the fore-runners of the diagnostic assessment still used in remedial and special education settings. In mainstream education, on the other hand, Burt's attempt to reduce this to a pencil-and-paper test, thus facilitating the testing of a large group in a short time, and Stern's neat summary of intellectual ability in a single figure provided a robust mould which constrained further developments in assessment until the 1980s. Its most far-reaching influence must have been through the eleven-plus.

1.22 The rise of the eleven-plus and the demise of teachers' judgments

In the years following the First World War, testing became more widespread. The Hilton Young Report (1920) which looked into the organisation of secondary schools recommended the introduction of tests in arithmetic and English at the age of eleven, to determine which children should have a free place. Sutherland (1984) quotes from the report: 'Common sense suggests that the limitation of the test to these two subjects minimises the risk of special preparation and prevents the examination from dominating the syllabus and methods of the primary school.' (Hilton Young Report para. 63; Sutherland p. 170).
The report goes on to say that the test of English should include composition to 'test the powers of thought as well as of expression' and that arithmetic ...' should mainly, but not wholly, take the form of problems.' The test, it was felt would assess capacity rather than attainment. Ironically, the restriction of the tests areas to two subjects resulted in those two subject areas dominating the primary curriculum for years to come.

The proposed tests were the seeds of the eleven-plus, which was intended to open secondary schools to children from state elementary schools, rather than only those who could afford the fee-paying route through preparatory school. Tests for this use appeared quickly. Burt published his group tests, Mental and Scholastic Tests in 1921. They consisted of tests of reading, spelling, handwork, writing and composition, arithmetic and a test of Graded Instructions. They were almost entirely verbal; essentially tests of reading comprehension. Significantly, even Burt still valued teachers' judgements. These words appeared in the test manual in the section on validity:

'There is no standard of comparison which can surpass or even supersede the considered estimate of an observant teacher, working daily with the individual children over a period of several months or years.' (Burt, 1962 (4th Edition), p. 249).

Ironically, but perhaps inevitably, the rise of the test was accompanied by the fall in status of teachers' reports. Godfrey Thomson, who produced a set of tests for the Northumberland Education Committee for their junior scholarship examination, promoted the use of tests for all primary age children as the means,

'...with most justice to select 11 year-old children in the primary schools for the privilege of free secondary school education ',

and in the hope that the...

'intelligence tests...might discover in those schools some children of potential secondary school ability even if their environment and their poorer primary schooling had handicapped them in the existing kind of examination' (Thomson 1921 pp 284-5, quoted in Sutherland, p.198). Other local authorities applied to Thomson for tests, and the consultancy fees he received were used to establish a trust to finance the development of what came to be the Moray House Tests.

Thomson, who attributed his own secondary schooling to the opportunity provided by open examination, clearly regarded test results as a fairer selection system than the typical 'primary review' procedure. This consisted of the head and/or teachers of the elementary school carrying out a 'primary review' of their pupils and putting certain ones forward for scholarship examination and/or interview with the secondary headteacher. The new tests appeared to promise greater justice in selection procedures, and great faith was invested in them.

By 1926, the Hadow Report, which introduced state-funded tripartite secondary education, not only endorsed the use of intelligence tests to assist in the secondary selection procedure, but also, formally, exalted test results over teachers' assessments in certain cases:

'A written psychological test might also be employed in dealing with borderline cases; or where a discrepancy between the result of the written examination and the teacher's estimate of proficiency has been observed.' (Hadow, 1926, para. 157)

Following Hadow, local authorities slowly and cautiously began to use tests alongside the usual headteachers' review and written examination procedure. Tests were not, however, universally accepted as an aid to selection and were evidently regarded as somewhat threatening to the established order. The Inspectorate's visit to Stockport in 1928, for example, found that, 'The chairman displayed complete ignorance, while the secretary thought the suggestion that they might examine all eleven-year-olds, 'socialistic' and leading to a 'nation on the dole''. (Sutherland, 1984). Sutherland's historical research found that even fourteen years after Hadow, over thirty LEAs did not and had not used intelligence tests in their selection procedures.

In the majority of areas, however, tests became the standard method of selection at eleven. The Butler Act of 1944 did not address the question of selection, and so, despite the Act's advocacy of the child-centred approach initiated in the 1931 Hadow Report, the eleven-plus maintained its hold on the primary curriculum for over forty years. The major goal of many primary schools became the achievement of as many grammar school places as possible for its pupils, whose intellectual and test-taking skills were carefully honed through the primary stage. The number of places won became a measure of a school's effectiveness, and test results, which, in the beginning, had been validated by teacher's judgements, now became validators of teachers' judgements.

1.3 The Plowden Report and the changed role of assessment

The Plowden Report (1967) represented, according to Richards (1984), 'the high water mark in the fortunes of primary education post-Hadow'. It epitomised official advocacy of the child-centred philosophy, and in contrast to Hadow, was published at a time when conditions seemed to be favourable for its acceptance. Firstly, the introduction of comprehensive secondary schools, and the abandonment of the eleven-plus by some local authorities, meant that it was possible to reduce the emphasis on developing the quick-answer computational, vocabulary or spatial puzzle-solving skills which were needed for the tests, so as to make way for the expansion of the primary curriculum in breadth and depth.

Secondly, psychological theories were emerging which acknowledged the interactive nature of the relationship between the individual and its environment. The work of Piaget, originally noted in Hadow, was extolled in The Plowden Report; Bruner, Isaacs and Luria were also mentioned. The report presented a simplified version of Piaget's work, which concluded that 'the great majority of primary school children can only learn efficiently from concrete situations, whether lived or described ' (para. 521). It also pointed out the contemporary disillusion with Skinnerian learning theory, going on to say that;

'... Piaget's explanations appear to most educationalists in this country to fit the observed facts of children's learning more satisfactorily than any other' (para. 522)

Expressed in this way, the emphasis of primary teaching could shift from testing the products to developing the process of learning. In its introduction, the report asked whether learning would be more successful through 'finding out' than 'being told', and the text then assumed a positive response.

There followed an account of children's learning, 'based on the most effective primary school practice, as it has been worked out empirically.' The report asserted that 'play is the principal means of learning in early childhood' (para. 523). It reiterated Hadow's message that children should be agents of their own learning, and that they should be enabled to develop at their own pace, dictating their own curricula according to their needs and interests. Teachers were encouraged to...'build on and strengthen children's intrinsic interest in learning and lead them to learn for themselves rather than from fear of disapproval or desire for praise' (para.532). Classroom organisation using individual and small-group teaching was advocated to cater for a variety of personalities, ages and abilities for...'it is folly either to interrupt (children's interest) when it is intense, or to flog it when it has declined. The teacher can best judge when to make a change and the moment of change may not be the same for each child in the class. (para. 537).

The Committee must be given credit for posing a number of questions and for presenting the views held by a minority of the committee members, which were in opposition to the methods advocated by the majority. In a sense, the report itself offered to teachers an enquiry-based approach to the study of children's learning.

The Plowden Report included various recommendations on assessment in the primary school and these are of special relevance in this thesis and will be considered in more detail, after an examination of the effectiveness of Plowden in changing primary practice over the next two decades.

1.31 The effects of Plowden

The existence of the Black Papers (Cox and Dyson 1969), and later, the initiation of The Great Debate in 1976, might suggest that the recommendations of The Plowden Report had swept the country with great force. Cox and Dyson (1969) blamed the student unrest of the late sixties on what they referred to as revolutionary changes in English education. They associated Plowden's appeal for the development of children's self-discipline and self expression with an increase in Home Office records of mental disturbance and indictable offences committed by teenage youths.

Simon (1981) and Galton (1987) reviewed the evidence from major studies of primary education during the 1970s and 1980s and both concluded that the suggestion of a 'revolution' in the primary schools seemed to overstate events. Five of Plowden's recommendations (listed (a) to (e) below) will be examined in relation to the findings of further studies published or carried out in the 1980s (e.g. Bennett, 1976; Bassey, 1978; Galton et al., 1980; Barker Lunn, 1984; Bennett et al., 1984).

(a) The use of mixed ability groups

Although streaming at junior level was reduced from over 50 per cent to under five per cent between 1963 and 1978 (Simon 1981; HMI 1978) Barker Lunn's (1984) questionnaire survey found that, of the teachers who responded,

'Nearly half seated their pupils for some of the time in accordance with their levels of attainment but roughly one-sixth of the teachers do so for all or most of the time, which is tantamount to streaming within the class.' (p.183, Barker Lunn, 1984)

b) Individualised teaching

Although a shift from class-based to individualised teaching has been found in some curriculum areas, particularly in mathematics, Bassey (1978) found that classwork was still the most widely practised method. In the case of mathematics, however, 47% of the teachers in the study reported never or hardly ever teaching mathematics to a whole class.

Individualisation had been achieved by the use of text-books; 93% of the teachers in the study reported using class textbooks in mathematics and 79% had children working individually from these for almost all or some of their mathematics time. Thus, as Bennett et al. (1984) pointed out, individualisation was limited to work rate rather than style or content:

'in similar periods of work, one child completed two calculations whilst another completed 300... Whether this was a result of, or underwrites the need for a very high level of individualisation ...... is a moot point' (Bennett et al., 1984, p. 68).

(c) Children as agents of their own learning

The third feature of Plowden type teaching was that children were expected to be in control of the nature and timing of their tasks. Barker Lunn's (1984) survey, found that the majority of teachers who used individualised teaching in any subject area but most particularly in mathematics, controlled not only the type of task but also when it should be done. The notion of children as agents of their own learning was by no means borne out by school practice, even where tasks were 'individualised'.

(d) The use of enquiry methods of teaching

Barker Lunn (1984) asked the teachers in her study which of two statements best fitted their approach to the introduction of new concepts:

1 'I would first let the children explore the concept with materials and apparatus', and

2 'I would be more likely to discuss it first with the children and then let them explore it' (Barker Lunn, 1984, p. 186).

90 per cent of the teachers indicated that they would be more likely to discuss the concept first, thus rejecting the former statement.

Even in those approaches consistent with the second statement, the exploration following the initial discussion might be less than open-ended. Galton et al. (1980) observed teachers' styles of questioning in the ORACLE study. It might be expected that enquiry-based teaching would be characterised by a high proportion of questions in relation to statements, but, in most cases, the number of statements far outweighed the number of questions asked. One group of teachers were labelled 'class enquirers'. This group did use a higher level of questioning than the other teachers but these were predominantly closed questions. Furthermore, these teachers used <u>more</u> statements of facts and ideas than the teachers in two of the other styles. Thus, since even the 'class enquirers' were essentially didactic, the evidence suggested that children had not become agents of their own learning.

(e) <u>Expansion and integration in the curriculum</u>

The Plowden Report encouraged an expansion within the primary curriculum to include the application of basic numeracy and literacy skills to real problems which might arise from empirical project work in environmental studies, for example. Bassey (1978) and Barker Lunn (1984) found, however, that the majority of teachers reported that they taught mathematics and language as separate subjects. According to the Inspectorate's survey of primary schools (DES 1978), children spent much of their mathematics time practising basic computation skills with little or no application to problems or practical contexts.

Integrated topic work rarely included mathematics: in Bassey's (1978) study, whilst about three-quarters of the teachers covered history, geography and science through topics, mathematics was not included. In the ILEA junior school project (ILEA 1986), only ten teachers out of nearly 300 questioned emphasised the use of project work as a means of integrating different areas of the curriculum.

Thus expansion within curriculum areas such as mathematics, and integration between them did not appear to be representative of practice in the majority of primary schools some ten years after the Plowden report.

The evidence quoted above on all five recommendations suggested, as Galton (1987) concluded, that
'the revolution was less revolutionary than the critics implied, so that many of the prescriptions set out in The Plowden Report have yet to be adequately tested in practice.' (Galton, 1987,p.83).

1.4 Plowden's recommendations on methods of assessment

Galton's (1987) conclusion aptly describes the fate of the Plowden Report's recommendations on assessment in primary schools. The Plowden Committee pointed out the good intentions of those who had introduced the eleven plus, and extolled the technical merit of the testing fraternity, quoting the 1962 World Survey of Education: 'Great Britain has made the greatest advance... in developing reliable and valued methods of testing and examining scholastic aptitude and ability. Few countries.. have yet adopted such reliable methods of standardising or normalising the marks in assessments used for selection purposes." (para 413).

In spite of this, the committee was sorely aware of the effect of the eleven plus assessments on the primary schools: 'the less enterprising primary schools are what they now are, partly, at least because of the selective system...' (para. 409) and the report went on to say that the Inspectorate's National Survey had found a lessening of the reputed ill-effects of the eleven plus, such as its... 'leading to a narrowing of the school curriculum, an excessive emphasis on the acquisition of measurable skills, and rigid streaming'. Still, where comprehensive schools had been set up or where testing had been replaced by teachers estimates....'some teachers continue their established routines when the reason for them has disappeared. The books of English exercises and of mechanical computation remain in many schools.' (para 412).

The report recommended, accordingly, that attainment tests should be discarded as a form of assessment, and that pupils' progress throughout the primary stage should be monitored by means of teacher's records and the use of teacher-made objective tests. It also warned that teachers should (a) beware of setting up self-fulfilling prophesies as a result of record-keeping, and (b) of valuing only that which was measurable when preparing objective tests. The use of attainment tests was firmly rejected for transfer or selection purposes. Where selection still took place, heads judgments were to be preferred, backed up, if necessary by intelligence tests which were still seen as measures of 'true ability' provided no coaching had taken place. Primary schools whose ex-pupils proved to be 'deteriorаters' at secondary school, would have their quota of grammar schools places reduced in favour of schools which produced 'improvers'. Thus coaching would be penalised.

Of greatest relevance to the present thesis was the report's clear encouragement to teachers to reclaim the role of assessor, to keep records, to devise their own curriculum-related tests, and to reduce their reliance on externally devised tests. The concept of testing itself went unchallenged, however, and the need for teachers to interpret test results with care and to be well informed about them was stressed.

'...At this time of rapid change in the curriculum, the means of assessment of progress are almost bound to lag behind. We hope that attention can now be diverted from the design of tests for the purpose of selection to the development of tests suitable to the changing primary curriculum, and helpful to teachers who need to diagnose children's difficulties in learning.'(para 421)

These recommendations might reasonably lead to the expectation that attainment testing would be rare in post-Plowden primary schools, having been replaced by the use of teacher-made tests and record-keeping. The first of these expectations was confirmed by the survey carried out by Gipps et al. (1983). The use of tests of English and arithmetic dropped by over 50 per cent to 27 and 20 per cent respectively between 1960 and 1972 in those authorities which had used tests for allocation of school places. As for the use of teacher-made tests, only 31% of the junior teachers in Bassey's (1978) survey were using their own tests for their own classes, and a further 17% used tests devised within the school for use with several classes. The use of intelligence or verbal reasoning tests, on the other hand, remained at over 90 percent throughout this period even when, by 1972, 31% of authorities had abandoned allocation procedures altogether.

The demise of attainment testing evidently engendered an insecurity which was interpreted as a decline in standards. Callaghan's Great Debate speech in 1976, and the setting up of the Assessment of Performance Unit were responses to this insecurity, and, as Gipps'(1983) survey showed, there was a sudden resurgence of testing from the mid-1970s on.

The expectation of an increase in systematic record-keeping will be discussed in the next section.

1.5 The Record-keeping movement

In the section of The Plowden Report on the 'interchange of knowledge of pupils', the form of school records was discussed. It was recommended that the record cards were not too detailed and recognised that some information might be too confidential to commit to a card. It was suggested that a change of school should give a child 'a fresh start' where s/he 'should not be saddled with a bad name.' (para. 433). The committee went on to recommend that a folder was made for each child containing:

- i medical records
- ii facts about illness, absence and composition of the family
- iii results of intelligence tests with a note on the test used and interpretation,
- iv results of attainment tests and, where necessary, diagnostic tests,
- v examples of children's work and the names of some of the books he has read,
- vi full notes of personal handicaps or special gifts,
- vii possibly a pen picture of the child. (para. 435)

The contents of the folder, it was suggested, could form the basis for regular reviews, with parents, of the child's progress and should help teachers to avoid overlap in successive years between primary and secondary schools.

1.51 Advice on record-keeping

The importance of record keeping was emphasised by writers such Rance (1971) and Dean (1972), although Rance, after detailing eight reasons for keeping records, seven characteristics of a good record, five features of records which should be avoided, and presenting 29 different types of record (some showing the same information in different ways), finally reduced it all to three 'golden rules' for record-keeping. These were:

1 Keep as few records as possible.

2 Be constantly on the look-out for some method of reducing those already in existence.

3 Regularly revise those that are in constant use. (p.20).

Rance suggested that only the <u>unusual</u> should be recorded; 'If something is normal why bother to record it?' (p.16). (This advice was directly countered in the survey of primary record keeping carried out by Clift, Weiner and Wilson (1981) which will be reported below.) With record keeping thus kept to a minimum, Rance promoted the use of standardised tests, as he considered a record of achievement based on standardised tests to be.. 'the most simple and yet the most relevant record which can be maintained for primary school children as it deals with concrete facts' and would allow a detailed comparison to be made between children' (Rance, 1971, p.74). He went on to extract an "Educational Quotient" by averaging each child's achievement scores for the year. This was to be accompanied by general comments and, possibly, the teacher's assessment of the child on a five point scale (A to E). In other words, the single figure description characteristic of attainment and intelligence testing, was now being applied to teachers' records.

The advice offered by Dean (1972) was also confusing: 'Good teachers have always kept records. Sometimes these have been written down but often the important parts of the process are done in the teacher's head ... The outstanding teacher has a highly developed intuitive ability to find the clues...which tell her whether or not she is succeeding in what she is trying to do...She often sees things which others may miss, and acts upon them with a sure instinct.. (p.421)

Dean dealt with various types of record, such as records of children's backgrounds, records of attainment and long-term records of children's personal development, which she regarded as 'one of the most important kinds of record'. She pointed out, however, the need for teachers to use some system to order or focus their observations rather than recording just what appeared to be significant behaviour at a given time. This advice is directly contrary to that provided by Rance.

The Plowden Report, in reinforcing the 'whole child' as the responsibility of the teacher had engendered an acute awareness of the potential interaction between the physical, emotional, social and intellectual states and needs of the child. Thus, it was, perhaps, that 'Details of absences, illnesses and composition of the family' together with '<u>Possibly</u> a pen portrait of the child' came to be interpreted as needing to be well informed about the domestic and family details of a child's home life. One of Dean's examples of concern for 'the whole child' concerns a five year old who, after finding 'settling into school something of a problem', was referred for child guidance by the school doctor... 'as he will only eat very few foods - chips, spaghetti and beans'. (Dean, 1972, p.434).

Dean also advised that a 'substantial pre-primary profile' should be given to parents to complete before a child started school. This long questionnaire included such items as whether their four year old, 'Asks permission before borrowing things', and 'Remembers the rules of games he plays'. (Dean 1972, pp. 429 - 431). Responses to this inventory, if absorbed by the teacher, could provide perfect seeds for the expectancy effects of which Plowden had warned teachers to be wary.

Recently, Alexander (1984) reviewed some of the research on teachers' "knowledge of the whole child". Even though this teacher knowledge may never be <u>written</u> into records, and although records may be neither passed on nor read by subsequent teachers, it could label the child for the rest of his/her life in the school. Anything unusual in a child's background, in his/her behaviour, or that of his/her parents, would soon be writ large in what Becher, Eraut and Knight (1981) called

> '"grapevine information"...'prominent in the staffroom...and providing the teacher with advance information on the reputation of a child (and its family)'. (Alexander, 1984, p. 36).

King (1978) in his detailed participant observational study of three infant classes confirmed that such reputations provided the source for teachers' typifications of children and for their assessments and interpretations of childrens' learning and behaviour. Alexander argued that the idea that the teacher 'knows the child best' was called into question when the basis of that knowledge was taken into consideration.

1.52 The Record-keeping Survey

In 1976, Clift, Weiner and Wilson (1981) began a survey of record keeping in the primary school, which was sponsored by what was the SSRC, now the ESRC. They found a very wide variety of records. Some infant school records were described as 'vague checklists and longhand reports' or 'idiosyncratic records' to which junior colleagues did not refer, perhaps because, as the report pointed out, they were too deeply embedded in particular contexts to have any general informational value.

Clift's team analysed 200 primary school records for curriculum content and for their different stated functions, as these were the most commonly expressed reasons for record keeping. Reading was regarded as the most important curriculum area for record keeping, and yet very many records were expressed merely in terms of a child's book and page number within a reading scheme. This finding was reinforced by the ILEA Junior school project (ILEA 1986) which found that 71 per cent of 200 teachers kept reading records which typically consisted merely of page numbers or books read. Thus, even the unique individual attention paid to children reading failed to result in informative records about a child's reading skills.

In other curriculum areas, records were less frequently available. The ILEA study found that 61 per cent of the teachers kept records indicating areas covered in mathematics, but only 28 per cent did so for language. These findings also confirmed the results of Clift's (1981) survey. Neither study found many teachers who kept files of samples of children's work, as Plowden had suggested.

Thus although the restrictions of attainment testing in English and arithmetic had been lifted, there was little evidence of any broadening of the assessment field to include record-keeping and the development of teacher-made diagnostic tests. Only a small proportion used ready-made diagnostic tests even in reading. Records of children's personal, social and emotional development were often lacking in factual information, and failed to give adequate descriptions of events from which interpretations of a child's behaviour were made. They tended to be evaluative rather than informative...'often based on imperfect memories ... may be a summary of a few atypical incidents... This type of summary record was frequently found in infant schools where they were called 'profiles' or 'pen portraits (or pictures)'." (Clift, Weiner and Wilson (1981) p. 175).

The group of teachers working with Clift's project recommended that teachers should determine in advance what to observe in relation to children's social and emotional behaviour, but that they should note not only events...'representative of the child's typical behaviour...(and those which were)...strikingly different from his usual form of behaviour. ..(but also that)...If it is unusual behaviour for the child, the fact should be noted." (Clift et al (1981) p.175). These recommendations were in direct opposition to Rance's (1971) advice.

It would seem that the record-keeping movement of the 1970s had failed to evolve the useful, detailed, individualised, diagnostic profiles of children's development and learning that The Plowden Committee had hoped might provide the basis for discussion with parents, information for subsequent teachers and evidence for monitoring progress.

1.53 Recent developments in record-keeping

The development of more useful records in recent years has been a result, perhaps of the Great Debate and demands for increased accountability in education. Porter (1983) traced the development of a new issue of ILEA records from being initially too vague, then too detailed, to an eventual form which was influenced by ILEA's declaration that records must be open to parents. The final records were structured, more objective, and encouraged comments rooted in facts about children's achievements. They included less subjective, more clearly-defined performance criteria in place of the previous five-point 'good' through 'weak' ratings. Space for comments on parental interest was deleted from the open record.

Nevertheless, the final version, issued in 1979-80, still revealed an unbalanced view of the curriculum. It gave detailed attention to the performance of basic subskills in language and mathematics, and allotted separate headings to creative, artistic and physical education, but lumped scientific, religious, geographical, historical, environmental areas of the curriculum together under the general heading of 'Topics/projects'. Under this heading, 'projects worked on' and any 'noteworthy attitude' were to be recorded. Although all of these areas call for the application of basic skills and the use of study skills, no attempt to record or assess progress in them was deemed necessary at that time.

1.6 Recent initiatives in primary assessment

In recent years, some attempts have been made to develop informative and practicable methods of assessment at primary level. In particular, attempts have been made to develop a diagnostic approach to teaching and assessment. In the past, the need for this type of assessment, whether by means of day to day observation, or through the use of specially devised tests or techniques was made clear by the "mismatch" problem.

1.61 The problem of 'mismatch'

One 'working' measure of a teacher's assessment of a pupil might be the tasks set for that child. The national primary survey (DES, 1978) pointed out that the work many children were doing did not match 'that which they were considered by HMI to be capable of doing' (para. 6.1). The inspectors found a reasonably good match between the tasks set in reading and mathematics and the judged ability of children graded by their teachers as average or less able in these areas. There was a poor match, however, in over half of the classes of 7, 9 and 11 years, in other curricular areas (e.g. science, history, geography, visual arts). More disconcerting still was the conclusion that, for the most able children in each of the three age-groups, under 50 per cent of the classes inspected had a satisfactory match for <u>anything</u> other than reading and physical education.

These observations by HMI drew attention to the inconsistency between the teachers' own ratings of their children and the work set for them. Since the area of greatest mismatch was at the top of the range in each class, this suggested, perhaps, that when faced with very wide ability ranges, teachers tend to concentrate on the average and less able children.

Bennett et al. (1984) examined the match between capability and classroom tasks more rigorously in their study of infant classes. Bennett's team observed children working on language and number tasks, and noted their error rates and problem-solving strategies by means of post-task interviews. They used standardised tests (The Group Mathematics Test (Young, 1970) and The Primary Reading Test (France, 1979) to determine the children's achievement levels. They found that almost half the high achievers were given tasks which were too easy for them, whilst half the low achievers received tasks which were too difficult. Bennett et al. (1984) hypothesised that teachers' failure to match task and capability could result from a tendency to 'tell' rather than 'ask' children about their work; to take them through 'how to do a sum' again rather than ask how they had done it.

1.62 Formative assessment

Similar observations had been made earlier in the ORACLE study (Galton, Simon and Croll 1980). The Cockcroft Report (1982) had also drawn attention to the need for teachers to try to shift the emphasis of mathematics teaching away from 'getting the right answer' to a consideration of children's strategies in trying to solve a problem. As Desforges and Cockburn (1987) pointed out, however, the demands on teacher time are very great when children are working at individual pace through a scheme, and when each wants help with a different problem. From the teacher's point of view, the most expedient way of dealing with this situation, is to repeat the approved solution, rather than to ask for the child's interpretation. The child's reply could be a long one.

The problem here is, perhaps, that a summative approach, concerned with the end products of a task or course, has become habitual not only in the formal assessment of children's performance, but also in record-keeping and even day-to-day marking. Recently, however, the need for a formative approach to take account of the processes of learning and to link teaching and assessment has been recognised. A number of Schools Council projects during the 1970s fostered this approach: the 'Communication skills in Early Childhood' project (Tough, 1976); 'Place, Time and Society, 8 - 13' (Blyth et al., 1976) and the 'Progress in Learning Science' project (Harlen, 1977a). Such initiatives were representative of a gradual shift from the notion of some 'invisible' potential of educability based on measured intelligence, to an essentially 'visible', analysis of the pupils' interaction with the curriculum, divided into specific "teachable" units. These projects have provided structure for teaching and assessment in applied areas such as science and the humanities at primary level.

A structured approach to teaching has existed in American educational analysis since Bobbitt's work on objectives was published as long ago as 1918 and 1924 (see Stenhouse, 1975). Thus, whilst American educationalists and psychologists were involved in analysing learning and behaviour into graded teaching units aimed at producing specific changes in students' capabilities, teachers in Britain were providing generalised practice in developing speed and accuracy in arithmetic and grammar with neither expectation nor intention of altering what they understood to be the inherited order of individual ability.

This emphasis on intelligence and ability in British primary education has had implications for the general attitudes of teachers to their own effectiveness, permeating them with a sense that an individual's problem can be traced to the child's limited ration of ability, or to personality traits such as perseverance or sloth. Stenhouse (1975) for example, in putting forward this view, quotes Bloom's comment on the deleterious effect of the assumption of a normal distribution of potential achievement levels within a class:

'the most wasteful and destructive aspect of our present educational system is the set of expectations about student learning each teacher brings to the beginning of a new course or term. The instructor expects a third of his pupils to do well, a third to learn less well, and a third to fail or just 'get by'. ...Students quickly learn to act in accordance with (these expectations), and the final sorting ... approximates the teacher's original expectations. A pernicious self-fulfilling prophecy has been created (Bloom, 1971, p. 47).'

These comments were made about the American system. It is likely that these expectations would be much more influential in Britain. Bennett's (1984) study, for example, although based on a very small sample, showed how some experienced and dedicated teachers described the children who had not grasped how to do a set task as 'she's lazy' or ' he doesn't listen'. These teachers might instead have analysed the tasks' demands or looked carefully at how to motivate the children or improve their listening skills.

The objectives model, however, provided a series of steps towards each goal, so that by means of regular assessments built into the teaching programme, teachers could readily identify what had been achieved, and what was still to be mastered. This model, in which the teacher essentially coached the child through a series of tasks planned in advance and leading to some predetermined goal, was the antithesis of the child-centred approach recommended in Plowden; in the latter, the teacher's role was to respond to the child's chosen educational path as an enabler. The various Schools Council projects listed above all provided statements of performance in a variety of skills. These statements served as assessment criteria which could be used to engender a match between activities and development. To illustrate this, a little more detail about Harlen's project will be presented below.

1.64 Direct links between teaching and assessment in primary science

Until recently, science was a relatively infrequent feature of the primary curriculum. As such, it was an underdeveloped area with a great deal of scope for the development of a new approach to teaching. It provided, in particular, a new field for matching tasks to children's ages and stages and this challenge was taken up by Wynne Harlen. In 'Science 5 to 13: with objectives in mind' (Ennever and Harlen, 1972), there was a serious attempt to use the Piagetian developmental approach adopted by Plowden as the basis for a set of eight general aims of science education. These included, for example, 'Interpreting findings critically' and 'Observing, exploring and ordering observations'. These general aims were broken down into specific objectives according to the child's stage of intellectual development as described by Piaget. The work provided information about what sorts of tasks and outcomes might be expected from children at a particular age or stage.

'Science 5 to 13' was followed by the 'Progress in Learning Science' project (Harlen et al., 1977a, 1977b). In this project, a more determined attempt to link assessment and teaching was made. The project was organised as an in-service package, and as the 'Leader's Notes' pointed out: 'The idea of matching activities to development is a key one for this project.' (Harlen et al., 1977a, p. v).

The project culminated in the production of two checklists of 'abilities, concepts and attitudes', one for younger children and one for older children in the 5 to 13 age range. Each item on the checklists was split into three developmentally-ordered statements each expressed in terms of behaviour demonstrated by the child. A child's ability in 'Finding patterns in observations' for example, was judged against the following descriptive statements which vary in their developmental level:

1 Does not relate findings to the purpose of the enquiry or notice any patterns there are to be found without considerable help.

2 Attempts to look for patterns in findings but rarely suggests possible explanations.

3 Makes reasonable inferences which fit the evidence and makes some attempt to explain the patterns which he finds in his observations.

Teachers were asked to observe children engaged in activities which had been developed or collected as part of the project, and to place the observed behaviour on a five point scale, according to whether it matched one of the three statements, or whether it was intermediate between (1) and (2) or (2) and (3). The overall task of assessing the behaviour of every child in a class on 24 characteristics, each with three criterion levels ranged across five assessment points was too detailed to be viable for general classroom use, although where used it provided a potential basis for further action: 'Putting the information on paper is a way of bringing a child's need for help to the conscious level where the teacher can begin to plan worthwhile experiences for him.' (Harlen et al., 1977a, p. 237)

The Progress in Learning Science project was a unique and detailed attempt to use behavioural criteria to determine a child's level of development on a range of constructs, and, having made that diagnostic assessment, to provide a basis for teaching, or to enhance the child's development within that construct area. The basis for teaching was set out in a second volume, entitled 'Finding Answers: Diagnosis and Development (Harlen et al., 1977b)

Harlen's system did not envisage the teacher playing a purely observational role, however. These assessments would be made as part of the teacher's regular interaction with the children. This combination of attempted assessment and teacher intervention poses a number of inherent problems which must be solved before the approach is feasible in the primary classroom. For example, when a teacher helps a child with a task, the teacher's intuitive assessment of the child's understanding of the task will be implicit in the type of help given. In order to make these implicit assessments become explicit, the nature or degree of help given must be recorded in some way. In other words, if the teacher's aim for a child is success at a task, the teacher would provide suitably 'graded' help until the child succeeds. Without some alternative assessment, the teacher would not know on a subsequent occasion whether the child would succeed without help. The extent and the detailed nature of the help the teacher provides is thus directly related to the child's initial and intermediate level of attainment while tackling the task. Unless this instantaneous, continuous assessment process which underlies the activity of teaching can be articulated, some of the aims of primary teachers, (see Ashton et al., 1975) concerned with fostering of social understanding or encouraging independence in learning, will remain grossly undervalued.

1.64 Developments in assessment at secondary level

During the last decade there have also been important developments in secondary level assessment. These initiatives have been taken in response to growing disillusion with formal examinations and the over-reliance on these as a way of summing up a child's school career. Firstly, criterion-referenced graded testing schemes have been introduced in a number subject areas by several Local Authorities. These have shifted the emphasis from product to process; they constitute a series of steps in the child's progress; and the tests can be taken when the candidate decides s/he is ready. Secondly, unlike many previous 'O' level examinations, the General Certificate of Secondary Education (GCSE) includes a substantial course work component, rather than being completely examination based.

Thirdly, the Records of Achievement movement which permits children to define their achievements in any sphere and decide which they would like recorded as a contribution to their school record has grown in popularity during the last decade. Broadfoot (1984) has suggested that secondary education in England and Wales is 'on the brink of an assessment revolution' (p.1). It is, however, somewhat ironic that secondary education, which until relatively recently was not overtly concerned with 'the whole child', should have forged ahead with the development of techniques and procedures to assess attributes of the child which have been the major concern of primary teachers for so long.

1.7 Summary and conclusions

In this chapter, a long-term historical perspective of assessment at primary level has been presented to provide a background to the present study. In the course of this brief history, the links between initiatives in assessment and their effects on the curriculum have been pointed out. Of particular interest has been the widespread acceptance of the validity of tested intelligence and the adoption of standardised tests of attainment and intelligence. These powerful constructs have exerted a limiting influence, not only on the curriculum, but also on the development of alternative forms of assessment and, it was speculated, on teachers' expectations of their own effectiveness.

Recent initiatives have attempted to combine the child-centred philosophy presented in the Plowden report with structured skills-based curricula which have been designed to allow criterion-referenced assessment of behaviour. These initiatives have attempted to provide a way to observe and assess children whilst they are engaged in meaningful activities, rather than in artificial and decontextualised testing situations. The assessment procedures developed so far have been too cumbersome and too demanding of teachers' time for widespread adoption.

The alternative approach has been to monitor children's progress through record-keeping. Many attempts at record-keeping have failed either because the records were too specific, or because too much detail was demanded. In some cases the intended audience of future teachers have ignored them because they were anxious to avoid being influenced by other teachers' judgements.

The situation at the start of the present study, in 1984, therefore, offered a paradoxical mixture of extremes and opportunities. There was a need for a form of assessment, based in the context of children's activities, which while avoiding the considerable demands of the observation system proposed in Harlen's project, was, nevertheless, more systematic than a general record-keeping approach. A method of assessment to be used in mixed ability primary classes needed to allow for a wide variety of methods for organising the time, the children and the curriculum. In addition, the range of activities and media other than those associated with the practice of pure linguistic and computational skills needed to be taken into account. Norm-referenced test-based information about a child's achievements obtained from test scores was clearly inadequate as a basis for planning teaching or determining children's strengths and weaknesses in this context.

The remainder of the thesis will describe an attempt to meet some of these requirements through the development of project-based assessment materials designed to tap children's study skills as they were applied to a variety of sub-topics. The methods used and the general approach have a wider applicability in primary schools, however, and have recently been employed to develop assessment procedures in primary science (Schilling et al., 1990).

Outline of thesis

A very general background to the present thesis has been described in this chapter. In contrast, Chapter 2 will consist of a review of the immediate context of the thesis. It will outline the literature on study skills, and provide details of the Educational Provision in Small Primary Schools (PRISMS) Project to which the work was linked. In Chapter 3, the development of the assessment materials and details of the pilot study will be described.

The next four chapters present the analysis of the main study in which the assessment materials, entitled 'The Prismaston File', were used in the small primary schools participating in the PRISMS project. Chapter 4 contains the results of a factor analytic study of the responses to the multiple-choice items within The Prismaston File, and discusses the relationship between study skills, topics and resources. In Chapter 5 the records of teacher help, and the resources used by the children are reported and evaluated. Chapters 6 and 7 describe three tasks forming part of the Prismaston File, which were designed to assess children's listening skills, and either their mapping or graph-making skills.

Chapters 8 and 9 describe the use of The Prismaston File in four classes. These case studies provided the opportunity for an evaluation of the validity and practical feasibility of the materials, and for the application of marking schemes based on the main study findings.

In Chapter 10, after a summary of the main conclusions, the application and refinement of project-based assessment to consider process skills in primary science will be described. Finally, the implications of the present study will be discussed in the light of two current issues; (i) the proposals for a national system of assessment and (ii) the emergence of new approaches to the study and measurement of intelligence.

CHAPTER TWO

The assessment of study skills at primary level

Introduction

This thesis describes the development of a project-based assessment of study skills in children aged between 8 and 11 years. This form of assessment was intended to be congruent with the aims and methods of primary teachers in contemporary primary schools. The assessment was carried out for the Educational Provision in Small Primary Schools (PRISMS) project (Galton et al., 1987), which meant that it must be capable of administration in a large number of schools, and across a wide range of ages and classroom organisations. Since one of the concerns of the PRISMS project was the breadth of curriculum provision, the assessment needed to take in a much broader range of curriculum areas than that available by means of conventional tests. When this work began, in 1984, assessment at primary level was limited to the use of standardised tests, which typically covered a narrow range of the curriculum, or of detailed and specific observational methods. The latter method was compatible with a growing awareness of the need for a diagnostic approach to teaching and of the need for skills to be assessed within a meaningful and relevant context but was not practicable on a large scale.

In contrast to the general historical survey of assessment at primary level presented in Chapter 1, this chapter will deal with the specific background to the preparation of these materials. It will begin with a survey of the research literature on study skills. This will be followed by a description of the sources which were surveyed to supply suitable items-types for the PRISMS assessment. These sources include a survey of published test materials and the materials prepared for the assessment of study skills used in the ORACLE project (Galton and Simon, 1980). The chapter will go on to describe the PRISMS curriculum observation methods, which provided a framework for the contents of the PRISMS assessment materials. Finally, there will be a summary of the recent primary curriculum studies and schemes which were used as a guide to the contents and difficulty levels of the PRISMS materials.

2.1 Study Skills

The review of the literature on study skills revealed a dearth of research on children in the primary age range, and is therefore based largely on studies of students at secondary school or university. It will begin with some current definitions and descriptions of study skills. Much of the research has been concerned with study skills courses and study behaviour of 'the successful student'. The section will conclude with a review of cognitive styles and study skills, followed by the implications of the literature for the PRISMS assessment of study skills.

2.11 Definitions and descriptions of study skills

Irving (1982) defined study skills as 'those skills which are associated with the acquisition and use of information in the pursuit of knowledge'. The term 'study skills' is widely used amongst teachers, but terms such as 'library skills', 'study methods' and 'information skills', are also in use. Avann (1985) distinguished between study skills in which she included library skills, comprehension, reading strategies, identifying main ideas, note-taking, report or essay writing, and the presentation of mapping and number skills, and information skills which included traditional reference skills and the use of information technology. Since the present study does not extend to the use of information technology, the term 'study skills' will be used except where an author has specifically chosen another term.

The Plowden Report (1967) advocated the development of children's independent study skills through the suggestion that '...facts are best retained when they are used and understood, when right attitudes to learning are created, when children learn to learn.' (para. 529). Many primary teachers have used individual topic work to provide children with the opportunity to 'learn to learn' and to allow them to follow their own interests and become 'agents of their own learning'. As Avann (1985) observed however, much of the work done was little more than copying from books. She argued that primary teachers have been too concerned with the product, 'the written and illustrated account', and have not attended to the process by which children obtain the information.

The notion of study skills had not developed very far at primary school level when this study began, although the basic ideas underlying it have been written about for over a century. As an example, Nisbet and Shucksmith (1986) quoted Rousseau's wish made in 1762 that Emile would not be taught the sciences, but be given,..'a taste for them and the methods of learning them' (p. 11). They commented on the flurry of study skills manuals which appeared between 1900 and 1924, and pointed out that the contents and advice offered then were 'astonishingly' similar to that contained in current manuals.

Study skills manuals cover a very wide range of behaviours, from organising for oneself a pleasant place to work, to extracting ideas from literature and linking them to other sources of information. The advice they contain can be divided into three categories:

(1) study behaviour, concerned with organisation of time, place, and facilities for study;

(2) library skills, e.g. using indexes, reference systems, dictionaries, guides;

(3) information handling/processing skills, such as extracting the author's meaning when reading, discriminating between main ideas and details when notetaking, organising and reorganising information form an essay.

Whereas study behaviour (e.g. arranging the room appropriately) and library skills (e.g. using a dictionary) are observable, concrete skills, an individual's application of information handling skills can only be infered from the eventual products such as the notes or the essay. The emphasis has swung towards these cognitive aspects of study skills in recent books. Tonjes and Zintz (1981), for example, categorised the study process into four parts, as follows:

1 locating information e.g.

    using alphabetical order, indexes, dictionaries, reference books, libraries;

2 organising information to extract meaning e.g. developing listening, reading and note-taking skills;

3 interpreting information e.g. comprehension of written material, understanding of graphs, charts, maps, pictures; ability to transpose from written to graphical information;

4 recalling and applying the information gained, e.g. practising appropriate study habits, developing memory and concentration, time management, using appropriate strategies for reading such as SQ3R (survey, question, read, recite, review).

In this classification, the three broad categories mentioned earlier are mixed: section 1 consists essentially of library skills, sections two and three involve cognitive, 'information handling skills', whilst section four includes both cognitive skills (e.g. SQ3R) and study behaviour such as time management.

In the Schools Council study on information skills in the secondary curriculum, Marland (1981) analysed the study process into a set of nine 'steps' to provide a framework for teachers to use in discussing information skills. The steps are shown in Table 2.1. Each step consisted of a question to be used with any topic for study, and was followed by a statement of the process skills involved.

The advantage of Marland's steps was that they could be applied directly to any piece of work, and that the 'action' needed was expressed in terms of the cognitive skills (e.g. analyse, appraise, interrogate etc.) which would result in the 'extraction of the main idea' and the 'use of an index'.

Marland's study was followed by a survey carried out by Tabberer and Allman (1983) of study skills provision in secondary schools, and this leads us on to consider study skills courses.

2.12 Study Skills Courses

Although early manuals on study skills were abundant in Great Britain, courses in study skills were more common in the United States. A review by Blake in 1955 (reported by Tabberer and Allman,

Table 2.1 Marland's analysis of information skills

What do I need to do?	formulate and analyse need
Where could I go?	identify and appraise likely sources
How do I get to the information?	trace and locate individual resources
Which resources shall I use?	examine, select and reject individual resources
How shall I use the resources?	interrogate resources
What should I make a record of?	record and store information
Have I got the information I need?	interpet, analyse, synthesise, evaluate
How should I present it?	present, communicate
What have I achieved?	evaluate

(from Marland, 1981, p.50)

1983) showed that over 90% of US colleges offered study skills courses. Entwistle (1960) reviewed evaluation reports on 22 British courses and identified some common problems amongst them. These included the lack of clear-cut research on which to base the courses; findings which contradicted each other, especially in research on reading skills; and a tendency to rely on expert opinion. The evaluations of present-day study skills courses reveal similar problems and the courses themselves have been regarded as ineffective.

The NFER survey by Tabberer and Allman (1983), for example, looked at study skills provision at 16-plus in 76 schools. Student interviews revealed that about half of them reported that their courses had been unhelpful. Some students reported that the courses were irrelevant to their subject areas and were rarely reinforced by their subject teachers in a relevant context; some had tried various study strategies and failed, because the provision was too late and their study habits had already been formed. A teachers' questionnaire showed that course aims had often been very broad, for example, to 'help students become more effective and efficient' and that they frequently lacked evaluation criteria. Many of the teachers stressed the need for good examination results in their aims, but some also mentioned the need to create independent learners. The questionnaire revealed that over 75% of the courses were still based on popular manuals which tend to express expert opinion, such as those of Buzan (1974) or Rowntree (1970) although a decade earlier Entwistle (1960) had pointed out the ineffectiveness of such courses.

2.13 'What makes a successful student?'

An alternative approach to the teaching of study skills was to try to identify the study characteristics of successful students in order to develop courses based on theses. Inventories, such as the Survey of Study Habits and Attitudes (SSHA) produced by Brown and Holtzman (1953) in the U.S.A. had identified some study habits (such as delay avoidance) which were associated with higher grades. In Britain, Entwistle et al. (1971) produced the Study Attitudes Inventory. Three of its four scales correlated highly with the scales of the SSHA mentioned above. These were,

motivation, (agreement with e.g. 'I enjoy the challenge of a difficult new topic in lectures');

study methods (disagreement with e.g. 'I find it difficult to keep awake during some lectures') which correlated with Brown and Holtzmann's delay avoidance scale;

examination technique (agreement with e.g. 'Low marks in an exam.

make me ashamed').

Scores on the Study Attitudes Inventory appeared to be useful determinants of success as defined by degree results, although 'A' level results were the most powerful predictors. Entwistle and Brennan (1971) re-analysed the data by means of cluster analysis, and demonstrated that although certain characteristic responses to inventory items might be associated with examination success, successful students possessed different combinations of these characteristics.

In a more recent study of this type, Selmes (1987) devised the Studying at School Inventory (SASI). The study by Entwistle et al. (1971) contained items which had been drawn from a literature review, from similar American scales and from discussions with students and colleagues. Selmes, in contrast, seems to have taken into account the recommendations of the NFER study (Tabberer and Allman 1983) and examined study skills within subject areas. He based SASI on the detailed descriptions made by 13 'A' level students of their work on 46 separate assignments. Thus the raw material for the inventory items is grounded in specific tasks rather than in general comment.

Selmes was able to identify what he called 'deep' and 'shallow' approaches to study, reflecting earlier experimental work by Marton and Saljo (1976a). A 'deep' approach was characterised by attempts on the students' part to personally integrate new material, and to seek inter-relationships and meaning in it. A 'shallow' approach, in contrast, referred to a tendency to keep facts isolated, to emphasise memorisation, and to exhibit a passive acceptance of new information. Selmes analysed the pupils' descriptions of their work by curriculum area and by type of activity e.g. note-taking, reading, problem-solving. He found that not only did individual pupils' approaches differ between curriculum areas, but also that they differed according to the type of task within a subject area. So, for example, in chemistry, a pupil might adopt a deep approach to reading and notemaking but a shallow approach to writing. The same pupil however, might show a deep approach to reading, but a shallow approach to notemaking in mathematics. No pupil adopted an exclusively deep or surface approach, and a mixed approach within subject area was shown by 11 of the 13 pupils.

Selmes' findings represented a considerable advance on the work of Entwistle and his co-workers in the 1970s, going beyond the finding that students possess different combinations of study habits, to suggest that each student could produce a different combination according to the task in hand. Using his interview material, Selmes went on to identify the reasons given by the pupils for the adoption of a particular approach. He isolated four reasons. A shallow approach was engendered by formal teaching leading to dependence on the teacher, 'closed' assessment such as tests of factual recall and a short time in which to do the task. A deep approach was associated with informal teaching and 'open-ended' assessment calling for the discussion of an issue for example. Selmes' findings can be used to explain some of the responses to Tabberer and Allman's (1983) study which was described above. They had found (1) that over half of students found their study skills courses ineffective, and (2) that much study skills provision was provided to enable pupils to pass examinations. Using the reasons which the students gave to Selmes, this ineffectiveness was not surprising. Examinations are usually perceived by pupils to be, 'closed' assessment, calling for the memorisation and reproduction of facts. The pupils' motivation may be extrinsic, i.e. to pass the examination, whilst the teacher may dictate notes, or give cyclostyled notes, thus making the teaching more formal and the pupils feel dependent on the teacher for the notes. If the pupils are not writing their own notes, they are neither practising finding the main ideas, nor finding links between sections.

Selmes (1987) had found that closed assessment, extrinsic motivation and formalised teaching methods were linked to a surface approach. If these common aspects of teaching fostered a shallow approach to work within subject areas, courses on study skills were even more likely to do so. In addition, since Selmes' study had also suggested that the scope for students' personal contributions within a course had been associated with a deep approach to study, it was hardly surprising that Tabberer and Allman found that the 'expert opinion' courses typical of many schools were so ineffective. In other words, the courses themselves engendered a shallow approach to the study of study skills.

Selmes' study provides a link between research based on inventories designed to find out what makes a good student, and the more experimental methods which will be described next. Before that, however, there are two serious problems which exist in all the work presented so far. First, there is a reliance on self-report measures, which must necessarily refer to the observable and explicit levels of study behaviour and library skills. Those aspects of study skills which entail information handling or cognitive skills cannot be completely susceptible to self report; certain strategies, such as a decision to compare and contrast two accounts may be deliberately adopted, but ideas, relationships, criticisms often emerge spontaneously. Some training in metacognitive skills would be needed before the majority of students could map these accurately.

Second, leading on from this, no attempt has been made to standardise the tasks, to limit them in scope ('notemaking' and 'reading' are panoplies of skills), nor to test the effectiveness of any particular strategy in terms of the task itself. Successful study has been defined as resulting in good examination grades, but as we have seen above, study for examinations has been associated with a 'shallow' approach to study.

2.14 Cognitive styles and study skills

Entwistle (1977) referred extensively to the studies carried out by Marton and colleagues in Gothenburg. The first of these studies identified students who showed deep or shallow levels of processing of the information in a written passage and compared these categories with examination success. Marton and Saljo (1976a) asked students to read a passage and then asked them questions about it afterwards. Ten of the 30 students showed deep level processing, i.e. they tried to get at the author's message; 13 showed shallow level processing, i.e. they adopted a memorising approach. Subsequently, only one of the students identified as having a 'deep' approach failed any examination, whereas only three of the 'shallow' students passed all of their examinations. In another study, Marton and Saljo (1976b) demonstrated that students could change their reading approach according to the kind of questions asked. The use of questions which demanded deep level processing of a passage, subsequently induced a deep level of processing, by students who had previous adopted a shallow approach. The students found it easier however, to change from a deep to a shallow level of processing, than vice versa.

Entwistle's (1977) review also referred to the work of Pask (1976) on cognitive strategies and one of Pask's findings is of interest here. Pask had identified two types of learning strategy used by students in complex learning and classification tasks. Students who adopted 'holist' strategies appeared to learn information from many topics in order to learn an 'aim' topic, whereas students who adopted 'serialist' strategies would only move on to a new topic when they were completely certain about the first topic. Holist students tended to ask questions about broad relations and formulate general hypotheses whereas serialist students asked questions about narrower relations and formed more specific hypotheses. In further experiments, Pask prepared materials which were structured to match either holist or serialist learning strategies. He found that new information was learned more quickly and accurately from materials which matched their preferred strategy. but was slow and unsuccessful using materials which did not. Some students were able to use both holist and serialist approaches, depending on the material to be learned, whilst some were able to 'act like holists' or 'serialists' although that was not their preferred strategy. Pask also found that various unhelpful learning strategies were used and in another set of experiments demonstrated that teh students could learn to identify and avoid using these if given appropriate feedback. Pask's work is complicated, and was carried out with sixth form and college students, but would seem to have some distinct implications for the teaching of study skills and the preparation of teaching materials and courses.

Finally, the work of Witkin et al. (1975) on cognitive style also has implications for study skills. Witkin required subjects to find a simple figure hidden within a complex geometric pattern. He referred to people who could spot the figure easily as 'field independent'. These people reported more success and enjoyment of mathematics or science subjects, than the 'field dependent' people who did not easily see the embedded figures and who were happier in arts subjects.

2.15 Implications of research on study skills

Numerous implications for teaching and researching study skills have emerged from the literature review. It was shown that students could change from their habitual style of study in response to the type of material or questions asked. The importance of the compatibility of materials and cognitive styles for aiding learning and, therefore, for consideration in formal assessment programmes, were also evident. For example, Witkin's research suggests that field independent individuals might find it easier to interpret graphs, maps and matrices, and make progress in subject areas using these forms of recording than field dependent individuals.

Another limitation of the previous research relates to the measures used. The tasks employed have either been especially designed for experimental purposes (e.g. Pask, Witkin) or naturalistic in which case they could not be the same for each subject (Selmes). Where naturalistic tasks have been used the research has relied on self-report measures such as diaries or questionnaires; where more direct measures of performance have been used, the tasks have been artificial.

Finally, but linked to the previous issue, is the question of whether the various cognitive skills listed by e.g. Marland et al.

(1981) are independent or whether performance in one is distinguishable from performance in another. In other words there was no examination of the content validity of the models of study skills. Going on from this, the question of whether study skills will only be manifest after basic literacy, numeracy and graphicacy have been mastered, or whether do form part of the child's basic competence is unexplored.

Thus, as Irving (1985) pointed out, that although we are already in an age flooded with information, we still do not know how children can be better equipped to locate, assimilate and apply it. In spite of the 'information age', study skills were not considered important in most schools (Tabberer and Allman, 1983; Nisbet and Shucksmith, 1986).

2.16 Implications for the assessment of study skills at primary level

The present study is concerned with primary age children, and there is a clear need for more research on study skills in this age group, since all of the research described above was carried out on the upper secondary and college age groups. In particular, it might be fruitful to investigate the possibility of a developmental pattern in the acquisition of study skills.

The present study cannot, of course, be concerned with all of the issues listed above, but it can address some of the criticisms of the previous work. Firstly, the PRISMS assessment can take in the full junior age range, so that variations with age can be investigated through children's performance, as well as through observation of their study behaviour. Secondly, some attention can be paid to the need for valid and non-trivial tasks which cover a range of topics and of presentation and response modes.

2.2 Survey of Assessment Materials

2.21 Review of test materials

The initial strategy for the PRISMS assessments, which had to cover a broad range of the curriculum at both upper and lower junior levels, was to use a combination of ready-made tests and specifically prepared exercises for areas where tests were not available.

A rapid review of readily available assessment materials revealed a wide variety of different types of tests of reading and tests of arithmetic, but only two tests of any other area of the curriculum, namely 'study skills'. (Levy and Goldstein's (1984) invaluable critical catalogue of tests was not yet published.)

Abbreviated versions of the language and mathematics tests from the Richmond Tests of Basic Skills (France and Fraser, 1975) had been administered already as part of the PRISMS research programme, but these did not include tests of reading or comprehension. It seemed necessary to seek a suitable group test to assess these skills which very probably underpin independent study skills.

Many of the reading tests available required the testee to read sentences, words or even unattached syllables out of any meaningful context. These techniques bear little relation to the processes of natural reading or comprehension. In the Carver Word Recognition Test (1970), for example, the child is required to underline the correct written form of the sound emitted by the teacher from selections such as:

ung hug nug gum gan gun.

Two reading tests had greater face validity; the London Reading Test (Inner London Education Authority, 1980) which uses cloze technique in comprehension tasks based on Barratt's taxonomy of comprehension skills (see Quigley, 1976), and the Edinburgh Reading Tests (Godfrey Thomson Unit, 1975 - 1980), which requires the children read passages and extract information from pictures, charts. the latter is ineffect a test of study skills.

One useful source of item 'models' was found in the surveys of language, mathematics and science at 11 carried out by Assessment of Performance Unit (APU, 1980, 1981a, 1981b). The language survey (APU 1981b) included comprehension exercises which were based on a variety of different types of written information aned which were presented as genuine reading materials or informative leaflets, rather than as passages printed on test forms. This idea was adapted for use in the PRISMS assessment materials.

The APU surveys of mathematics and science at 11 also provided item types which had not been found in the tests of mathematics which were available. None of these tests would have extended the information obtained from the shortened Richmond Test of mathematics (France and Fraser, 1975) which were used by the PRISMS project, and none of those examined included any applied or practical skills. Questions on the construction of graphs and on reading graduated scales were adapted from the mathematics survey (APU, 1980) and the science survey (APU 1981b) respectively.

2.22 Tests of Study Skills

The Work-study tests from the Richmond Battery of Basic Skills were a promising source, but had some drawbacks. They cover three main areas; interpreting graphs and tables, map-reading and using reference books such as encyclopaedias, dictionaries etc. The test contents, however, did have some obvious restrictions. For example, they include a test of children's skill in using alphabetical order, but do not examine whether the child would have thought of finding a dictionary in the first place, if faced with a word to define. Although the test claims to test dictionary skills, the 'dictionary' consists of a tiny extract from a dictionary reprinted on the page beside the item. Testees are not required to cope with an actual book and with finding the relevant page; this has already been done for them.

The Bristol Tests of Study Skills (Brimer and Gross, 1982) were not available in the short time during which this review had to be carried out, but Riding's (1984) review pointed out that many of its items on aspects of elementary science, maps, geometry and graphs, demand a reasonable attainment in those subject areas, despite the claim in the manual that the test is curriculum free.

2.23 Implications of the survey of test materials

The survey of test materials to be adapted for the PRISMS assessments or to provide a source of items was unsuccessful; and it soon became evident that this was because the notion of a test of study skills was in some ways absurd. In tests, the required information should no longer need to be studied, but should be 'at the testee's fingertips'. The conditions in which tests are carried out might have the effect of inhibiting study by restricting movement, consultation and time available. To re-phrase this in terms of Selmes work, the time limit and unconnected nature of the items would be likely to engender shallow rather than deep study skills. Furthermore, since tests typically sample a tiny proportion of the subject's time, it would be relatively easy to obtain an unrepresentative performance as a result of external effects such as tiredness or distraction.

Test conditions are intended to be standardised for all candidates. The concern in the PRISMS project, however, was to find classrooms in which the conditions engendered independence in learning. Thus a child's performance would be a product of her own skills and understanding of the tasks as well as of the working conditions. The exploration of the study skills of a large number of children ought to possess higher content validity when carried out in normal working conditions than in test conditions.

An extended piece of work stretching over a few days at least and to be worked on at different times of the day, should have greater classroom validity than a test or a series of tests with short time limits. This would avoid the problem of children having 'off-days' at the time of testing, but would mean that the contents must be able to sustain the children's interest and motivation for a longer period of time.

Another feature of tests surveyed was their reliance on pencil and paper methods. Whilst it would be difficult to include active or three-dimensional response modes such as dance or sculpture, reception modes such as listening, and responses involving drawing, could be utilised to broaden the scope of the assessment exercise even though these are not commonly used in school assessment methods.

In summary, the ten conditions listed below emerged for the composition of the PRISMS assessment materials.

The materials must:

1 be amenable to normal classroom working conditions, allowing for movement, use of resources, consultation with the teacher and other children;
2 be suitable for children aged between 7 and 11;
3 attempt to minimise the likelihood of children copying each other's responses;
4 provide an overall context for the various items, and potentially possess a wide ranging content;
5 be extended over period of a few days, to minimise the potential effects of 'off days';
6 be capable of sustaining children's interest;
7 not waste children's time; (the exercises must have a teaching potential as well as a testing function);
8 be of a form which could be sent out to schools and be returned to Leicester by post;
9 be quick and easy to mark;
10 attempt to incorporate different presentation and response modes within the practical constraints of the exercise.

The forerunners of the PRISMS assessment exercises were, of course, the work-study tasks devised by Ann Jasman for the ORACLE project (see Galton and Simon, 1980), and these will be described next.

2.3 The ORACLE work study exercises

Jasman designed two sets of three tasks; namely study-skill exercises and structured activities. These were intended to measure children's ability to acquire, organise, present and use information; They are listed in Table 2.2:

Table 2.2 The study skill tasks used in the ORACLE project

Study-skill exercises

1 the interpretation of pictorially presented data and the construction of a block graph;

2 making a plan of the classroom;

3 making a model of a clock face with movable hands;

Structured Activities

4 a set of tasks involving 'listening skills';

(i) matching the tape-recorded sounds of musical instruments to their pictures

ii) after listening to pre-recorded series of sounds (e.e. an alarm clock ringing) which made a 'sound story', the children had to put pictures depicting the sounds into the correct order;

iii) following a set of prerecorded instructions;

5 making a picture incorporating a given geometric design, scored for originality and appropriateness;

6 a series of tasks involving the acquisition of information other than by reading;
i) the children listened to a story and looked at a picture which illustrated it, and then answered a series of questions based on information obtained solely from either the story or the picture;
ii) the children were asked to write down five questions (or more) which they would like to ask of a character in the story.

(adapted from Galton and Simon, 1980, p. 103)

After scoring systems had been devised and satisfactory inter-scorer reliabilities obtained for the plan of the classroom and the clockface models, the pupils' scores on all of the tasks were factor analysed. This was to determine whether there were separately identifiable skills, such as accuracy, which would contribute to certain of the tasks but not others. If such study skills were distinct from basic literacy and numeracy, then the scores on the tasks should be independent of performance on the conventional achievement tests (shortened Richmond tests) which were administered as part of the ORACLE project. On the other hand, the skills involved might be completely task-specific.

The results of the factor analysis supported the latter interpretation; the factors were specific to the separate tasks. There was no evidence of underlying factors contributing to more than one of the tasks. Instead, Jasman found that some of the tasks themselves involved two or three different factors, and separate factor analyses of the scores on each task led her to suggest that the six tasks incorporated twelve task-related study skills. For example, the results of the block graph task (task (1) in Table 2.2) split into four orthogonal factors which were labelled 'concept', 'layout', 'accuracy' and 'presentation; the plan of the classroom task (2) produced two factors, which were labelled 'positioning' and 'layout'; and the picture completion task scores (5) also produced two factors, labelled 'originality' and 'appropriateness'. The scores on the remaining tasks loaded on a single separate factor for each task: The clockface task (3) produced a general factor only. The first and third of the three listening tasks (4) tasks loaded on one factor of which the common element appeared to be following instructions, and the scores from the second task loaded on one factor, labelled 'sequencing'. Finally, the two tasks involving the acquisition of information other than by reading (6) resulted in two factors which were labelled 'comprehension' and 'formulating questions'. Questions based on information acquired from the two sources (aural and visual) did not produce separate factors.

Some significant intercorrelations were obtained between these twelve skills as involved in performance on the different tasks. Her overall conclusion was that these skills complemented each other but did not overlap to any considerable degree (Galton and Simon, 1980). Jasman suggested that study skills, if identifiable, must be embedded in 'everyday study tasks' but these involve a complex pattern of different skills. Even if the task actually taps the study skill which it was designed to assess, such as classification, analysis or comparison (or a combination of these), other cognitive skills must be involved in the reception and decoding of the information. Success or failure at the task might depend on skills other than the 'target study skill. As Jasman found, decoding instruction seemed to be a more powerful link between two tasks than the listening skillls involved in four tasks, or the verbal/non-verbal division within the four listening tasks. Similarly, the cognitive skills in Marland's list, can only be inferred from the content of task. Whilst successful completion of the task might have resulted from the use of a particular cognitive skill, failure need not mean that the child failed to use the 'target' skill; the breakdown could be elsewhere in the chain.

Jasman sought common study skills within a few, different 'full-scale operations', (such as 'make a clock face' or 'construct a block graph') but found separate skills within each operation. This suggested that, in the present study, the aim should be to identify different skills within a large number of small-scale tasks, or items: in other words, to use identical presentation and response modes, but to vary the 'target' skill. Failure in all items, might then be put down to input, (e.g. reading skills), output, or comprehension processes, but success in some and not others, could be attributed to the 'target' skill. Factor analysis would be used to test whether the items which were expected to tap the same skill formed separate factors which could be labelled in terms of study skills.

Another aspect of Jasman's tasks which is likely to have contributed to her failure to identify common skills is that they were heterogeneous on content and purpose. It seems possible that if a similar set of tasks were linked by a theme, providing some kind of cognitive set, then relevant underlying 'skills' or strategies would be more likely to be brought into play.

Throughout the preceding paragraphs, there has been an assumption, following Jasman, that any factors which might be extracted from the results of a series of tasks intended to tap study skills, could be identified as skills. This assumption also needs to be tested when interpreting the basis of any factors extracted. Since Jasman's factors were, in most cases, task specific, the task itself, or its resources may have been as useful a label for a factor as the skill-based interpretations which were adopted.

At a practical level, the geographical distribution of schools in the ORACLE project enabled Jasman to have regular meetings with the teachers. For the PRISMS project, however, the spread of schools across nine LEAs meant that the assessment had to be developed for use at a distance, and such that the teachers could administer without prior training.

In summary, the differences between the tasks devised for the ORACLE project and the requirements of the PRISMS project, meant that a new set of tasks was needed which would be parallel with Jasman's tasks in some cases. At the same time, it was hypothesised that a single theme to integrate the tasks in some way might perhaps facilitate the transfer of skills from one task to another. Bassey (1978) had used the term 'thematic studies' to embrace ..'topics or projects on scientific, geographic, environmental, historical or Biblical themes...where the teacher's main aim is to provide experience of the subject matter or, to develop the skills of enquiry.' (p.38). Thus the use of a topic or theme would be consistent with one way in which teachers tried to encourage study skills.

2.4 The PRISMS Project

The Educational Provision in Small Primary Schools (PRISMS) project (Galton et al., 1987) was funded by the Department of Education and Science. The project ran from April 1983 to September 1985 and involved 68 small primary schools from nine local education authorities.

The central aim of the project was to provide a detailed description of curriculum provision in small schools. Systematic classroom observation techniques developed in previous projects at Leicester University (Galton, Simon and Croll, 1980) were used to record not only classroom interaction but also details of the pupils' tasks. The classroom observation took place during the school year 1983-4 and was carried out by nine seconded teachers, one from each participating local authority.

In addition to the classroom observation, the PRISMS research included a questionnaire survey of teachers and interviews with the the heads and teachers from 14 schools. Information about pupil progress was gathered by the administration of shortened versions of the language and mathematics components of the Richmond Tests of Basic Skills (France and Fraser, 1975) in October 1983 and June 1984. These tests were very limited in scope, and so the need for further assessment exercises was evident.

Previous research projects, such as the ORACLE project (Galton, Simon and Croll, 1980) had been principally concerned with classroom interaction. Curriculum activities had been of secondary importance and were recorded in terms of nine broad areas (three for mathematics, four for language work, art and craft,and one general area to cover history, geography and science etc.). In the PRISMS project this balance was reversed: the major emphasis was on curriculum activities, and classroom interaction was of secondary importance. The PRISMS curriculum observation schedule was therefore designed to give considerable detail about classroom activities.

A schedule of 110 categories was devised. The categories are listed beside their section headings in Table 2.3, and abbreviated definitions of them are shown in Appendix A1. To record a child's curriculum activity, the observer noted in longhand the details of the child's task during each 50 second period of observation. Later, using the manual definitions, the observer would code the activity using any number of the 110 categories which were relevant to the task.

The PRISMS' curriculum observation schedule was comprehensive and flexible, so as to accommodate the myriad variations of the numerous activities commonly prevailing in primary schools. If the assessment tasks could be defined in terms of the curriculum categories, then

Table 2.3 THE PRISMS CURRICULUM OBSERVATION CATEGORIES

Section heading	Categories
Curriculum areas	
MATHEMATICS:	
NUMBER	digits (1); count; place value; add; subtract; multiply; divide; carry; tables
PRACTICAL (2)	length; weight; time; area; volume; angles; symmetry; shape; money; temperature
CONCEPTS	sets; scale; logic; matrix; graphs; network
LANGUAGE	letter; part-word; whole-word; symbol; sentence; passage; poem; story; foreign
TOPIC (3)	history; geography; biology; physics; environmental studies; art; drama; music; religion; movement; social/moral
Media	read; listen; observe; write; vocal; draw; actout; material; hardware
Criteria	create; map; copy; learn; test; play
GAMES	physical; educational; competitive; cooperative
Actions	
ACTION	select; classify; reorganise; construct; analyse; question; answer; discuss
RELATE	match; order; compare; predict; meaning
STAGE	wait; instructions; plan; routine; assess; report; feedback
Resources	teacher; pupil; board/OHP; chart; textbook; reference book; reading book; workcard; published; environmental resource; unsupervised
Equipment	tape-recording; radio/record-player; television/video/film; calculator; computer; apparatus (any)

Notes: (1) There were 9 'digits' categories which were used to show the maximum number of digits in a term.

(2) Included both actual weighing or measuring, and sums involving length, weight etc.

(3) Used in combination to cover different aspects of integrated work.

the results of the assessment exercise could, in theory, be linked to the observed curriculum. The main sections of the observation schedule were therefore used as a guide to the item writing to ensure a range of different item 'profiles' across certain sections. For example, the items could be mapped against the categories as an observer would have done, if s/he had been observing a child doing that item in class. So, one item might require the child to read a sentence, from a reference book, and to classify its meaning in some way or match to the meaning of some given words; another might ask the child to observe and compare two sections of a chart, so analysing the information (the PRISMS definition of 'analyse' included the bringing of information together to form a conclusion: see Appendix A1).

Having taken the decision to use a topic or theme to integrate the tasks, and to make the item or task structure compatible with the observation categories, three sources of information were used to guide the choice of topic and to ensure some degree of content validity. These included surveys of primary practice (e.g. the HMI survey, recent curriculum packages together with the initial frequencies of the PRISMS curriculum observations. This last will be described in more detail in Chapter 3. The first two sources will be described below.

2.5 Recent studies of the primary curriculum

Bassey's (1978) survey included a list of the most common topics undertaken in primary schools. Whilst it was important in the present study to avoid an over-familiar theme, it was necessary to find one to which every child could relate. The survey indicated that local studies was a common theme. The HMI primary survey (DES 1978) also provided support for this theme and gave an indication of acceptable subtopics. HMI also suggested that certain features of local studies projects that might be expected, were not always used. For example,

> 5.123 Some attention was given to the study of the past in three-fifths of the seven year old classes, nine out of ten nine year old classes and almost all of the eleven year old classes........Some classes were studying periods of English history, often with a bias towards work on buildings....frequently stimulated by a visit to a nearby castle...
>
> 5.129 Some work of a geographical nature was undertaken in three fifths of the seven-year-old classes and nine out of ten nine- and eleven-year-old classes. The seven year olds learned about the immediate environment and more distant places to the same extent. Similar topics, for example, 'Homes' tended to appear in classes of all ages.
>
> 5.130 Two fifths of the seven-year-old classes and two thirds of the eleven-year-old classes carried out some geographical studies in the local environment. Some work relating to ..transport... took place in nearly half the older classes.
>
> 5.131 Some of the most successful work was based on the locality of the school, as in a nine-year-old class....(in which).. the children studied local maps and illustrations and carried out a traffic and pedestrian survey, as well as considering alternative routes for the proposed new road.
>
> (DES, 1978)

Paragraph 5.133 revealed that reference books and atlases were frequently used in three-fifths of the eleven-year-old classes but that maps of the locality were used in only a quarter of the nine year old and two fifths of the 11 year old classes. The decision to use a local study theme was thus supported by this report.

2.6 Recent curriculum packages

After initial reference to '<u>Primary Practice</u>' (Schools Council, 1981), the Schools Council project, '<u>Place, Time and Society 8 - 13</u>, directed by Alan Blyth, (see Blyth et al., 1976) was consulted. This project was cited in Chapter 1 as a representative of the shift to a skills based curriculum in which a set of criteria which could be used to assess a child's progress and guide the teaching in the acquisition of a skill was provided. It included a set of aims and objectives for the teaching of history, geography and social science. The objectives were divided into four categories; intellectual skills, social skills, physical skills, and personal qualities exhibited through interests, attitudes and values. The objectives based on intellectual skills are essentially a list of study skills to be acquired. The child has to learn to:

1 find information from a variety of sources,
2 communicate findings through an appropriate medium,
3 interpret pictures, charts and maps,
4 evaluate information,
5 organise information through concepts and generalisations,
6 formulate and test hypotheses and generalisations.

The list is very similar to the study skills listed by Tonjes and Zintz (1981) and described in section 2.1 above. Objectives 1,3,4, and 5 could be incorporated into the assessments but objectives 2 and 6, would be difficult to test adequately through a pencil and paper task alone. It was pointed out earlier that any extended assessment exercise should also have some educational value for the child. For this reason, some of these objectives ought to be incorporated into the text of the assessment materials. The <u>Oxford New Geography</u> series, (Elliott, 1980) and

History 7 - 13 (West, 1981) were the most important sources for the history and geography item content.

2.7 Summary

This chapter has described the immediate background to the devlopment of the PRISMS assessment materials and for the practical work to be reported next.

An initial survey of the study skills literature revealed a serious lack of research on study skills at primary level. It was therefore clear that some exploration of the development of study skills could be undertaken if data were collected across the junior age-range. The need for a variety of forms of information, including verbal, numerical and graphical forms was recognised, following the work of Pask and Witkin on cognitive style. A survey of existing test material was undertaken with a view to combining, or adapting this with specially devised exercises, but the use of test conditions was rejected as being likely to inhibit rather than induce study skills.

The contents and results of the study skills exercises from the ORACLE project were examined and the need for an integrating framework such as a topic or theme emerged from this analysis. The ideal of using a variety of presentation and response modes was recognised but was limited by the nature of the PRISMS project and the need to develop a 'distance' assessment package. After a brief outline of the PRISMS project and the curriculum observation system, the recent primary surveys and curriculum materials which were consulted to provide information on levels of difficulty and likely subtopics were listed.

CHAPTER THREE

The Prismaston File: development and pilot study

Introduction

In this chapter the development of the PRISMS assessment materials, 'The Prismaston File', will be described. Details of the materials and the classroom trials in the pilot study classes will be reported. After a discussion of the results of the pilot study, the modifications to be made to the items, tasks, and classroom introduction will be presented.

The survey of the relevant literature and accessible materials in the previous chapter led to a series of implications for the PRISMS assessments, and these will be restated here as the aims of the present study. They are:

1 to assess the independent study skills of children aged eight to eleven in a wide range of curriculum areas;

2 to determine whether there are common or discrete study skills according to different tasks;

3 to find out whether study skills change during the junior age-range;

4 to devise materials for the assessment of the study skills, which will:

   a) cover a wide range of the curriculum, :

   b) have greater context and content validity than published test materials;

   c) depend on study skills rather than knowledge;

   d) not require test conditions;

   e) fit into any classroom organisation.

3.1 The PRISMS assessment materials: development

The decision to use a topic or project-based approach to the assessment tasks meant finding a theme which could encompass a wide range of topics, and the first part of this chapter describes the development of the 'Prismaston' theme. Since test conditions had been rejected as unsuitable for the assessment of study skills, it was decided that the children should work in normal class conditions, thus achieving some ecological validity, and should be asked to record the resources they used and any help they were given. The way in which they did so will be described in the second section of the chapter.

3.11 The issue of content validity

One aim of the PRISMS assessments was to achieve greater validity in terms of classroom tasks, than is usually possible in tests designed to sample a narrow range of skills or a single ability. Classroom tasks, on the other hand, are typically complex, requiring the child to use a variety of skills and resources and so their use presents a different set of problems. It is necessary, for example to have some record of typical classroom tasks. As suggested in Chapter 2, the PRISMS observations made in the first few weeks of the project provided detailed information about the component actions and contexts in frequent use in classroom activities.

3.12 The observed curriculum

The PRISMS team of researchers and seconded teachers met in December 1983 to discuss the first set of curriculum observations.

The team was able to study the frequencies of the first two weeks' observation of curriculum activities, and the degree to which certain categories appeared frequently in conjunction with others. These frequencies are shown in Table 3.1. Table 3.2 shows how the team reanalysed the more frequently used single categories and combined the less frequently used categories to represent activities which could be readily identified as classroom tasks. The categories were either 'broken down' or combined together to produce frequencies of about 8 to 10 per cent of observations. This would mean that the activity had been observed often enough to be a regular part of the curriculum. All of the combinations of categories were to include at least one category designated an 'action', such as 'write', 'plan', 'add' or 'predict' so that the task could be described in terms of skills, or what the children were actually doing. Some were accompanied by 'context' categories, such as poem, history, or teacher; other were combined with other actions. The category 'create', for example, had been used in 15 per cent of the observations (see Table 3.1) (this represented 345 actual observations); it had appeared with the action 'write' in 7.2 per cent of the observations and in the context of 'art' in 5 per cent. Similarly, the category 'listen' had been recorded in 20 per cent of the observations; it was used with the contexts 'story', 'poem' or 'passage' in 10 per cent of the total observations and with 'teacher' in another 10 per cent i.e. 50 per cent of the children's listening was to some literary piece, and 50 per cent was to the teacher giving instructions for example.

Some of the categories on the curriculum sheet such as 'predict', 'plan' and 'analyse', on the other hand, had so rarely been used that it was necessary to combine them with other rarely used categories which seemed to represent similar skills or were likely to be part of the similar overall tasks. 'Predict', for example, had been used in only 1 per cent of the observations, and this was combined with 'classify' and 'reorganise' which had been used in 4 and 5 per cent of the observations, since the team judged that all three cognitive skills were used in advanced comprehension tasks, for example.

By revising the categories in this way, each item on the list in Table 3.2 represented a realistic curriculum activity which had been observed a significant number of times. Examples of tasks which might be represented are shown in Table 3.2. Taken together, the frequencies in Table 3.1 and the tasks in Table 3.2 provided an account of the observed curriculum which could be used to guide the contents of the assessment materials to ensure ecological validity.

Some of the activities in Table 3.2 such as pure arithmetic had been tested by the shortened Richmond tests. Others, such as listening to a story, doing a measuring or a comprehension task had not, and so these were included in the PRISMS assessment materials. The following tasks were chosen for inclusion on the basis of Table 3.2 and of their practical feasibility for inclusion in the materials (including the need to distribute materials and responses by post):

practical mathematics e.g. measuring;

interpreting graphs or maps;

discussion;

comprehension of a story, poem or passage;

a listening task;

a mapping task - transforming information across two media;

a creativity task - making up or inventing a story, picture;

drawing as art - a picture or making a model;

drawing (not art) e.g. graph; map.

Table 3.1 To show the percentage frequencies based on the first two weeks' observation.

Category	%	Category	%	Category	%
NUMBER		PRACTICAL MATHS.		MATHS. CONCEPTS	
digits	21	length	3	sets	4
count	15	weigh	2	scale	0
placevalue	12	time	2	logic	1
add	9	area	1	matrix	1
subtract	6	volume	1	graphs	2
multiply	5	angles	1	network	0
divide	4	symmetry	1		
carry	9	shape	3		
tables	1	money	2		
LANGUAGE		TOPIC		GAMES	
letter	4	history	3	physical	0
partword	2	geography	1	educational	1
wholeword	9	biology	3	competitive	0
symbol	2	physics	3	cooperative	0
sentence	10	envir. studies	4		
passage	18	art	12		
poem	2	drama	2		
story	5	music	7		
foreign lang.	0	relig. studies	3		
		movement	2		
		social/moral	4		
RELATE		STAGE		MEDIUM	
match	6	wait	4	read	17
order	4	instructions	4	listen	20
compare	4	plan	1	observe	11
predict	1	routine	5	write	22
meaning	5	assess	0	vocal	14
		report	1	draw	14
RESOURCES		feedback	1	act out	5
/EQUIPMENT				material	13
teacher	21	ACTION			
pupil	6			CRITERION	
board/OHP	7	select	14		
chart	2	classify	4	create	15
textbook	7	reorganise	5	map	15
reference book	2	construct	3	copy	18
reading book	7	analyse	1	learn	2
workcard	25	question	1	test	0
published	28	answer	7	play	4
environment	2	discuss	6		
unsupervised	1				
tape recorder	1				
radio/records	1				
TV/film	2				
calculator	1				
computer	0				
apparatus	19				

Notes: figures show percentage of 2300 categories used in first two weeks' observation.

Table 3.2 To show curriculum activities which were observed about eight per cent of the time during the first set of observations.

ACTION	+/-	CONTEXT	EXAMPLE TASK
count	-	apparatus	counting e.g. bricks
count	+	app'tus + prac maths.	measuring; money; area
add subtract			pure arithmetic
multiply) divide)			
match) order) compare)	+	apparatus + maths concepts	interpret graph or scale
discuss plan) analyse) assess report) question)			class discussion; or planning and doing an experiment
predict) classify) reorganise)			inferential comprehension
select			multiple choice task: choosing correct word
write	+	passage	write a story
write	-	passage	writing less than two lines
copy			copy a question, sum, poem
read	-	passage	read instructions, words,phrases, short poem
read	+	passage	read book, story
listen	+	story, poem, passage	listen to story read aloud
listen	+	teacher	listen to instructions, or music
observe			e.g. picture, specimen, TV
map			transpose information e.g. from 3D to 2D
create			invent, compose
draw	+	mater'l, construct, art	2D or 3D art work
draw	-	mater'l, construct, art	graph, map, picture
actout	+	physical, vocal, music	drama; music + movement
learn	+	vocal	learn a poem

Key: + : occurred with; - : occurred without

3.2 The Prismaston theme

The brief review of curriculum materials and surveys of primary. practice described in Chapter 2 had suggested that a topic built around local studies would be neither over-familiar nor too remote for the children. Such a topic would be capable of incorporating the tasks listed above but it needed to be built into a theme or story which could sustain their interest for the course of an extended exercise.

The subject of the local study was an imaginary place called Prismaston, which had the characteristics of any small town or community, such as a few shops, a church, a primary school, and a playground. The aim was to provide a setting with which the children could readily identify, probably seeing similar characteristics in their own area. The story which was invented to introduce the work centred on the everyday lives of four children who attended 'Prismaston Primary School' and whose names were chosen from a list of the most popular names for children born in England in 1975 (Dunkling, 1977). These children, according to the story, had been being observed by some friendly 'aliens' who now wished to check their 'observations' with the help of the children in the PRISMS small schools. The 'aliens' had collected their observations and information together into some booklets called 'The Prismaston File' and had provided copies for (real) school-children to check. In order to carry out the checks, the real children were asked to act as 'secret agents'. This device was intended to stimulate interest, emphasise secrecy, and justify the need for children to record the resources they used. For example, it meant that the children could consult books, the teacher or their friends on condition that they recorded the resource they had used.

'Secret agents', of course, need to be trained, and this provided the justification for a formal and somewhat intensive introductory session to the work on 'The Prismaston File'. The introduction was called a 'training course' and it was to be led by the teacher who read the instructions aloud, with the children following the words.

These elaborate constructions perhaps seem rather bizarre when described in this way. It was important, however, that since 1500 children were to be asked to develop a sustained interest in the work, at short notice, and were to be expected to work independently over a period lasting one or two weeks, without any particular support from their teachers, then some features of story books and television serials which seem to engage children's interest might be helpful.

3.21 The assessment materials: pilot version

After initial trials using preliminary materials with 6 junior age children, the pilot materials were produced. Two versions were prepared, one for lower juniors, aged 7 to 9 years, and one for upper juniors, aged 9 to 11 years. The pilot materials can be seen in Appendix A2. The contents are summarised in Table 3.3. Each child was supplied with:

'The Prismaston File : Data-check' - a 23-page A4 booklet containing the 'story' and the items, typed in double spaced large type. The upper and lower junior versions were typed on green or yellow paper respectively.

'The Prismaston Data Collection : Agent's Codebook' - a 12-page booklet containing the appropriate letters for the child's choice of answer, the codes to record use of resources and

Table 3.3 Summary of contents of 'The Prismaston File'

(i) LOWER JUNIOR VERSION

INTRODUCTION

Instructions and introduction to the story: example to initiate careful reading of text and use of map, reference book and resource records.

FIGURES:

Map of Prismaston labelled with road names and functions of buildings; pictures of houses; simple bar chart of modes of transport

HOUSING: 9 items (final version: 7 items)

- location of houses on map given addresses or aerial diagram

ARCHITECTURE: 4 items

- questions based on pictures of the children's houses

THE TOWN: 4 items

- map symbols and reference book

THE PAST: 11 items

- historical content; evidence from pictures of houses, road names, reference book

JOURNEYS: 5 items (final version: 7 items)

- finding routes and determining distance

TRAVEL ON LAND: 3 items

- recognition of features used to differentiate 4 modes of transport

TRANSPORT: 7 items

- interpretation of simple bar chart

IT'S QUICKER BY BUS: 12 items

- 9 items on comprehension of short passage; 3 items on reading a timetable

YOUR JOURNEY: 5 items (final version: 3 items)

- (different format) children asked to note features on their own journey to school and then draw a 'picture or plan' of that journey

MONEY: 7 items

- interpretation of fares table, relating fares to destinations on the map; coin recognition

---

Pilot version 67 items; Final version 60 items
(5 items omitted from final analyses)

(ii) UPPER JUNIOR VERSION

INTRODUCTION

Identical to the lower junior introduction (to ease administration in four year age range classes)

FIGURES

Map with grid, scale and compass, roads, buildings labelled; pictures of houses; histogram and Venn diagram on transport use

HOUSES AND SKY-VIEWS: 8 items (final version: 4 items)

- location of sites using addresses, compass directions and aerial diagrams

TERRITORIES: 4 items

- shape and relative area of ground plots

THE TOWN PLAN: 2 items

- map symbols

PRISMASTON COUNCIL MEETING: 7 items

- practical mathematics involving measuring and use of units of area, perimeter, volume; proportions; calendar

THE MAP: 5 items

- grid references; decimals

TRANSPORT: 7 items

- interpretation of histogram and Venn diagram

YOUR TRANSPORT SURVEY: 9 items (final version: 5 items)

- children asked to collect information from ten children on their transport to school and to present data in form of a histogram and a Venn diagram; (the items were designed to set out the stages for making the diagrams and were omitted from the results analysis)

THE TRANSPORT DISCUSSION: 9 items

- advanced comprehension involving recognition of arguments supporting and protesting against certain forms of transport

CASTLES: 12 items

- comprehension of passage and illustrations in reference book

HISTORY IN PRISMASTON: 6 items

- interpretation of time-line in reference book

Pilot version 69 items; Final version 60 items
(12 items omitted from final analyses)

teacher help, clocks to record the time at the beginning and end of each section; green and yellow paper was used for the upper juhnior and lower junior versions respectively.

A map of Prismaston: the upper junior version of the map was printed on green paper and included a reference grid and compass points. The lower junior version of the map was printed on yellow paper and was identical except that the grid and compass points were not included.

Both age levels were supplied with:

'The Prismmem' - a 14 page reference booklet, typed on A4 pink paper, in large double spaced type. It contained reference material such as map symbols, dictionary, history notes. The booklets were intended to be kept on bookshelves to be consulted when required. There was one copy for every four children in the class.

Each teacher was given:

teacher's notes;

a copy of the descriptions to be used for the listening skills task. There were two difficulty levels, one for lower and one for upper juniors.

3.22 Timetable for development of the materials

The time available for the development of these materials was very short. This meant that many steps in the preparation and revision of the tasks were somewhat condensed. The author was asked to survey existing assessment materials in December 1983 and the decision to produce new materials was taken in January 1984. Preliminary materials were tried in February and the pilot versions were trialled in March. The next two months were spent analysing, revising and producing the final versions which were distributed to the schools in late June. The responses were returned by post in July 1984.

3.23 Multiple choice format

A multiple choice format was adopted for the majority of the items. This is a weakness in terms of classroom validity since children would usually be required to write down their answers independently. This format was dictated by the practical needs of the PRISMS project, however. Firstly, if open written responses were to have been invited, the exercise would necessarily have become much more complicated. Teachers would be asked for help with spellings etc. and much more time would be have been needed to complete the work as many children write slowly. The response booklets would have needed to be much bigger to allow space and this would be have been more costly for return postage. The marking of up to 1500 scripts would have been a very lengthy process which would have made it impossible to get results to teachers in reasonable time.

Some open, practical tasks were nevertheless included. These were a listening and drawing task, a map-drawing task and a bar-chart task. More details of these tasks will be given below.

Multiple choice tests have a number of drawbacks, largely arising from the difficulty of devising effective items. Satterly (1981) catalogued the problems, such as the need to avoid negative stems and to use distractors of similar length to the correct response. In the introductory section of the Prismaston File attempts were made to 'disguise' the multiple choice nature of the items as far as the children were concerned. The four friendly aliens were given names which began with the letters A, B, C and D and the aim of the exercise, for the children, was to decide which of the answers given by these four 'friendly aliens' in the story they agreed with most. The letters A, B, C and D were used to mark the response choices. It was stressed that all four aliens had suggested good ideas, and one of the example items in the introduction was set up so that the children would see that a variety of answers was acceptable. This was intended to reduce the possibility of children copying each other's answers by showing that different answers were permissible.

3.24 Text readability

The text was to be read by 7 and 8 year olds, and so attention had to be given to its readability. Harrison (1980) provides a number of methods for determining readability. Two methods were used. These were the Flesch Reading Ease Score devised in 1948, and the Mugford Readability Charts which were published in 1970. Both methods are carried out on 100-word samples of text, and the former is intended for use with standard text. It was used, therefore, to provide a cursory check on the comprehension sections of the preliminary set of materials. The results of these checks were: at upper junior level, a Flesch Score of 60.49 was obtained which corresponds to 'standard' and has a Neale Analysis Reading Ability equivalent of 10 years (Neale, 1966). The lower junior comprehension task obtained a Flesch score of 85.75, designated 'easy', and which corresponds with a Neale Analysis equivalent of about 8.6. (see Harrison 1980). These results indicated that the readability of the text was within the appropriate ranges although, as Harrison (1980) points out, the Flesch formula is a poor discriminator at primary level. Further checks were carried out using the Mugford charts which could accommodate the text of the multiple choice sections.

Most readability formulae depend on a comparison of the mean syllables per word and the mean words per sentence taken from a 100-word extract. In the Prismaston File, it was difficult to define the sentences because of the multiple choice format. The formulae available for text that is not written in sentences are intended for use on adult technical material. The Mugford method, according to Harrison, was one of two measures which had the highest age-level accuracy in relation to teachers' judgements in the 'Effective Use of Reading' study (Lunzer and Gardner, 1979). For the present purpose, it had the advantage that it does not depend on the precise number of sentences, so that allowances could be made for the multiple choice sections provided that there were at least seven sentences in the 100 word section.

Using the Mugford charts, the introductory paragraph, common to both upper amd lower junior versions, had a reading level of 9.1: this was considered acceptable for a section which the teacher would read aloud. At lower junior level, reading levels of 8.6 (the Houses section), 8.4 ('It's quicker by bus' section) and 8.2 (The Past) were obtained. In the upper junior versions a wider range was found. The reading levels ranged from 8.6 for item 6 in 'The Prismaston Council Meeting', to 12.5 in the Transport Discussion. The mean of 10.5 over five samples was a little high for the 9 to 10 year olds, but the formula does not take account of words which would have become familiar by the time a child had done some of the work.

3.25 Description of the contents of 'The Prismaston File'

The tasks which were to be included in the assessment were listed in section 3.2 of this chapter, and the way in which these tasks were incorporated will be described in the next few pages. Table 3.3 provides a summary of the contents of the subtopics within each version. Table 3.4 shows examples of items grouped according to the major resources such as the map or a prose passage which they required, the skills or 'actions' that they were intended to tap, and the task set by the item.

(i) Maps

These items centred around the town plan of Prismaston. The map was prepared in two forms; one with a map reference grid for upper juniors, and one without for lower juniors. The map-reading items were designed to introduce the children to the town and to where the 'story' children lived. Some of these items were identical for both difficulty levels. This was firstly because the items had an important role in the continuity of the story, and secondly, because some duplication in this opening section would make it easier to administer in a vertically grouped class.

The items therefore required the children to locate the children's addresses on the map, to identify the houses in plan form, as seen from above, and to work out the relative positions of one house to another using compass points. At the task level, these are map-reading skills, but they can be further refined in terms of the skills listed in the PRISMS observation schedule. At the cognitive level, relational skills such as <u>match</u>, <u>order</u>, and <u>analyse</u> would be required. In addition skills to interpret the <u>medium</u>, e.g. the 'input' skills such as <u>read</u> and <u>observe</u> would be needed. Some examples are given in Table 3.4.

(ii) <u>Interpreting Graphs</u>

A bar-chart was incorporated into both versions of the Prismaston File. It showed the forms of transport that the story children had used to travel to school. A series of questions requiring the PRISMS children to interpret the graph was included. At the upper junior level, the children were also asked to interpret a Venn diagram illustrating the same topic.

(iii) <u>Drawing graphs and maps</u>

Two tasks were included to provide a change from the multiple choice items and to be more typical of classroom tasks. They were: a graph drawing task for the upper juniors:

> 'Make a bar chart to show how ten children in your class travelled to school today'.

and a map drawing task for the lower juniors:

> '..draw a picture. Call your picture 'My journey to school'.

(iv) <u>Pictures</u>

Certain items required the children to obtain information from pictorial clues. These items were intended, in particular, to involve the PRISMS category of MAP, which was used to describe the transformation of information from one medium to another e.g. from pictorial/visual to verbal. At upper junior level, items appeared in the 'Castles' section in which the answer had to be determined by comparing pictures of two types of castle, or by studying a diagram,

Table 3.4 : Examples of items with associated resources and skills

Upper Junior Level (Item 'numbers' refer to final version; pilot version in brackets)

item		skills	task
Resource: MAP : all items require children to read and observe			
ha	What is Paul's address?	order/count map*(words to map)	identify house on map
hb (hb)	Sarah's house is .... of the school.	match/compare	compass reading
mb (mr2)	The Westgate zebra crossing is in...(L12)	map/count	grid reference
Resource: GRAPH or CHART : all items demand read and observe			
tb (t2)	How many children came by car?	count	interpret bar chart
y/tc (H3)	Exactly when was the school built?)	map*/scale	read graduated scale on time-line
Resource: PICTURE : all items demand read and observe			
nj (C9)	(comparison of two castle designs)	compare/analyse	castle structure
y/tb (H2)	When did this happen? (picture of event)	map*/analyse	read time-line
Resource: PROSE : All items involve read + passage			
nc (C3)	What were the first castles made of?	meaning	comprehension
da (d1)	Which of these arguments is FOR walking?	reorg/analyse	"discuss"

* 'map' as 'action' in converting from one medium to another

Table 3.4 contd: Lower Junior Items (Final item 'numbers' in brackets)

ITEM		SKILL	TASK
RESOURCE : MAP			
h1 (hx)	Which house does this sky-view belong to? (diag)	match/map*	recognition of (diagram to words) plan
h9 (hr)	..(along Westgate.. in which order would you pass the ...houses	order	mapreading
m1 (mx)	There is no .... on the map.	match/compare	mapreading/symbols
RESOURCE : GRAPH			
t4 (td)	how many children came altogether?	count	interpret barchart
RESOURCE : CHART (timetable)			
c11 (cl)	...going to school was quickest by....	compare/analyse subtract	read timetable
f1 (fa)	How much did Mark pay to travel from home to school?	select/analyse	read map and fares chart
RESOURCE : PICTURE			
c3 (cc)	Look at the people on the bus. Do they look...	map/meaning	interpret picture
A2 (gv)	One of the houses seems to have had a new window	match/analyse	interpret picture
APPLICATION OF MATHEMATICS			
j5 (jf)	Which (is) the right thing to measure...	select	correct apparatus
(new) (jg)	Which agent measured Old Walk correctly?	compare/count	measure length in cms.
RESOURCE : PROSE			
c7 (cf)	How many people speak in the story?	analyse/count	comprehension

for example. Two further picture-based items were included in the 'houses' section and the 'History in Prismaston' section. At the lower junior level, there were picture/map questions about houses, 'The Past', and the 'It's quicker by bus' comprehension section.

(v) Listening, drawing and 'creativity' task

At both levels a 'productive' task of mapping skills was included in addition to the recognition tasks of the multiple choice items. The children were asked to listen carefully to a description (longer and more detailed for the older children) of a creature from 'Prismos'. The description was read out twice and the children were then asked to draw their own image of the creature.

The 'creativity' aspect of the task allowed the children to invent a variety of tool-shaped finger tips for the 36 fingers possessed by the creatures. This part of the task would be scored in terms of fluency and originality.

(vi) Application of practical mathematics

Another specific activity area which appeared on the list of activities in Table 3.2 was practical mathematics with apparatus, and so The Prismaston File included a number of practical mathematics items. At upper junior level, there were items in the Council Meeting section on area, (in finding a large enough site for a carpark): on length, (determining the perimeter of the school grounds): and on volume (in determining how much paint would be needed for some road markings). These items could be done either with the use of a ruler, or without a ruler by counting the squares on the map grid if the child had realised that it consisted of centimetre squares.

At lower junior level, the children were asked to determine some distances on the map, to find and compare the length of different routes and to say which instrument (string, tape measure, ruler, trundle wheel) would be the most appropriate for various measuring tasks. This area cannot be tested adequately in this way however, because, as the APU found, many children have not had enough experience with measuring instruments to use them correctly and confidently (APU 1981).

(vii) Comprehension

Another activity which emerged from the list of activities in Table 3.2 was 'read and passage', in other words some form of comprehension of written verbal material. In a sense all written tests are basically comprehension tests. In the case of The Prismaston File, however, some aspects of this were reduced by permitting the teacher to help with reading and understanding of the text. Although highly dependent on competence and confidence in reading, however, The Prismaston File was intended to assess independent study skills of which reading with understanding is a key component.

Certain sections of both the upper and lower junior versions were designed to assess comprehension skills specifically. At the lower junior level, the Edinburgh Reading Tests (Godfrey Thomson Unit, 1972) were cited earlier as tests which included the 'reading' of verbal information, supported by pictures and in places contained within the pictures, thus placing the writing in a context. The Edinburgh test version for 7 to 9 year olds (Stage 1) has four sections testing vocabulary, syntax, sequence and comprehension, and the items in these sections provided a model for the Prismaston items.

In addition, the items testing comprehension of written material must go beyond basic questions which can be answered regardless of whether the child has understood the meaning of the passage. For example, if the text said: 'Ob sag, Susan brit u taraxe va uggle' and the question was: 'Who brit u taraxe va uggle?' being able to read 'Susan' and 'Who' would be enough to answer correctly. On the other hand, some simple questions were needed to give children success at the start.

If, however, following a full text of 'nonsense' words, the question asked for a definition, an interpretation or a grasp of the whole text, genuine comprehension of the passage would be needed. The Prismaston File includes both types of question. The simple question, 'Who brought the picture to school?' (item c1 (ca): (the item number in the final version of the materials is shown in brackets) can be answered correctly, whether or not the child understands the words 'picture' and 'school'. Questions demanding understanding and interpretation of the text such as ' How many people speak in the story?' (item c7 (cg)) and 'Who felt a little bit angry?' (item c8 (ch)) cannot.

At upper junior level, the London Reading Test (ILEA, 1978), intended for juniors in their last term at primary school, was used to guide the question writing. This is based on the Barratt comprehension taxonomy (see Quigley, 1979). It is designed to assess five skills:

1 literal comprehension: understanding of simple facts;

2 reorganisation: demanding analysis and summary of information;

3 inferential comprehension: forming hypotheses;

4 evaluation: making comparisons;

5 appreciation: aesthetic judgment of the passage.

In the upper junior Prismaston File there were two forms of comprehension task. One was the Castles section, in which the children were asked to read about castles in the reference book and then answer questions. This section contained some 'picture reading' questions, see (iv) above, together with literal comprehension items e.g. item C3/nc: 'What were the first castles made of?' and reorganisation items e.g. item C11/nl 'What kind of castle could be built in the shortest time?'. Inferential comprehension, requiring the children to use or provide details, ideas, outcomes that are not explicitly stated in the text, was included. e.g. at lower junior level: item c12/cs: ' What would be a better title for the story?'

(viii) Discussion

In discussing an issue, children have to exercise cognitive 'actions' or skills such as analyse, predict, classify and reorganise which form part of the PRISMS schedule. It was naturally impossible to include a discussion in a pencil and paper task, but children may use the same cognitive skills in examining a written discussion and a task was devised accordingly. The task was in a sense a form of advanced comprehension test. 'The Transport Discussion', is more advanced than the Castles section in terms of Barrett's taxonomy, involving inferential comprehension and evaluation. The section consists of various points taken from a debate on the virtues of different forms of transport which are listed for the children to read. The children are then required to determine which points support the argument for a given form of transport and which points support the argument against it. They are also asked to recognise groups of arguments classified on the basis of issues such as pollution or safety. It was anticipated, that the PRISMS curriculum category 'discuss' could be tapped, here, albeit in written form.

3.26 The use of resources

Bassey (1978) found that 95% of the junior teachers in the sample believed that their thematic studies helped children's enquiry skills, which were defined as the ability to use an index, source books, and a library classification system. These skills are particularly relevant in the small schools curriculum provision debate where resources such as books and library space may be restricted for either physical or financial reasons. On the other hand, it could be argued that the smaller classes and more intimate nature of small schools could engender a freer use of the available reference books and other resources than would be possible in larger schools where pressure of numbers may generate the need for rule restrictions on movement, or timetabled use of the library.

An exercise which required children to use reference books, however, would depend on the same books being available in each school. Since it was unlikely that sixty-eight small schools would use the same reference books, the solution was to produce a booklet containing reference information for the study skills exercises.

In tests of study skills, as explained in Chapter 2, such as The Richmond Tests, the issue of reference books does not arise because the relevant chart, map or dictionary extract is printed on the same page as the test items. This may test whether the child can use these resources when provided, but it does not assess in any way whether the child would either think of using, or go to find, say, a dictionary, to discover the meaning of a word. This aspect of study skills, i.e. finding the appropriate reference material is an important part of independent study which is not included in tests.

In the Prismaston materials, the children could record their use of either the special reference book, (the Prismmem) or any other book by circling the syllable 'mem' alongside their choice of response.

3.27 Teacher and pupils as resources

Since one central requirement of the PRISMS assessments was that children should carry out the work in normal classroom conditions, the use of two other major resources was essential; namely use of the teacher and other pupils. The children were asked to record their use of these resources by circling the symbol 'dis' if they discussed an item with a friend, or a symbol to indicate the nature of the help received from the teacher. This record of help from the teacher was adapted from Jasman's earlier work on teacher-based assessment in the 1970s. She asked teachers to use a set of five grades of help, coded 'a' to 'e' and which represented levels of help ranging from 'read the instructions' to 'worked out the solution with the child'. In the present study, this format was altered to indicate the type of help received by means of the following codes which were incorporated into the children's answer books:

code	teacher help
r	read : ask the child to re-read the question or read it for a child who has difficulty reading;
d	define : define a term or suggest that the child looks it up in a reference book;
h	hint : give a hint if r and d fail;
e	explain the process needed;
m	advise the child to miss out the item if the explanation must be too involved.

3.3 The pilot study

The pilot study will be reported in three sections, which are as follows;

1 The setting and subjects;

2 Implementation: instructions, teachers' comments and children's reactions;

3 Analysis and results.

3.31 The setting and sample

The pilot study was carried out at a two-to-three form entry, socially mixed primary school in a large semi-industrial village. Both open plan and closed classroom situations were used. The pilot study took place in March, 1984.

118 children drawn from two first year classes and three vertically grouped second and third year classes took part in the pilot study. The vertically grouped classes provided the opportunity to use both upper and lower junior versions in the same class, a situation which would be common in the small schools. In all, 78 and 40 children used the lower and upper junior versions respectively.

The class teachers introduced the Prismaston File in three of the five classes and provided comments on the materials and the introduction. The author was able to observe one of these sessions and introduce the materials in the other two classes, one at each age level. These sessions revealed the need for more detail in the introductory section for the children, and more elaborate teacher's notes, and a series of revisions were made. It was essential that the teachers in the PRISMS schools would be able to introduce the work independently and appropriately, without having to spend a long time reading background information and working out the system.

3.32 Implementation

The pilot study was concerned with the overall practical feasibility of The Prismaston File. In addition to the preparation of a reliable instructions in the teachers' notes and the introduction to the materials, there were numerous questions concerned with whether the children would be able to react appropriately to those aspects of the materials which had been incorporated to minimise copying, encourage independent work and the use of the resources.. Would the children, for example:

be able to understand the instructions?

be able to read the type-script?

read the short passages of 'story' in between sections?

respond positively to the 'secret agent' idea?

reject the materials completely?

be able to coordinate the use of question and answer books?

use the reference book?

use the help and resource codes at all, and if so, would they do so appropriately?

be able to record the time spent on each section?

The answers to these questions were sought by means of observation of and conversations with the children working on The Prismaston File, and by observing, questioning and inviting comments from the teachers.

3.33 The revision of the introduction

It was likely that the PRISMS teachers would be reluctant to find time to study The Prismaston File and then devote two or three weeks to using it, particularly at the end of the summer term. It was therefore important that the introductory session would provide adequate information for both teachers and children to understand and implement the work without requiring the teacher to spend a long time working out how to use it. At the same time, the word-for-word instructions which precede many standardised tests were to be avoided. The Prismaston File was intended to be thought of as special topic work, rather than as a test. Thus the introductory sections of 'the story' and the examples had not only to inspire the children,but also to ensure that every aspect was adequately explained. At the same time, there had to be scope for teachers to elaborate, reiterate and question the class on particular points, just as s/he might do when introducing a new topic or work scheme, in mathematics, for example.

The main differences between the pilot materials and the final materials are in the introduction. Firstly, in the pilot version the introduction was divided between the question book (the 'Datacheck') and the answer book (the 'Code Book') in order to introduce both books. In the final version the instructions, formulated as the 'Secret Agents Training Course', are all in the question book. Secondly, the final version contains step-by-step instructions to guide the children through the basic details of filling in their names, dates of birth, as the trial introductions had shown these tasks to cause numerous problems! Thirdly, the final version gives much more detail about how to use the records of resources, teacher help and time taken for each section.

The first trial, with fewer written instructions and more reliance on the 'teacher' took about 45 minutes. The final version of the introduction would require a 60 to 90 minute period. The modifications were based largely on the suggestions made by the teachers in the pilot study. It was felt, however, that it would be better to extend the introduction and to 'spell out' the instructions. It was important, for example, to make sure that the children could follow the cross referencing of the question and answer books by getting them to point to matching item numbers in both books. The introduction in the final version was, therefore, much longer than the pilot study introduction.

3.34 The children's reactions

Although no systematic survey was carried out, the following anecdotal evidence was noted. The children's response to the first trial was surprisingly enthusiastic, and serious. The class appeared to accept the 'secret agent' idea wholeheartedly, asking questions, later, such as 'Can I tell my brother about it?' 'Do the other classes know about it?' 'Can we tell our teacher?' (who was not present during the introduction), and many more questions about the 'friendly aliens from Prismos'. Similar reactions were noted in the other pilot classes, suggesting that the 'story' devices had successfully fired the children's enthusiasm.

The initial interest persisted, and the listening/drawing exercise 'What does a prismon look like?' gave it a boost in the second week. One teacher commented that she 'felt like a spare part' as most of the children worked very independently. She capitalised on this opportunity to use the materials with a small remedial group and commented on how much she learned about these children as a result.

She pointed out too that she felt that other children transferred their experience of using resources independently for the Prismaston File, to doing so in other topic work.

Observation of children working from the materials revealed the need for certain emphases and additions to be made to the text, but showed that the children did attempt to use a variety of reference books. It also revealed that many first year children tried to use reference books to find answers, but that they did not know how to use them or what sorts of things could be answered by referring to books. In order to encourage more appropriate use of resources, the final version included hints as to where to look for the answer. The hints were given in this form beside each item:

item number	:	hx
'clue'	:	?
resource e.g.	:	map

indicating that a clue to item 'hx' would be found on the map of Prismaston.

3.35 Teachers' comments

Some of these have already been recorded in the preceding sections. Others were points about layout and typing and the unwieldiness of large A4 booklets. The final version was produced in A5, which made the booklets more manageable for the children. The need to retain an acceptable size of print yet to keep the number of pages low, meant a loss of space in the lay-out. This perhaps had the effect of making the final versions look more difficult than the pilot versions.

3.4 Pilot study analysis

At this stage, the PRISMS' project's timetable, the final version had to be ready within three months of the pilot study, only the multiple choice items and the help and resources records were analysed. The bar chart task, the map drawing task, the listening and drawing task had been observed in progress and aspects of their presentation were modified as necessary, but no detailed analysis was undertaken.

3.41 Overall results of the pilot study

The overall results of the pilot study of both upper and lower junior versions are listed in Table 3.5. At upper junior level, 27 of the full sample of 40 children attempted every multiple choice item whilst, at lower junior level 78 began the work and 68 completed every item. Further analyses of the multiple choice items were based on those who had completed the items but the 'use of resources' and 'teacher help' analyses were based on all of the children, since those who had not been able to complete the exercises would probably have used the various resources as well as consulting their friends and the teacher. It was necessary, therefore, to consider their resource records, although their inclusion in the analyses of the results of the items would have invalidated these figures.

There were 63 and 62 multiple choice items in the upper and lower junior versions respectively (excluding items associated with the bar-chart and map-drawing tasks) and the score ranges shown in Table 3.5 indicate that there was no ceiling effect: no child answered every item correctly. The means are both within the middle third of

Tables 3.5a and 3.5b:

List of basic characteristics of Upper and Lower junior versions of The Prismaston File.

Table 3.5a : UPPER JUNIOR LEVEL

number of children	40
number of children who attempted all items	27
number of multiple choice items	63
score range	6 - 47
mean score (n = 40)	28.95
standard deviation	10.93
mean score (n = 27)	32.04
standard deviation	10.19

Table 3.5b : LOWER JUNIOR LEVEL

number of children	78
number of children who attempted all items	68
number of multiple choice items	62
score range	3 - 61
mean score (n = 78)	36.60
standard deviation	14.62
mean score (n = 68)	39.12
standard deviation	13.47

the possible score range, indicating an intermediate overall level of difficulty. A very low mean score of 15 or less, would have suggested that the items were too difficult, and a very high mean score of 50 or more, that they were too easy. The item facility indices i.e. the proportion of children who answered each item correctly, are shown in Table 3.6. The frequencies of the children's responses distributed across the four choices (A, B, C, D) are shown in Appendix A3. The standard deviations are relatively large for both levels, and the very wide and even spread of scores is shown in Table 3.7.

3.42 Item selection process

The analysis of the multiple choice items was carried out to identify which items should be retained, and which rejected or modified: various indicators were considered.

(i) Response frequencies and facility indices

The pattern of choices shown in Appendix A3 was used as a check on item construction. For example, if a large number of children chose one incorrect option, it may have been that the item stem, or one of the distractors was misleading and needed to be rewritten or omitted. Item MR4, for example, in the upper junior version (see Appendix A3) the item followed straight on from a short explanation of the use of decimals in map-referencing, and had been preceded by items on map references which did not use decimals. The table shows that only 5% chose the correct response (P22.3) whereas 62% chose the partially correct response P22. The item was intended to determine whether the child had read and taken in the explanation and had therefore opted for the decimal reference. A subsequent comparison of the means of the correct and incorrect responders to this item showed that the two

Table 3.6: Percentage of Children Who Selected Correct Response
(children who attempted all items)

UPPER JUNIOR (N = 27)

Item	Facility (%)	Item	Facility (%)	Item	Facility (%)
HA	59.3	MR1	77.8	H1	66.7
HB	85.2	MR2	63.0	H2	11.1
HC	40.7	MR3	55.6	H3	25.9
HD	44.4	MR4	3.7	H4	59.3
HE	37.0	MR5	33.3	H5	66.7
HF	63.0			H6	14.8
HG	48.1	T1	81.5		
HH	63.0	T2	92.6	C1	92.6
		T3	70.4	C2	81.5
G1	22.2	T4	44.4	C3	59.3
G2	77.8	T5	48.2	C4	44.4
G3	22.2	T6	29.6	C5	92.6
G4	33.3	T7	22.2	C6	66.7
				C7	88.9
M1	96.3	XT1	33.3	C8	37.0
M2	92.6	XT2	55.6	C9	70.4
		XT3	44.4	C10	66.7
CM1	48.1			C11	29.6
CM2	22.2	D1	48.2	C12	59.3
CM3	18.5	D2	63.0		
CM4	44.4	D3	51.9		
CM5	25.9	D4	29.6		
CM6	3.7	D5	55.6		
CM7	37.0	D6	55.6		
		D7	48.2		
		D8	55.6		
		D9	22.2		

Table 3.6: Percentage of Children Who Selected Correct Response (continued)

LOWER JUNIOR (N = 68)

Item	Facility (%)	Item	Facility (%)	Item	Facility (%)
H1	69.1	P1	69.1	C1	86.8
H2	92.7	P2	75.0	C2	85.3
H3	94.1	P3	69.1	C3	85.3
H4	79.4	P4	70.6	C4	44.1
H5	64.7	P5	35.3	C5	73.6
H6	58.8	P6	73.5	C6	58.8
H7	72.1	P7	67.6	C7	29.4
H8	89.7	P8	16.2	C8	51.5
H9	55.9	P9	48.5	C9	36.8
		P10	69.1	C10	63.2
G1	73.5	P11	32.4	C11	47.1
G2	36.8	J1	76.5	C12	41.2
G3	77.9	J2	57.4		
G4	63.2	J3	69.1	F1	44.1
		J4	63.2	F2	44.1
M1	85.3	J5	64.7	F3	66.2
M2	80.9			F4	64.7
M3	60.3	S1	66.2	F5	58.8
M4	67.7	S2	66.2	F6	57.4
		S3	77.9	F7	39.7
		T1	82.4		
		T2	58.8		
		T3	60.3		
		T4	61.8		
		T5	75.0		
		T6	58.8		
		T7	47.1		

children who answered correctly had a mean score of 34, whilst the incorrect responders' mean was 28, so the item was retained. Its layout was modified in the final version to separate it from the explanation by indenting it.

(ii) Facility indices

Table 3.6 shows the facility indices for the pilot study items. In a conventional test, items answered correctly by a large proportion of the children would be rejected as having low discrimination power. Satterly (1981) suggested that items with facility levels between 30 and 70 per cent are acceptable, and that some very easy items (facility over 90%) should be included as anxiety reducers. In an extended task such as the Prismaston File, it is all the more important to retain a reasonable number of easy items so as to maintain children's motivation. In addition, since the items of the Prismaston File contributed to a 'document' about the Prismaston children and their town, the retention of easy items was important for the completeness of the information.

(iii) Item - total correlations

In conventional test construction, high item-total correlations are an important criterion in item selection. Since it was expected that the Prismaston File would tap a number of potentially independent skills which would form separate scales, item-scale correlations would be more appropriate. This would have been possible if such scales had been formulated on the subjective basis of the author's intention at the item construction stage. One objective of the present study, however, was the objective identification of such scales based on children's actual performance. In this case,

Table 3.7: Pilot Study Score Distribution and Cumulative Frequencies

Upper junior scores			Lower junior scores		
Total Correct	Percentage Frequency	Cumulative Frequency	Total Correct	Percentage Frequency	Cumulative Frequency
9	3.7	3.7	10	1.5	1.5
17	3.7	7.4	11	1.5	2.9
18	7.4	14.8	14	1.5	4.4
20	3.7	18.5	20	1.5	5.9
23	7.4	25.9	21	2.9	8.8
28	7.4	33.3	22	1.5	10.3
29	3.7	37.0	23	1.5	11.8
30	3.7	40.7	24	1.5	13.2
32	3.7	44.4	25	1.5	14.7
33	11.1	55.6	26	2.9	17.6
34	3.7	59.3	27	4.4	22.1
35	14.8	74.1	28	4.4	26.5
36	3.7	77.8	29	2.9	29.4
38	3.7	81.5	30	1.5	30.9
41	3.7	85.2	31	1.5	32.4
46	3.7	88.9	32	1.5	33.8
47	11.1	100.0	33	4.4	38.2
			34	4.4	42.6
			36	1.5	44.1
			37	1.5	45.6
			38	4.4	50.0
			39	5.9	55.9
			40	2.9	58.8
			41	1.5	60.3
			45	2.9	63.2
			46	1.5	64.7
			47	4.4	69.1
			48	2.9	72.1
			49	2.9	75.0
			51	1.5	76.5
			52	1.5	77.9
			53	1.5	79.4
			55	4.4	83.8
			56	4.4	88.2
			57	1.5	89.7
			59	4.4	94.1
			60	2.9	97.1
			61	2.9	100.0

therefore, both item-total correlations and inter-item correlations were considered. If an item did not correlate highly with the total, but correlated significantly with a number of other items then it was retained.

Table 3.8 summarises the results of this stage of item analysis for upper and lower junior versions. The table shows the item-total correlations, the number of significant inter-item correlations and the maximum inter-item correlation coefficient and the item facility index for each 'problem' item. 'Problem' items were identified as those having non-significant item-total correlations ($r < 0.38$ (upper junior; 27 cases); $r < 0.25$ (lower junior; 68 cases). At both levels, the first section of the Prismaston File contained a high proportion of 'problem' items.

(iv) Factor analyses

The pilot study scores were factor analysed for the purpose of scale identification. Each item was therefore included as a separate variable in the analysis. The alternative method would have been to group the items together and base the analysis on composite scores. The 'blunderbuss' method (Youngman, 1979) was used, however, to investigate potential scales within the data. If any factors which emerged from this analysis of the empirical data corresponded with those which might have been expected from a priori predictions from the item content, they could be subjected to further analyses.

At this stage, however, the factor analyses of the pilot study scores were intended purely as indicators of the value of pursuing the use of the materials and so a limited description of the process will be given here. A full description of the factor analyses of the main study, which was based on more satisfactory sample sizes, will

3.8a Upper Junior Pilot Study: Summary of Item Analysis (N = 27)

Item	Content	Item - whole correlation*	Item - Item correlations Number significant	Maximum correlation		Facility (%)	Factor Analysis Factor	Loading	Decision
HC	Compass E-W	.28	13	C11	0.61	40.7	1	.63	alter
HD	Compass SE-NW	-.01	6	H11	0.55	44.4	3	.51	drop
HE	Skyview	.33	3	C9	0.50	37.1	3	.37	drop
HF	Skyview	.36	9	MR3	0.70	63.0	2	.77	keep
HG	Type of house	-.04	6	G3	0.50	48.2	3	.59	keep
HH	Labelling house type	.09	5	XT1	0.54	63.0	1	.36	drop
G1	Area of territory	-.15	3	C3	-0.46	22.2	4	-.55	alter answer choice
G3	Floor area compare	.01	7	D9	0.57	22.2	1	-.60	'houses' into upper case
G4	Compare area	.26	12	CM4	0.63	33.3	1	.61	keep
CM2	Site of car park (area)	-.14	6	MR1	0.57	22.2	2	-.56	road->lane hint 'map'
CM4	Lines on road	.24	11	G4	0.63	44.4	) omitted		) put correct
CM5	Painting lines) problems) no answer	-.16	9	G3	0.50	25.9	) due to		)
CM6	Length, volume) given	.00	1	H2	0.55	3.7	) interdependence		) answer in!
MR4	) Map references	.06	0	XT3	-	3.7	(3	.20)	keep
MR5	) with decimal places	.37	10	CM4	0.63	33.3	1	-.58	put in right answer

3.8a Upper Junior Pilot Study: Summary of Item Analysis (N = 27) - continued

Item	Content	Item - whole correlation*	Item - Item correlations Number significant	Maximum correlation		Facility (%)	Factor Analysis Factor	Loading	Decision
T3	Bar chart total	.22	9	D4	0.65	70.4	2	.64	keep
XT2	Order of stages in bar chart	.30	5	G2 MR1	0.42	55.6	(2	.33)	keep (instruction)
D1	Argument for walking	.22	16	D5	0.86	48.2	2	.74	keep
D9	Council grant/£p/5 digits	-.04	11	G3	0.57	22.2	1 2	-.63 .41	keep keep
H2	Time-line/mapping/picture - word	-.12	1	CM6	0.55	11.1	4	-.47	keep (nature of question)
C1	Literal comprehension	.33	6	C7	0.80	92.6	4	.73	keep story
C3	Literal comprehension	.21	8	CM7	0.48	59.3	1	.57	keep story
C4	Palisade/castles/observe compare	-.18	10	XT3	0.65	44.4	1 4	-.58 -.43	keep question
C5	Infer - comprehension	.30	8	NR1	0.53	92.6	4	-.39	keep add hint
C8	Rings of defence compare/ analyse	-.26	8	D7 C12	0.49 -0.61	37.1	2	-.53	keep
C12	No more castles/infer	.17	10	D2	0.61	59.3	2	.65	keep

* Correlation coefficients less than 0.38 not significant at 5 per cent level for N = 27

3.8b Lower Junior Pilot Study: Summary of Item Analysis (N = 68)

Item	Content	Item - whole correlation*	Item - Item correlations Number significant	Maximum correlation		Facility (%)	Factor Analysis Factor	Loading	Decision
H2	Next door neighbours order/count/network	-.02	1	H3	0.4	93	3	-25	drop
H3	Skyview match/plan/observe	.18	4	H4	0.4	92	4	35	keep (easy)
H4	Skyview/match/observe	.06	1	M2	0.3	76.9	1	-22	drop
H6	Map picture-word/match	.30	:0	-	-	61.5	4	35	drop
H7	Map picture-word/select	.17	1	G1	0.3	70.9	2) 3) 4)	-42) 45) 38)	alter pictures
H8	Pair of children/map/select	.20	0	-	-	82	3	24	drop
H9	Order/network/map	.22	7	F3	0.6	53	1	56	keep
G1	Shape/observe	.23	5	C12	0.37	71	1	32	keep
G4	Predict/read/logic	.15	2	H9	0.31	59	1	34	alter choices
P8	Plan signs/symbol/use of memory	.004	1	J3	-0.30	14	4	-29	alter, hint needed
J3	Length/compare/observe	.28	13	C10	0.48	65	4	55	keep
C5	Logic/observe/map/compare	.25	6	M1	0.41	65	4	55	keep

* Correlation coefficients less than 0.25 not significant at 5 per cent level for N = 68

be given in Chapter 4. In the pilot study, the main purpose of these analyses was to find out whether all the items were loaded exclusively on the first principal factor, which would suggest that all variation could be accounted for by some general factor or basic skill. If there were a number of significant loadings on other factors, however, this would suggest that more than one ability or skill accounted for the variation amongst the responses and this would accord with our theoretical predictions. The results of the principal factors analyses were generally encouraging in this respect, although both analyses, and in particular the upper junior version had limited value because there were so few cases. A varimax rotation was applied to both lower and upper junior versions and four factor solutions accounted for 41 and 52 per cent of the total variance respectively. The major loadings are shown in Table 3.9. and the combinations of items which loaded on each factor appeared to be meaningful. Detailed interpretations were not undertaken since the analyses were suspect due to the small number of cases relative to the number of variables. Nevertheless, the results were regarded as positive indicators for work on the final version to proceed.

3.43 Validity

A validity study was attempted in which the intention was to compare children's performance on the Prismaston map-reading items, graphs and charts items, and comprehension items with the Richmond Work Study tests of Map-reading and Interpreting Graphs and Tables. In the event, only one class of children was available to take the tests and in this class few children had completed the Prismaston File. This meant that the comparisons were based on a sample of only eight children. (Further validity checks are reported in Chapter 9).

Table 3.9: Factor analyses of pilot study data: Varimax rotations

(i) LOWER JUNIOR

Item	I	II	III	IV	communality
F2	68	43			67
T7	68				51
F1	62	48			64
F6	60				56
C12	58			43	58
H9	56				33
C4	55	45			59
H1	52				44
F7	52				32
C9	51	46			50
C7	50				35
H5	49				44
M3	46	42			42
C8	46	46			47
F5	44				45
T1		70			51
T2		66			51
J2		61			42
P2		61			51
J1		58		43	53
T6		58	45		60
T3		50			53
C6		48			40
T4		47			40
T5		47			39
C4		45			59
F4	42	44			39
P4		42			26
M2		40			43
H7		-42			52
S1			75		70
S2			69		54
C2			67		59
C1			65		52
P3			65		43
P7			51		45
M4	41		50		45
H7			45		52
H5			43		44
J4			40		45
C10				66	60
J3				64	48
C11	43			57	54
G2				56	37
C5				55	32
M1		40	46	52	60
P10				51	44
S3			43	51	56
P1		45		48	47
P11	43			44	41
Eigenvalues	15.5	3.9	3.3	3.0	
Percent variance	25.0	6.3	5.2	4.9	
Cumulative variance	25.0	31.3	36.6	41.5	

(ii) UPPER JUNIOR

Item	I	II	III	IV	communality
T6	78				70
H3	74				71
T7	73				65
CM3	71	43			69
CM7	70				51
D7	69				48
XT1	68				47
T5	67				57
T4	64				57
D8	64				46
HC	63				43
C11	63				52
G4	61				44
D6	59				54
C3	57				39
XT3	52				38
G3	- 60				63
MR5	- 58				54
C4	- 59			- 43	69
MR3		84			76
HF		77			67
MR2		76			59
D2		77			62
D1		74			74
D5		69	48		72
C12		65		42	67
T3		64			42
C10		60			41
H1		48	43		57
H4		45			37
D9	- 63	41			63
D4		- 61			43
C8		- 58			44
CM2		- 56			45
T1			85		77
G2			77		65
T2			73		56
HA			66	48	67
C9		45	65		65
HG	- 42		59		62
D3			54		42
M1			52		29
HD	- 41		51		54
CM1			50	41	61
MR1		40	49		55
HB			46		49
C1				73	58
C2				68	56
C7			47	63	65
G1				- 55	34
H2				- 47	24
Eigenvalues	12.5	8.9	5.4	4.8	
Percent variance	20.8	14.8	9.0	8.0	
Cumulative variance	20.8	35.6	44.6	52.6	

The correlations obtained are of limited value therefore. At lower junior level the Spearman rank correlation coefficients between the mapreading and graphs items in the Prismaston File and the corresponding Richmond Work-study tests were 0.90 (maps) ($N = 8$; $p < .01$) and 0.72 (graphs) ($N = 8$; $p < .05$). The respective correlations between items which were not expected to intercorrelate highly i.e. the Prismaston comprehension items and the Richmond maps and graphs tests respectively were not significant (0.38 and 0.50; $N = 8$; $p > 0.1$). Although based on the ranks of so few children, the correlations between items intended to tap similar skills were positive and significant, whereas those which appeared to tap different skills were not significant.

3.44 Gender differences

One of the teachers suggested that the 'secret agent' theme might appeal more strongly to boys than to girls. 't' tests were carried out. There was no significant difference between the overall means of boys and girls at lower junior level (boys' mean = 38.18 (s.d. = 14.58, $N = 39$); girls' mean = 41.23 (s.d. = 12.62, $N = 26$); $t = 0.87$, $df = 63$, $p > .05$), nor at upper junior level (boys' mean = 37.00 (s.d. = 9.19, $N = 10$); girls' mean = 30.57 (s.d. = 7.60, $N = 14$); $t = 1.87$, $p > .05$) (In three cases at each level either gender had not been recorded, or the work was unnamed). These results indicated that the Prismaston File was not biassed in favour of either sex.

3.45 Reliability

The internal consistency of the Prismaston File was assessed using a split-half method in which the items are split into two halves and the correlation between the two half-tests is computed. Levy and Goldstein (1984) pointed out, however, that a number of well-known tests of internal consistency such as the Spearman-Brown, Kuder-Richardson and Cronbach's alpha tests are based on the assumption that the test is a 'power test' in which the testee is faced with items of ascending difficulty such that the testee will 'have a point beyond which he will tend systematically to fail items' (p.xxiv). Where items are not arranged in order of ascending difficulty, a time limit may be imposed, making it more difficult to score on the later items. Where there is neither ascending difficulty of items nor a time limit as in The Prismaston File, Levy and Goldstein pointed out that spuriously high reliability values can be obtained.

Bearing these difficulties in mind, as well as the fact that the Prismaston File was not carried out in test conditions, and that it is likely to be multi-dimensional (internal consistency measures assume unidimensionality) the interpretation of overall reliabilities may be problematic. Nevertheless, the results shown in Table 3.10 were obtained using the Spearman-Brown split-half test.

Table 3.10 **Internal reliability of Prismaston File pilot versions**

Version	N Cases	N Items	Spearman-Brown
upper junior	27	63	0.84
lower junior	68	62	0.94

3.46 Use of the help and resource codes

The children were asked to record their uses of references, discussion with friends and teacher help beside each item by circling an appropriate code letter. The type of teacher help given, if needed, was classified into five types (read, define, hint, explain, miss out) and the teacher told the child which to record. The frequencies of the use of these codes are summarised below in Tables 3.11 and 3.12.

(i) Use of the reference book (Prismmem)

Table 3.12 shows that almost half of the children in both groups failed to record a single use of the reference book. The figures for those who did record its use are consistent with the usage that might be expected from the number of items which potentially draw upon it. For example, in the upper junior version, the 'castles' section (12 items) and the time line section (6 items) required its use. In the lower junior version, however, none of the items specifically required its use, although in the history section ('The Past'), the items on map symbols and some of the words which might need definition would be supported by its use. In the lower junior version, three or four children circled the reference code repeatedly; they may have been looking in vain for the answers or perhaps did not understand what 'mem' stood for. More detailed analysis of the lower juniors' use of the reference book revealed the counter intuitive finding that those who recorded that they had used the reference book were more likely to have answered incorrectly than those who did not!

At upper junior level, in the castles section, more children failed to record using the book than did record it, and most of these answered correctly. Since the reference book was essential for these items

Table 3.11: Summary of Use of Resources and Friends

Resource	Recorded uses	Upper junior (percentage) (N = 27)	Lower junior (percentage) (N = 68)
Prismmem (Reference book)	0	44.4	50.0
	1 - 5	29.6	32.4
	6 - 10	0.0	2.9
	11 - 15	25.9	5.8
	16 - max	0.0	8.9 (max = 43)
Discuss with friend	0	11.1	10.3
	1 - 5	29.6	16.2
	6 - 10	22.2	5.8
	11 - 15	14.8	2.9
	16 - 20	3.7	8.8
	21 - 25	3.7	7.4
	26 - 30	3.7	8.8
	31 - 35	0.0	11.8
	36 - 40	0.0	4.4
	41 - 45	0.0	4.4
	46 - max	0.0	19.1 (max = 62)

Table 3.12: Summary of Recorded Use of Teacher Help

Teacher Help	Number of Uses	Upper junior (percentage) (N = 27)	Lower junior (percentage) (N = 68)
Reading	0	88.9	76.5
	1 - 5	11.1	15.7
	6 - 10	0.0	2.9
	11 - 15	0.0	2.9
	16 - 20	0.0	1.4
Define a term	0	92.6	86.8
	1 - 5	7.4	10.2
	6 - 10	0.0	2.9
Hint eg 'look at the map'	0	88.9	75.0
	1 - 5	3.7	17.5
	6 - 10	3.7	4.4
	11 - 15	3.7	0.0
	16 - max (48)	0.0	2.9
Explains problem	0	85.2	85.3
	1 - 5	11.1	2.9
	6 - 10	0.0	2.9
	11 - 15	3.7	0.0
	16 - 20	0.0	0.0
	21 - 25	0.0	2.9
	26 - max (38)	0.0	5.8
Suggests miss out	0	92.6	91.2
	1 - 5	7.4	7.2
	6 - 10	0.0	1.5

because the relevant passage was in it, and since classroom observations had shown that they did use it, it must be concluded that their failure to record this was an error.

(ii) Alterations to help and resource codes

These results coupled with the observation of children using the Prismaston File suggested that information should be given in the text to identify items where it was appropriate to use a particular resource; beneath each item number a 'hint' such as 'map' or '*' (which replaced the use of 'mem' as symbol for the use of reference book) was printed in the margin, as was shown above in section 3.34.

In the final version of the Prismaston File, the range of resource codes was extended so that the children were asked to record each time they used a map, chart or picture in order to answer a question by circling the letter 'p'; use of the Prismmem or any other book was denoted by an asterisk, and if any classroom apparatus was used, such as ruler or calculator, the children were asked to circle an 'a '.

(iii) Discussion with a friend

Table 3.11 shows that the lower juniors recorded their discussion with their friends on many more items than did the upper juniors. This could have arisen for a number of reasons: they may have been more talkative, cooperative or honest, for example, or more reliable at recording their collaborations.

(iv) Teacher help

Table 3.12 shows the amount of teacher help that was recorded. Clearly, the majority of children did not record any teacher help. A slightly higher proportion of the younger children needed help more frequently than the upper juniors. The records show that 'define' was rarely used and it was decided that this could be combined with 'hint'. The table shows that some 8 or 9% of the children did select answers even where they were advised to omit the problem.

(v) Times to complete the sections

Table 3.13 shows the ranges of time taken to complete each section, based on children's completion of a 'timebox', consisting of an analogue clock-face on which the children drew the hands, or a 'box in which they filled in the time from a digital display. They were asked to complete one of these on beginning and ending a section of the Prismaston file, to provide a guide to the range of times taken to complete each section. The table shows the percentage of children who completed a section within the time-range shown. Most were able to complete the sections in within 15 to 25 minutes and the results tended to be skewed to the lower end. Some of the teachers thought that the children would be unable to complete the time boxes, but the relatively small proportion of invalid times, numbering five or six per section, (such as negative times and times considerably longer than one hour), suggests that most could do this accurately.

Table 3.13: Summary of Times Taken to Complete Each Section

UPPER JUNIOR PILOT STUDY (N = 40)

Section	Percentage of Children within Range	Range (minutes)	Median[1] (minutes)	Invalid[2] (%)	Missing (%)
Houses	80.0	2-25	10	15.0	20.0
Territories	85.0	0-40	6	7.5	7.5
Map	97.5	0-45	3	2.5	0
Council meeting	72.5	1-40	10	20.0	7.5
Map reference	85.0	1-28	9	7.5	7.5
Transport charts	75.0	0-29	10	12.5	12.5
Own graph	47.5	0-45	23	22.5	30.0
Discussion	72.5	2-45	12	10.0	17.5
Castles	67.5	3-48	15	2.5	30.0
Time line	65.0	2-55	5	2.5	32.5

LOWER JUNIOR PILOT STUDY (N = 78)

Section	Percentage of Children within Range	Range (minutes)	Median[1] (minutes)	Invalid[2] (%)	Missing (%)
Houses	59.9	0-45	15	35.0	5.1
Architecture	82.0	1-45	8	6.5	11.5
Map	78.0	0-56	7	14.3	7.7
The Past	71.6	0-45	10	24.6	3.8
Journeys	83.2	0-53	8	7.8	9.0
Ways to Travel	74.2	0-60	4	10.4	15.4
Transport	70.4	0-60	8	6.5	23.1
Quicker by bus	62.6	0-49	8	15.6	21.8
Bus fares	20.4	3-31	8	6.5	73.1

1 Median of valid times

2 Valid time is 0-60 minutes (0 minutes could result from child's drawing of hands on clock face)

3.5 Conclusion

The preparation of the Prismaston File materials and their use in a pilot study have been described. Various changes were made to the materials as a result of this and these are listed in general terms below.

1 The weakest items were omitted or amended (see Table 3.8).

2 Smaller, more manageable booklets were used as a result of the teacher's comments on the pilot version.

3 The instructions were lengthened so as to become more standard and more detailed.

4 The text was amended to include hints as to which resource to use.

5 The range of resources was extended to include 'p' for the use of pictures, maps or charts, * to refer to reference books and 'a' to refer to measuring apparatus, 'dis', meaning discussion with a friend, was altered to 'f'.

6 The teacher help categories were reduced from five to four, since 'define' had rarely been used.

The internal consistency of both versions of the Prismaston Files was high but the reliability coefficients must be treated with caution as the Prismaston File was not intended to meet all the criteria for standardised psychometric tests.

Concurrent validity trials were carried out but the number of pupils included in each one is rather small. The comparisons between items intended to test similar and dissimilar skills from the Prismaston and from the Richmond tests of work study skills were, nevertheless, in the expected directions. An acceptable range of difficulty levels was found in both versions and no sex differences were found. The modified form of the Prismaston File materials were considered to be adequate for full-scale use in the PRISMS schools.

CHAPTER FOUR

The Prismaston File in the small schools: the main study

Introduction

This chapter will be concerned with the use of the Prismaston File in the small primary schools which took part in the PRISMS project. First, the revised Prismaston materials and the schools will be described. The chapter will go on to present the main characteristics of the children's performance on the multiple choice items. A large part of the chapter will be concerned with the factor analyses of the multiple choice sections of the materials and the relative importance of topics, skills and resources in the interpretation of the factors. The similarities and differences between the factor solutions of the upper and lower junior versions will be described. Finally, the relationship between the children's performance on the Prismaston File and in tests of basic skills will be discussed.

4.1 The revised Prismaston File

The version of the Prismaston File which was sent to the small schools was modified from the pilot version in ways outlined in the previous chapter. To summarise, there was a 25-page A5 question book ('Prismaston datacheck') at each level, covered in yellow for the lower juniors and in green for the upper juniors. The map of Prismaston for each level formed the centre-fold of each booklet.

Corresponding yellow and green A5 answer booklets (the 'Prismaston Agent's Codebook') were provided for each child. The reference book, or 'Prismmem', also in A5 format, was issued on the same basis as in the pilot study i.e. one booklet between four children. A full set of the booklets is presented in the supplementary volume (The Prismaston File: project-based assessment of study skills) in their original form, together with reduced photocopies of the teachers' notes and the descriptions for the listening task. A4 size copies of the notes and descriptions were sent to the teachers and are shown in Appendix B1.

4.12 The small schools: sample, distribution and response rate

All 68 schools in the PRISMS' sample had less than 120 pupils on roll, at least one vertically grouped class and up to four teachers. Copies of The Prismaston File were delivered or posted to 62 of these schools in June 1984. The remaining schools were infant schools. The schools returned the answer books in large 'Freepost' envelopes which were provided. The response rate was surprisingly high as shown in Table 4.1. The overall response rates were 60 per cent (lower junior) and 81 per cent (upper junior) of the copies (excluding spares) which were sent out. Nine schools contacted us by letter or telephone to explain that they were too busy to undertake the work because of field trips and other activities. All remaining 53 schools returned attempted or completed copies from at least one age group. Table 4.1 shows that a higher proportion of the upper junior version was returned. In classes where lower juniors still needed help with reading the teachers might have been reluctant to undertake the work. Nevertheless, over half of the lower junior copies were returned with some items attempted.

Table 4.1 The Prismaston File response rate by local authority and over whole sample.

LOWER JUNIOR VERSION

LEA	copies sent	copies returned	percentage response
1	101	74	73.3
2	154	108	70.1
3	200	112	56.0
4	128	53	41.4
5	85	59	69.4
6	103	51	49.5
7	113	64	56.6
8	121	83	68.6
9	263	144	54.8
total	1268	748	mean 60.0

62 schools were supplied with lower junior copies.
25 schools returned full sets.
13 did not return any copies.

UPPER JUNIOR VERSION

LEA	copies sent	copies returned	percentage response
1	127	120	94.5
2	180	142	78.9
3	59	35	59.3
4	75	74	98.7
5	55	41	74.5
6	100	58	58.0
7	99	98	99.0
8	93	81	87.1
9	80	51	62.5
total	868	700	mean 80.6

49 schools were supplied with upper junior copies. (Some PRISMS schools were first schools and so did not have upper juniors.)
31 schools returned full sets
5 schools did not return any copies

4.13 Teachers' comments

Letters containing both positive and negative criticism of the materials were received from ten teachers, and four teachers made a point of reporting the children's reactions at meetings or by telephone. Three headteachers said that they liked the materials but felt that they had arrived too late and that more time was needed for the work (schools 27, 29, 86). Specific positive comments conveyed the degree to which the children had become involved with the materials such that 'Prismos' had spilled into other activities. For example, three heads reported that it had stimulated further art and language work (10, 17, 41) and another that the children set up a 'look-out security system' to ensure complete secrecy (73). These comments probably reflected the teachers' skill and enthusiasm in introducing the work.

Among the negative comments were that:

1. the print was too small for young juniors (35, 84);
2. there were too many errors (80) (a correction sheet had to be sent out with the booklets);
3. the teacher's role was too vague (35);
4. instructions were unclear (80);
5. coding was too complex (93);
6. organisation was too tight and lacking in freedom (63)

Some of these comments were justified. The size of print chosen was 11 on 12 point in a sans serif type face, recommended by Harrison (1980) as satisfactory for readers aged eight or more. The effect of condensing an A4 typed page to an A5 type-set page, however, as pointed out in Chapter 3, was to reduce the amount of empty space surrounding the print, although the letter size and spacing was the same. The overall effect of this was probably to make the pages look more formidable. The answer books were typed on A4 pages and were reduced to make A5 photocopies. This reduced type-size would obviously have been too small for text to be read by lower juniors. The text in the answer books consisted of well-spaced strings of letters which were repeated over and over again, however, and which were introduced by the teacher in the first session. It should not, therefore, have presented too many difficulties in subsequent sessions. A number of errors did appear in the main study materials, which had not been present in the pilot materials. A sheet noting these errors was issued with the booklets.

4.14 The results for the teachers

Results were sent to the PRISMS teachers in January 1985, just prior to a round of PRISMS project meetings. Each teacher received a list showing each child's mark profile and the number of items attempted within each group of items, as shown in Table 4.2. The lists were accompanied by an explanatory leaflet (see Appendix B2) and were explained to the teachers at the project meetings. All 60 items at each level were included in the list at this stage, although some items were omitted from later analyses. Column five of the table shows the pupils' total score. The next six columns at upper junior level, or five columns, lower junior level, show the number of items correct, followed, after the 'decimal point', by the number of items attempted in that subsection (so 6.10, for example, would mean that a child had answered six items correctly out of the ten items s/he had attempted in that section). These subsections, or part-tests, were made up of items which were intended to tap specific skills, such as map-reading or comprehension skills. The explanatory leaflet in

Table 4.2 Example of results of Prismaston File to show individual performance. Each teacher received a computer print-out like the one below and a copy of the explanatory leaflet shown in Appendix B2.

PRISMASTON (GREEN) SCORES AND PART-TESTS, JUNE-JULY 1984 85/01/09. 14.47.09. PAGE 69

FILE AMRGTSB (CREATION DATE = 85/01/08.)

CASE-NO	I01	YRG	SEX	DOFB	SCORE	MAPS	MATHS	PICT	GRAPH	COMPR	INFER
				OUT OF	60	13	12	5	13		
1	43301.	3	2	74.12	23	5.13	3.12	2.04	6.11	4.09	2.08
2	43302.	4	1	72.12	37	8.13	6.12	3.05	7.12	7.09	5.08
3	43303.	3	1	74.08	41	8.13	7.12	2.05	9.13	9.09	6.08
4	43304.	4	2	72.12	50	11.13	10.12	2.05	12.13	8.09	6.08
5	43305.	4	1	73.07	38	6.13	9.12	4.05	8.13	7.09	3.08
6	43306.	4	2	72.09	47	9.13	7.12	3.05	11.13	8.09	8.08
7	43307.	4	1	73.00	29	7.13	6.12	2.05	5.13	5.09	3.08
8	43308.	4	2	73.08	49	11.13	10.12	4.05	11.13	7.09	5.08
9	43309.	4	2	72.12	39	10.13	5.12	.04	8.13	8.09	7.08

Appendix B2 shows the mean scores of each age-group for the whole sample, as well as the mean numbers of items attempted, so that the teachers were able to make a crude comparison between their children's marks and the sample means.

4.2 Overall characteristics of the main study results

4.21 Sample sizes

Over fourteen hundred answer books were received back from the schools. In many cases, the children had not completed all of the items and so thresholds for the acceptable numbers of missing items were set by examining the 'number missing' frequencies. Children who had omitted five or more items at upper junior level, and six or more at lower junior level were excluded from the analyses. These thresholds left 78 per cent of the upper junior children and 56 per cent of the lower junior children in the sample. The resultant sample sizes are shown in Table 4.3, together with the overall characteristics of the results.

Table 4.3: Characteristics of main study data at upper and lower junior levels.

Version	Number of pupils	Number of items	Mean score	Standard deviation	Maximum score	Minimum score
upper junior	544	48	29.57	7.51	48	10
lower junior	418	55	36.53	8.56	53	13

Table 4.4 shows the overall mean scores for each age group. The older year-group within each age-range obtained higher means than the younger year-group, as would be expected.

Table 4.4: Mean scores obtained by each age group

Version	Year Group	Mean	S.D.	Pupils	t
Lower Junior					
	J1 (8+)	35.16	8.56	159	2.91
	J2 (9+)	37.72	8.22	238	(p < .01)
	others*	-	-	21	
Upper Junior					
	J3 (10+)	28.08	7.51	234	5.06
	J4 (11+)	31.42	7.42	279	(p < .001)
	others	-	-	31	

* others: includes older children who had used the lower junior version, and vice versa; and cases where ages had not been reported.

4.22 Item facilities

Table 4.5 summarises the item facilities of the upper and lower junior versions. The table shows the number of items in each version with facility indices in the given range. In other words, the table shows the number of items that were answered correctly by the given proportion of the upper or lower junior sample. Only 9 of the upper junior and 4 lower junior items had facility indices of under 0.39 which means that there were very few 'difficult' items, compared with 19 and 17 of the upper and lower junior items respectively which were answered correctly by over 70 per cent of the children in each case. This was to be expected as the materials were written so that the childen would be able to find the correct answers by using the resources available. Detailed tables of the item facilities within each year group appear in Appendix B3.

Table 4.5 Summary of upper and lower junior item facilities

item facility range	number of items (upper junior)	number of items (lower junior)
.80 plus	8	13
.70 - .79	11	14
.60 - .69	9	11
.50 - .59	7	8
.40 - .49	6	5
.30 - .39	7	3
under .30	2	1

N children: upper junior 544; lower junior 418

4.23 Reliability : main study data

As explained in the previous chapter the reliability coefficients which would be applied to a standard norm-referenced test were used in the absence of an alternative even though the Prismaston File does not conform to standardised test conditions. The results are shown in Table 4.6. The Spearman-Brown coefficient of internal consistency was computed for the all subjects who attempted each version of the Prismaston File. Cronbach's alpha was also computed at each age level. The results obtained show an acceptable consistency for an exercise of this type, but they may be spuriously high because the assumptions which underly their application such as the existence of ascending difficulty gradients, time limits and unidimensional test material did not apply here (see Levy and Goldstein, 1984).

Table 4.6 Reliability estimates based on main study data.

Sample	Cases	Items	Cronbach alpha	Spearman-Brown
UPPER JUNIOR	544	48	0.84	0.76
junior 3 (10+)	234	48	0.81	
junior 4 (11+)	279	48	0.85	
others	31			
LOWER JUNIOR	418	55	0.87	0.78
junior 2 (9+)	238	55	0.87	
junior 1 (8+)	159	55	0.87	
other ages	21			

The Prismaston File aimed to test a variety of skills and so these overall reliability coefficients are less meaningful than the equivalents for groups of items testing separate skills, if the latter could be identified. The next stage, therefore, was to identify the different sub-scales. One way to do this would be to group the items on the basis of their content, context or the skill that they were intended to test: for example, the items could have been grouped in the same way as they had been in the results which were sent to the teachers. Alternatively, factor analysis could be employed in order to identify separate scales empirically.

Neither of these methods of grouping items could guarantee the identification of the actual skills underlying children's methods of arriving at an answer. This could be only be achieved by asking children directly how they did so, and even this would be limited by their ability to articulate their introspections.

4.3 The factor structure of the Prismaston File

The main Prismaston study had enough cases to use factor analysis for the identification of subscales. Although factor analysis is a statistical technique, there are decision points in its administration which require judgement and interpretation. Some of the judgements which had to be made will be described below.

First, the question of whether to submit separate items or groups of items was considered. Separate items were submitted to the factoring process since any prior grouping would have presupposed the basis of the factors. The original planning of the items incorporated an attempt to test the same skills (e.g. observing, comparing, interpreting written information) in a variety of settings to determine whether skills or contexts would predominate in answering an item. It was necessary, therefore, to submit the items separately.

The decision as to how many factors to extract depended firstly on the number that would provide a sensible reduction of the data and would allow for either a skills-based or a resources based interpretation. The use of Kaiser's criterion (that is, the acceptance of factors with eigenvalues greater than 1.00) in the present case, would have led to the extraction of 17 and 19 factors at upper and lower junior levels respectively (see Appendices B4 and B5) as a result of the very large number of variables in the analysis. Since this represents too great a number of factors for economical interpretation of the data. The application of Cattell's Scree test (Cattell, 1966) led to the extraction of eight factors initially for both versions, which allowed sufficient factors for a skills-based solution. After a series of analyses, a four factor solution to be discussed in detail below appeared to support the most economical and meaningful interpretation of the data from both upper and lower junior versions.

When factor analysis is being used to identify scales, as in the present case, Cattell (1966) suggests that the eventual solution should account for about 60 per cent of the variance. In the present case the four factor solutions accounted for only about 25 per cent of the variance in each version, but the results of two checks on what might be regarded as the stability of the solutions led to the continued pursuit of the method.

The Prismaston data was stored initially in four separate data files, one containing the target pupils' responses and one containing the non-target pupils' responses, for each version. Thus by factor analysing both sets of data at each age level, the two solutions could be checked against each other by inspecting the number of equivalent loadings on each factor. On the basis of visual inspection of both unrotated and varimax rotated solutions, the solutions appeared to be sufficiently similar to merit a further check. This involved the addition of the children's scores on the shortened tests of mathematics and English (the Richmond[1] test scores) which had been used in the PRISMS project to the data for factor analysis (see Appendix B6). The unrotated factor solutions, with and without the addition of the test scores were compared. If the pattern of loadings had collapsed when these test scores were present such that all of the Prismaston items had loaded on the general factor with the test scores, this would have implied that most of the variance was accounted for by the abilities tested in the Richmond tests. On the other hand, if the pattern of loadings was similar in the presence of the Richmond test scores, then we might conclude that the Prismaston File had some structure of its own. Factors which looked equivalent (similar pattern of loadings irrespective of order of extraction) were once more plotted against each other (see examples in Appendix B4). Table 4.7 shows the way in which the Richmond scores loaded with the four factor varimax solution at upper junior level, and the equivalent lower junior results are shown in Appendix B5. It is clear that the Prismaston factor structure remained intact.

The fourth decision to be made was whether to employ an orthogonal or an oblique factor solution. Factors do not correlate with each other in the former, whereas they do in the latter. The degree of intercorrelation between factors can be varied until a solution is obtained which makes sense of the data, and which satisfies the following conditions. In the accepted solution each factor should have at least three marker items, which define the factor, plus a number of background items with significant loadings (i.e. > 0.3),

[1] Richmond test scores refer to shortened language and mathematics tests shown in Appendix B6, throughout, unless specified otherwise.

Table 4.7: Upper Junior Prismaston File: Comparison of Four Factor Varimax Solutions with and without Richmond Test Scores (50 items)

(544 cases without Richmonds (-R), 482 cases with Richmonds (+R)

	I -R	III +R	II -R	II +R	III -R	I +R	IV -R	IV +R
ha			44			38		
hb								
hc						32		
hd								
ga								
gd								44
cm								44
cn								39
co							45	51
cp				45			44	
cq							69	50
cr				40			65	38
cs				39				
ka				30	43			
kb					46	37		
kd								30
ta	42	38			44	44		
tb					41	49		
tc					43	48		
td					63	60		
te					63	64		
tg			38					
th			36					34
xa							34	
da			38	33				
db			50	39		33		
dc			62	57				
dd			30					
de			40	35				
dg								
dh						30		
di	41	41	36			31		
dj				42				
na	52	43				30		
nb	59	56						
nc	49	41						
nd								
nf	47	46						
ng	33	36						
nh	54	50						
ni	34	37						
nj	42	38						
nk			36					
nl	46	51						
nm			33	36				
ya	53	56	31					
yc	35	33		36				
yd			38	43				
yf	45	46						
yg			42	32				
RICHMOND TESTS								
Language 1		36		51		47		
Language 2		34		52		46		
Mathematics 1		31		51		43		
Mathematics 2				54		47		

Note: Loadings under 0.3 omitted

whilst the remaining items should ideally have near-zero loadings. In addition, items loading on one factor should have near-zero loadings on the other factors (Cattell, 1966).

In the Prismaston File, an oblique solution seemed plausible since the items were linked by a common theme. Cattell (1966) describes the 'pursuit of maximum simple structure with the restriction of orthogonality... (as)..an impossible goal, a worshipping of two gods' (p.186). On the other hand, the intercorrelations between the factors which result from the oblique solution make it difficult to form an image of the factor structure, and this in turn can make interpretation difficult. Examination of the distribution of the variables about the varimax factors in Appendices B4 (upper junior) and B5 (lower junior) which showed the majority of them to be in the positive quadrant of the display, supported the decision to use an oblique method.

Several factor analyses were carried out on both the separate target and non-target data, and on subsequently combined datasets of upper and lower junior versions, until a point was reached when the time spent on producing further solutions was not justified by the information gained.

The results of these analyses will be described in detail below. They refer to the combined datasets of the PRISMS target and non-target pupils.

4.4 The Upper Junior Factor Solution

At upper junior level, a four factor 'fairly correlated' oblique solution was adopted. (Direct Oblimin; delta = 0; SPSS version 8.3; Nie et al., 1975). This rotation supported the most economical

Table 4.8: Upper Junior Prismaston File: Factor Pattern Coefficients of Oblique Factor Analysis.

(Delta set at 0; coefficients < 0.3 omitted) (N = 544)

Item	I	II	III	IV
ha				
hb				
hc	30		34	
hd				
ga				
gd			53*	
cm			42*	
cn			39	
co			47*	
cq			43	
cs				-34
ka	37			
kb	42			
kd			35	
ta	40	-40		
tb	42			
tc	40			
td	65*			
te	66*			
tg				-35
th				
xa			37	
da				-30
db				-50*
dc				-63*
dd				-36
de				-46*
dg				
dh				
di		-36		
dj				
na		-54*		
nb		-60*		
nc		-50		
nd				
nf		-49		
ng		-31		
nh		-54*		
ni		-36		
nj		-43		
nk				-34
nl		-48		
nm				-44
ya		-52*		
yc		-30		
yd				-40
yf		-42		
yg				-40
Eigenvalues	6.40	1.80	1.74	1.57
Percentage Variance	13.3	3.7	3.6	3.3
Cumulative Percentage	13.3	17.1	20.7	24.0

* DENOTES MARKER ITEMS

interpretation of the data, and produced the clearest solution. The factor pattern matrix was used as the basis for identifying factors, which were then be checked against the factor structure loadings (Youngman, 1979). Items with pattern coefficients at or near 0.5 with correspondingly high loadings were taken as marker items, and those over 0.3 were regarded as significant. The full factor structure and pattern matrices are shown in Appendix B4. The factor pattern provides a clearer basis for the interpretation of the factors than the factor structure (Youngman, 1979) and the salient factor pattern coefficients are shown in Table 4.8. The tables in Appendix B4 show that factors II and IV consisted largely of negative loadings. Examination of the data and the factor plots indicated that these two factors should be reflected since the vast majority of the variables lay in the positive sector. The negative loadings were therefore made positive, as were the negative correlations in the factor correlation matrix.

The factor correlation matrix is shown in Table 4.9a. Each correlation coefficient can be interpreted as the cosine of the angle between the two factors, and the corresponding angles are shown in Table 4.9b. Tables 4.9a and 4.9b show that Factors II and IV were most closely correlated ($r = 0.27$; $p < .05$; one-tail test; $N = 48$) although the the correlation is small. None of the other coefficients reached statistical significance. The lowest correlations were between factor III and the other factors, in particular factor I ($r_{I-III} = 0.12$).

Table 4.9a: Upper Junior Prismaston File: oblique factor intercorrelation matrix

FACTOR	I	II	III	IV
I	1.00			
II	.23	1.00		
III	.12	.18	1.00	
IV	.22	.27	.22	1.00

Table 4.9b : Oblique factor matrix: angles between factors

FACTOR	I	II	III	IV
I				
II	76°42'			
III	83°17'	79°38'		
IV	77°17'	74°20'	77°17'	

4.41 The interpretation of the factors using item profiles

The interpretation of the factors was based on a set of item profiles drawn up at the pilot stage and shown in Table 4.10. Each item had been prepared to require the use of a PRISMS action, such as 'analyse', 'predict', 'match' and so on. The PRISMS observers, who were experienced in the use of the curriculum observation schedule, had been asked to check this by coding some items from the pilot materials. They were asked to say which category from the 'action' or 'relate' sections of the PRISMS' curriculum schedule they considered each item demanded. The results were disappointing: few of these 'action' categories were consistently recognised as being needed to answer the items, and typically two or three of the six observers would select one action whilst the others either chose another or did not consider any of the actions to be tapped. These thinking skills were known to be high inference categories and the chance level of agreement was not therefore surprising. This meant that the 'actions' or thinking skills were not identified sufficiently reliably to be used alone for the interpretation of the Prismaston factors.

Instead, the interpretation would have to be based on lower inference features such as the resources used, the major skills involved, and the topic or the item content. The thinking skills were nevertheless retained in the item profiles, to give some indication of whether the items were intended to demand higher order skills such as 'analyse' or 'reorganise', or lower order skills such as 'match' or 'count'.

The upper junior factor pattern matrix in Table 4.8 showed the significant coefficients grouped together within the different sections of The Prismaston File. This suggested that the topic, or 'book section', was a strong influence. The characteristics of the items are shown in more detail in Table 4.10 where the item profiles are set out in the following categories:

SKILLS

MEDIUM: basic major skills (read, observe)

ACTION: thinking skills (match, compare, analyse, count)

CONTEXTS

RESOURCE map, chart, passage, reference or question book

TOPIC castles, transport

CLASSROOM TASK

TOPIC: to show the broad aspect of the topic, e.g. transport, castles

CONTENT: the type of task e.g. survey; maths problem survey

ACTIVITY: nature of the items in classroom terms.

These profiles were inspected to see whether there was any consistency within the columns of the item profiles or whether the features were mixed up, or interdependent.

Although the factor pattern matrix in Table 4.8 suggested topic as a basis for the factors, Table 4.10, showing the item profiles, revealed other consistent features associated with the topics. For example, the four factors were divided clearly by MEDIUM into two read factors and two observe factors. Secondly, the RESOURCE column appeared to be consistent. Thus, whilst the topics, or sections of the Prismaston 'booklets' would seem to be strong associates of the factors, the fact that each factor carried items using similar resources and/or skills from other sections of the booklets supports an alternative interpretation in terms of resources.

Table 4.10 Upper Junior Prismaston File : Item Profiles

				SKILL		CONTEXT		CLASSROOM TASK		
p	s	m	ITEM	MEDIUM	ACTION	RESOURCE	BOOK	TOPIC	CONTENT	ACTIVITY
FACTOR I										
66	67	75	te	observe	count	matrix/table	qn	transport	survey	interp symbol & bar chart
65	66	75	td	observe	count	matrix/table	qn	transport	survey	interp symbol & bar chart
40	49	81	tc	observe	count/add	matrix/graph	qn	transport	survey	interp bar chart
42	45	68	mb	observe	map/count	matrix/map	qn	town plan	map reference	symbol/grid
37	39	77	ma	obs/read	map/count	matrix/map	qn	town plan	map reference	symbol/grid
30	33	72	hc*	observe	match	matrix/map	qn	houses	town plan	find skyview
42	45	90	tb*	read/obs	count	matrix/graph	qn	transport	survey	interp bar chart
40	48	91	ta*	read	meaning	word/sentce	qn	transport	survey	definition
FACTOR II										
60	60	72	nb	read	meaning	passage	ref	castles	non-fiction psge	literal comprehension
54	57	82	nh	read	mean/reorg	passage	ref	castles	non-fiction psge	inference comprehension?
52	55	71	ya	read/obs	order/compare	timeline	ref	history	read timeline	interpret scale (castle)
54	54	91	na	read	meaning	passage	ref	castles	non-fiction psge	literal comprehension
50	52	72	nc	read	meaning	passage	ref	castles	non-fiction psge	literal comprehension
49	49	87	nf	read	meaning	passage	ref	castles	non-fiction psge	literal comprehension
42	48	72	yf	read/obs	map/match?	timeline	ref	history	read timeline	interp graduated scale
40	47	91	ta*	read	meaning	word/sentence	qn	transport	survey	definition
36	47	70	di	read	clas'fy/analyse	sentence/psge	qn	transport	discussion	money issues
48	45	47	nl	read	analyse/reorg	passage	ref	castles	non-fiction psge	reorganisn comprehension
43	45	55	nj	read	analyse	passage/pic	ref	castles	compare pictures	castle design
30	42	61	yc	observe	count/map	timeline	ref	history	read timeline	interpret scale (school)
40	40	90	tb*	read/obs	count	matrix/graph	qn	transport	survey	interp bar chart
31	38	77	ng	read/obs	meaning/count	passage/pic	ref	castles	non-fiction psge	reorganisn comprehension
36	34	54	ni	read/obs	map/meaning	passage/diag	ref	castles	study plan view	interp diagram
FACTOR III										
53	51	34	gd	observe	compare	map	qn	town plan	mathematics	shape - interp map
47	50	34	co	observe	count/+/x	map	qn	council mtg	maths problem	length - map scale
43	45	33	cq	(observe)	divide	map	qn	council mtg	maths problem	volume/length
42	42	45	cm	observe	compare	map	qn	council mtg	maths/social	area - best clinic site
39	39	30	cn	observe	compare	map	qn	council mtg	maths problem	area - best carpark site
37	39	49	xa	read	order	sentences	qn	own survey	maths stages	make bar chart
35	39	24	kd	observe	divide/decimal	map	qn	town plan	map reference	symbol/decimals
34	36	72	hc*	observe	match	map	qn	houses	use town plan	identify skyview
29	36	67	th	observe	logic/+/-	chart	qn	transport	maths/logic	interpret Carroll diagram
FACTOR IV										
63	66	64	dc	read	reorg/analyse	sentence/psge	qn	transport	discussion	reorganis'n compreh (for)
50	53	68	db	read	reorg/analyse	sentence/psge	qn	transport	discussion	reorganis'n compreh (against)
45	47	63	de	read	analyse	sentence/psge	qn	transport	discussion	reorganis'n comprehension
41	46	61	yd	read	order	timeline	ref	history	read timeline	earliest/latest events
40	47	57	yg	observe	analyse	timeline	ref	history	read timeline	find date (penny)
35	41	65	tg	observe	reorg/analyse	sets/logic	qn	transport	survey	interpret Carroll diagram
44	39	30	nm	read	analyse	sentence/psge	ref	castles	non-fiction psge	inferential comprehension
34	38	49	cs	observe?	predict	chart	qn	council mtg	extrapolate dates	predict day on calendar
34	36	46	nk	observe	cmpar/analyse	diagrams	ref	castles	castle design	compare picture and plan
31	35	40	dj	read +	subtract/money	passage/5-dgt	qn	transport	discussion	5-digit money subtract problem
36	33	49	dd	read	analyse	sentence/psge	qn	transport	discussion	evaluative comprehension
30	33	53	da	read	reorg/analyse	sentence/psge	qn	transport	discussion	reorganis'n compreh (for)
29	41	61	yc*	observe	count/map	timeline	ref	history	read timeline	interpret scale (school)
26	40	70	di*	read	clas'fy/analyse	sentence/psge	qn	transport	discussion	money issues

Key:

p - pattern coefficient

s - structure loading

m - item mean

* - items on two factors

4.42 Detailed descriptions of the factors

Factor I INFORMATION GAINED FROM GRAPHS AND TABLES

Most of the items on this factor involved the use of coordinates or interpreting information displayed in a matrix as shown in the 'context/resource' column of Table 4.10. The items prefixed with 't' were from the section in which the children are required to interpret a bar chart about transport, whilst the most prominent items, te and td, required the children to complete a table summarising the bar chart results by referring to the chart itself.

The items prefixed with 'm' required the children to use the grid reference on the town plan, by finding certain map symbols and selecting from the choice available their grid references. 'Md' however, which involved the use of a decimal expression appeared on the 'map-mathematics' factor (III).

The mean facility for items with loadings over 0.4 on factor I was 0.8, which indicates that the majority of the children could interpret a bar chart and use two-dimensional coordinates. The fact that these were easy items may explain the unexpected appearance of 'ta' on this factor since it has a mean of 0.91.

Factor II INFORMATION GAINED BY READING A PASSAGE: LITERAL COMPREHENSION

The item profiles in Table 4.10 show immediately that the factor II items have reading a passage and using the reference book in common. The major difference between this factor and factor IV, the other 'reading' factor, appeared to be in the level of comprehension required. The factor II items were mainly concerned with 'meaning' or the lower levels of Barratt comprehension taxonomy (see Chapter 2) i.e. literal comprehension and understanding of simple facts. The mean facility of factor II items with loadings over 0.4 was 0.76 which suggests that this factor consists of the easy comprehension items.

Four items in the castles section, (ni, nj, nk) were intended to test the PRISMS category of 'mapping' (transposing information from one mode to another). The correct answer had to be obtained from a picture or diagram, but the items themselves involved several lines of print. The fact that these items appeared with items involving reading might suggest that their READ element was more influential than the OBSERVE element. No separate factor for mapping between pictorial and textual information emerged based on the PRISMS definition of mapping. The other items designed to test mapping had non-significant loadings.

Factor III APPLYING MATHEMATICS TO INFORMATION FROM THE MAP

The items with significant loadings on this factor require the use of the map of Prismaston as the basis for some mathematics problems which involve spatial concepts such as area, length, volume and shape, to the map. The Factor III items are almost all mediated through observation since map-reading must involve observation. There are two differences between the items involving map-reading on this factor (III) and those on factor I. The first is that this factor consisted of the most difficult items (mean facility 0.36) whereas the factor I items were easy for these children. The second difference, which probably explains the difference in difficulty of the items is that the factor III items involve locating information on the map and then using it in some way: the factor I items simply required the location or recognition of points on the map.

Item xa did not involve the map. It concerned the order of the stages in making a bar chart, a mathematical task which demanded more than the simple recognition tasks of Factor I.

Factor IV APPLYING AND ORGANISING INFORMATION FROM READING

The majority of the items on this factor involved advanced comprehension and/or a logical operation such as finding arguments for and against issues; grouping arguments into 'issues'; interpreting a simple Carroll diagram; ordering events in time. Eight of the items were from two sections: the 'transport discussion' and the use of the timeline. The first involved reference to an alphabetically ordered list of statements for and against different forms of transport. The list was on the page preceding the questions, so that the child had to turn the page to refer to it, and then locate the appropriate argument, perhaps by using aphabetical order to speed up the process. Two items (yd and yg) involve the interpretation of the timeline which was in the reference book, whilst item cs required the children to predict a date given the day of the week and the previous month's calendar. One common feature between these three items and the discussion items was that they all involved following an ordered sequence. The mean facility of the items with loadings over 0.4 on this factor was 0.64.

4.43 Discussion and links with previous research

Certain parallels can be drawn between the present findings and the literature reviewed in Chapter 2. It should be emphasised that these are tentative, in view of the vast differences between the various studies, which included questionnaire surveys, diary-based case studies and psychological testing, and which were conducted in the main with college students.

First we shall consider the lists or categories of study skills described in Chapter 2. The multiple choice items of the Prismaston File were concerned with Tonjes and Zintz' (1981) third category of study skill, namely 'interpreting information'. Tonjes and Zintz included the comprehension of written material, the understanding of maps, charts, graphs and pictures and the transposition of written to graphical information in this category. (This last skill was labelled 'mapping' in the PRISMS schedule.) The present results lend some support to the suggestion that the first two of these are largely independent skills, but those items which were intended to tap the ability to 'map' or transpose between written and graphical information did not form a separate factor. Instead, the items aligned with either the 'reading' or the 'observing' items.

Two other lists of study skills were reviewed. Marland's (1981) step-by-step analysis of study skills requires observation and interrogation of the child in order to determine his or her strengths and weaknesses. It provides a framework for the assessment of the process of study rather than merely its products and is in keeping with the developments described in Chapter 1. The study process will be discussed in relation to the case studies of classes using the Prismaston File which are reported in Chapter 8 and 9.

The third list of study skills was part of the 'Place, Time and Society' project (Cooper 1976). The present results support the notion that finding information and evaluating it should form separate objectives insofar as the items within the Prismaston File which demanded the evaluation, application or organisation of information appeared on separate factors from those demanding simple identification of a piece of information from a given resource. The amalgamation of the three different resources, 'pictures, charts and maps' into a single objective is called into question, however, since the items based on using a map as a resource for further work had low means and formed a separate factor. This suggests that the interpretation of maps should form a separate objective to ensure more specific map-based activities. The PRISMS' frequencies of observations of activities based on graphic materials were low (matrices 1.2 per cent; graphs 2.0 per cent; reference to charts 2.0 per cent) whilst work involving maps or networks was extremely infrequent (networks (maps) 0.2 per cent).

The identification of separate objectives for different aspects of graphicacy would recognise the differences between the types of information being presented and would be more in line with Tabberer and Allman's (1983) recommendations that study skills should be taught within subject areas. Selmes' (1987) research also demonstrated that students used different approaches to study in different subject areas and for different types of task. Although the present study is based on a sample of nine to eleven year olds, the topic dependence of the factors which have emerged is consistent with the idea that study skills are highly influenced by their specific contents or resources.

Finally, the results of the factor analysis suggest two levels of study skill. It is suggested that this may parallel a common finding in previous research, namely the identification of 'deep' and 'shallow' approaches to the study of verbal materials, (e.g. Marton and Saljo 1976, Selmes 1987), despite the use of different methods and samples. In the Prismaston File, the factors based on reading verbal materials and those based on graphic arrays were divided into two levels. Factors I and II both consisted of items requiring basic location, recognition or identification of information for which a shallow approach would be adequate. Factors III and IV, on the other hand, demanded a deeper search as well as the ability to make connections within the resources. This interpretation was supported by the item facilities, which were notably higher for the first two factors than for the last two (see Table 4.10).

These speculations suggest that some of the research carried out with students may have implications for the development and teaching of study skills at upper primary level.

We shall turn now to the analysis of the lower junior Prismaston File.

4.5 The Lower Junior Prismaston File factor solution

At the lower junior level a four factor varimax solution was adopted. The use of an oblique rotation did not clarify the data significantly. Table 4.11 shows the major loadings sorted into factor groups. The complete factor structure is shown in Appendix B5.

Table 4.12 shows the item profiles for the lower junior factors. the item profiles in Tables 4.12 for the lower junior data have no equivalent of the LOCATION category which appears in the upper junior item profiles (see Table 4.10) because the lower junior version was

Table 4.11 Lower Junior Prismaston File: Four Factor Varimax Factor Analysis (coefficients < 0.3 omitted; N = 418)

Item	I	II	III	IV
ch	58*			
cg	51*			
fc	50*			
tg	48			
tb	46			
td	45			
fb	44			
te	44			
cf	44			
tc	36			
ck	35		33	
ce	34			
fg	34			
ff	33			
gx		61*		
gt		53*		39
hs		47*		
gv		46	-35	
gs		45		
ht		44		
pn		39		
hr		39		
hx		39		
jg		36		
pl		32		
mx			63*	
mv			50*	
cl	44		48*	
cm	40		44	
ja			43	
jb			42	
hv			40	
fe			34	
ms		32	33	
pb				52*
pa				43*
ca				39*
cb	33			35
ta				34
pc				33
pd				32
pk				32
jf				30
pe				30
Eigenvalues	7.00	2.02	1.82	1.79
Percentage Variance	13.2	3.8	3.4	3.4
Cumulative Percentage	13.2	17.0	20.4	23.8

* DENOTES MARKER ITEMS

not dependent on the use of the reference book. The lower junior children were asked to refer to maps, charts and text but all of these contained within the question book. A number of items did refer children to the reference book for information but its use was not essential. Inspection of Table 4.12 shows that the TOPIC is a consistent feature of the items which constitute each factor. In contrast to the upper junior result, there is no division into factors based on 'read' and 'observe' in the MEDIUM column, and the ACTION column is rather mixed. The RESOURCES column shows some consistency, however: ten of the items on the first factor involve the interpretation of a chart or graph, and the third factor consists of items involving the map. We shall consider each factor in a little more detail.

FACTOR I TRANSPORT

This factor consists of items from three sections of the Prismaston File, all on the theme of transport. Since over half of the items on this factor involved reading information from charts or tables, or drawing conclusions from them, it could be suggested that the factor corresponds quite closely to Factor I in the upper junior analysis. The presence of the literal comprehension items on this factor is difficult to explain, without reference to the topic of transport, however. On the other hand, the combination of simple comprehension items and basic arithmetic items might suggest that this is a general factor dependent on basic skills. This interpretation is reinforced by the factor solution which included the Richmond test scores and which is shown in Appendix B5.

Table 4.12 Lower junior Prismaston File: item profiles

ITEM	LOADING	MEDIUM	ACTIONS	CONTEXT/RESOURCE	TOPIC	CONTENTS	ACTIVITY
FACTOR I							
ch	58	read	meaning	passage	transport	story	infer comprehension
cg	51	read	meaning/count	passage	transport	story	reorgan comprehension
fc	50	read	select/analyse	matrix/map	transport	bus fares	interpret table
tg	48	read	analyse/logic	bar chart/sentence	transport	survey	interpret bar chart
tb	46	obs/map	count	bar chart/passage	transport	survey	interpret bar chart
td	45	obs/map	count/add	bar chart	transport	survey	interpret bar chart
fb	44	obs	select	picture	transport	bus fares	which coins
te	44	obs/map	count (zero)	bar chart	transport	survey	interpret bar chart
cf	44	read	meaning	passage	transport	story	literal compreh
cl	44*	read/map	compare/analyse	matrix	transport	the race-times	interpret tables
cm	40*	read	mean'g/analyse	matrix/passage	transport	the race-times	interpret tables
tc	36	obs/map	count/match	bar chart	transport	survey	interpret bar chart
ck	35*	read/map	compare/subtract	matrix	transport	the race-times	interpret table
ce	34	obs/map	compare/predict	picture	transport	story	interpret picture
fg	34	obs/map	analyse	matrix/map	transport	bus fares	link table and map
ff	33	read	predict/meaning	word	transport	bus fares	missing word
cb	33*	read	meaning	passage	transport	stroy	literal comprehension
ci	30	read/obs	compare/analyse	picture	transport	stroy	interpret picture
FACTOR II							
gx	61	obs/map	compare/mean	picture	houses	architecture	identify shape
gt	53*	read/obs	analyse	pictures?	houses	architecture	new style window
hs	47	observe	match/analyse	picture	houses	architecture	identify type of house
gv	46*	obs/map	analyse	picture	houses	architecture	identify missing feature
gs	45	read	analyse/predict	sentences	houses	architecture	infer type of heating
ht	44	read/obs	meaning	picture	houses	architecture	identify type of house
pn	39	read/obs	meaning	picture	the past	identify coin	Victorian penny
hr	39	read/obs	order	map	houses	map reading	order of houses
hx	39	read/obs	match/order	map	houses	map reading	find address
jg	36	observe	compare/count	map	journeys	map reading	measure length
pl	32	read/obs	predict/analyse	timeline	the past	find date (castle)	interpret scale
ms	32*	read/obs	match/order	map/symbol	town plan.	map reading	order of buildings etc.
FACTOR III							
mx	63	observe	match/compare	map/symbol	town plan	map reading	find missing building
mv	50	observe	match	map/symbols	town plan	map reading	identify symbols
cl	48*	read/map	compare/analys	matrix	transport	the race-times	interpret results
cm	44*	read	mean'g/analyse	passage/matrix	transport	the race-times	interpret results
ja	43	read/obs	compare	map			
jb	42	obs/map	match	map/symbol	journeys	map reading	shortest route
hv	40	observe	match/compare	map/symbol	journeys	map reading	route
fe	34	read	predict/meang	letter/word	houses	map reading	find aerial view
ms	33*	read/obs	match/order	map/symbol	transport	bus fares chart	missing letter
gv	-35*	obs/map	analyse	picture	town plan	map reading	order of buildings
					houses	architecture	style of window
FACTOR IV							
pb	52	read	meaning	time/sentences			
pa	43	read/obs	meaning/match	timeline/picture	the past	vocabulary/time	define century
ca	39	read	meaning	passage	the past	vocabulary	read datestone
gt	39*	read/obs	analyse	picture	transport	story	literal comprehension
cb	35*	read	meaning	passage	houses	architecture	missing chimney
ta	34	read	meaning	word/sent	transport	story	literal comprehension
pc	33	read	analyse/compare	sentences	transport	vocabulary	define transport
pd	32	read	predict/reorg	timeline/passage	the past	maths/time	relative age
pk	32	observe	match/meaning	map/symbol	the past	(use ref book)	no garages
jf	30	read/obs	select/length	map/picture	the past	read map symbols	evidence of hill
pe	30	read/obs	predict/reorg	timeline/picture	journeys	maths/length	measuring instrument

FACTOR II HOUSES

The items on this factor consistently refer to 'houses', with pictures or the map as the resource. The items with the highest loadings required the children to use the information available from pictures of houses. The map-reading items, such as hr and hx, involved locating which house belonged to which child. Thus those who had successfully identified the children's houses and found them on the map would have less difficulty with these items than those who had not.

FACTOR III THE TOWN PLAN

Reading the map seemed to be the dominant feature of the items loading on Factor III and here the resource dependence was more consistent than the topic. With the exception of item 'fe', all of the other items involved either locating symbols or finding routes. Items cm and cl, which appeared on Factor I, asked the children to interpret the results of a race to school. Since the race involved different routes which might have been considered in determining who had won the race, these items have a clear connection with the map. To answer item fe, the children had to find and then supply the missing letter in a word in the corner of a chart. This aspect of the item may be consistent with the emphasis on symbols and/or details in the other items on Factor III.

FACTOR IV THE PAST

This factor is predominantly verbal and includes a number of items from the topic 'The past'. It largely consists of the easier items with item facilities of over 0.80. Many of these items involve reading alone whereas those defining the first three factors frequently involved reading followed by the use of a diagram, or the mapping of information from one medium to another.

4.6 Comparison of the upper and lower junior factor analyses

In this section a consideration of the similarities and differences between the factors obtained from the upper and lower junior versions will be presented. Table 4.13 provides a summary of each factor and shows some similarities between the two versions. In both cases, items involving information from the map loaded on one factor and in both cases, items involving the time-line displayed similar loadings to verbal rather than spatial or mathematical items. This finding supports the case for the existence of specific context-based study skills at primary level.

At the same time, there was a difference in emphasis between the two levels. Inspection of the topic and resource columns of Tables 4.10 and 4.12 shows although the resource and topic components of the profiles were fairly consistent for each factor at both levels, the topic was the more consistent component at lower junior level. This could be explained in two ways. Firstly, it is likely that the differences between the two sets of materials were largely responsible. Secondly, it is hypothesised that the difference may represent a gradual shift from a topic-based to a more resource-based influence on performance. This could appear as the children get older and have more experience in using different resources for a wider variety of topics. As children became more familiar with using the skills needed to interpret different sources of information, so the nature of resource itself might begin to have an influence on performance regardless of its topic content. This suggestion would require further investigation using one set of materials over a wider age-range. If some progression from topic-based to resource-based performance was found, it would have considerable implications for the development of both national assessment tasks and teacher-based context-bound assessments at 7 and 11.

Table 4.13: To show the similarities between the Prismaston factors at upper and lower junior levels

	Resources	Topics
UPPER JUNIOR FACTORS		
I	matrices	transport; town plan
II	passage; (timeline)	castles; history
III	map	council meeting; town plan;
IV	sentences/passage; timeline	transport; history
LOWER JUNIOR FACTORS		
I	passage; matrices; pictures	transport
II	pictures	houses
III	map; matrix	town plan; transport; journeys
IV	timeline; passage	the past; transport

4.7 The Prismaston File factors and the tests of basic skills

Correlations between the Richmond mathematics and language test scores and the Prismaston factor scores were used to investigate the relationship between the Prismaston factors and basic skills. The administration of the shortened Richmond tests and that of the Prismaston Files were separated by about one month. It had been expected that the correlations between basic skills and study skills would decrease as the children's ages increased, but the reverse pattern was found, as shown in Table 4.14. The highest correlations were between the tests themselves which increased from $r = 0.51$ in the first year junior group (8+) to $r = 0.73$ for the fourth year junior children (11+). This result was surprising, but might possibly arise from increased test-taking skill in the older children.

At upper junior level, there was a strong positive association between basic skills and Prismaston scores, particularly at fourth year level, but the lower correlation between basic skills scores and the map-reading factor scores implies that this aspect of graphicacy may be a relatively distinct study skill. The correlations between the basic skills test scores and the lower junior Prismaston File factor scores are generally lower than the upper junior equivalents. The strong positive association between the lower junior test scores and the first factor support the suggestion that the first factor depends largely on basic language and arithmetic. At the same time the failure to obtain significant correlations between the test scores and factors II and IV in the 8-plus group, and factor IV in the 9-plus group was unexpected. Since factor IV consisted of the easier items for these age-groups, there could have been a ceiling effect in operation.

Table 4.14

The Prismaston File: correlations between factor scores and basic skills scores by year group.

UPPER JUNIOR VERSION

age	N[1]	test	I matrix	II passage	III maps	IV discussion	language test
11+	252	language	.42	.46	.24	.47	
		mathematics	.45	.47	.24	.43	.73
10+	208	language	.29	.41	.17	.38	
		mathematics	.28	.27	.22	.38	.59

LOWER JUNIOR VERSION [2]

age	N	test	I charts	II pictures	III map	IV timeline	language test
9+	189	language	.34	.30	.32	.01 (ns)	
		mathematics	.36	.21	.35	.11 (ns)	.58
8+	131	language	.35	.09 (ns)	.18 (*)	.21 (*)	
		mathematics	.24	.03 (ns)	.33	.06 (ns)	.51

All coefficients significant at $p < 0.01$ or beyond unless followed by:
(ns) : $p > .05$ or (*) : $.05 > p > .01$

Notes

1 N refers to the number of children in each school age-group who had taken the Richmond tests and completed the Prismaston File.

2 The factor scores used here were derived from a factor solution which included two items (fa, fd) which had been excluded from the factor analyses reported earlier. The difference between the two solutions is minimal.

A general explanation of the overall pattern might be linked to the response rates shown at the beginning of this chapter. A higher proportion of upper junior Prismaston Files than lower junior versions were returned completed. It may be that the lower junior children who had more difficulties in basic skills were screened out either in the classroom or by the 'number missing' threshold which was adopted, thus perhaps restricting the lower junior sample to those children who obtained higher Richmond test scores. At upper junior level, where the general level of basic skill would be higher, and so more children would be able to work more independently from the Prismaston materials, the sample may be more representative of the full range of basic skill. On the other hand, it could be argued that since teachers were allowed to help children with reading and to give hints, the Prismaston scores of the younger children may be inflated in relation to the test scores. It will be shown in Chapter 5, however, that very little teacher help was recorded at either level. In any event it is quite clear that the original hypothesis of a declining relationship between basic skills and study skills as measured by the Prismaston File was not supported by these results.

4.8 Constructing subscales of the Prismaston File

The original purpose of the factor analyses had been the construction of sub-scales derived empirically from the children's performance rather than simply on the item content. At upper junior level, the factors appeared to be based on resources and this suggested that the construction of sub-scales might have some general value. In other words, if a teacher were to use the Prismaston File with a class, the children's scores on the four sub-scales might provide some general information about their study skills in relation to different resources.

At lower junior level, however, the factors appeared to be based on their topic content and as this would have little general value, no further refinement was carried out.

The upper junior sub-scales were built up from the items with significant loadings(i.e. over 0.3) on the four oblique factors. Items which reduced the scale means or had low item-scale correlations were subsequently excluded. The items which were retained in the sub-scales and the sub-scale reliabilities are shown in Table 4.15. A correction or 'prophesy' formula was applied to the Spearman-Brown split-half coefficients to compensate for the small number of items in each sub-scale (see e.g. Youngman and Eggleston, 1979) and the resultant coefficients are all above 0.7.

Inspection of the upper junior factors had also shown, however, that items from the same sections of the book had tended to group together on the same factors. To determine whether the sub-scales derived empirically from the children's performance showed any greater internal consistency than a set of subscales constructed simply on the basis of the sections of the book, corrected reliabilities were computed for the latter and are shown in the lower part of Table 4.15.

The two sets of reliability coefficients suggest that the empirically derived subscales were slightly more consistent than the book-section subscales, although the time-line items (Table 4.15: 'History') obtained the highest coefficient of all. Thus, these results provide some support for the superiority of the empirically derived sub-scales based on resources.

Table 4.15: Upper Junior Prismaston File: reliabilities of sub-scales derived from oblique factor analysis

Items included for each factor scale

FACTOR I (hc, ka, kb, tb, tc, td, te)

FACTOR II (di, na, nb, nc, nf, ng, nh, ni, nj, nl, ya, yc, yf)

FACTOR III (gd, cm, cn, co, cp, cq, cr, kd, xa)

FACTOR IV (da, db, dc, dd, de, di, dj, nm, nk, yd, yg, cs, tg)

Scale	Mean	Standard Deviation	Spearman-Brown Split Half	with Spearman-Brown Correction
FACTOR I Matrices	4.66	1.43	0.58	0.80
FACTOR II Literal comprehension	10.02	2.97	0.72	0.79
FACTOR III Maps and mathematics	4.13	2.11	0.58	0.73
FACTOR IV Advanced comprehension	7.16	2.86	0.67	0.79
Reliabilities of items grouped together in book sections				
HOUSES (ha, hb, hc, hd, ga, gd)	4.16	1.29	0.39	0.68
COUNCIL (cm, cn, co, cq, cs)	1.91	1.31	0.34	0.67
MAP GRID (ma, mb, md)	1.69	0.85	0.15	0.54
TRANSPORT (ta, tb, tc, td, te, tg, th)	5.44	1.58	0.53	0.76
DISCUSSION (da, db, dc, dd, de, dg, dh, di, dj)	5.16	2.12	0.51	0.70
CASTLES (na, nb, nc, nd, nf, ng, nh, ni, nj, nk, nm)	7.49	2.31	0.60	0.71
HISTORY (ya, yc, yd, yf, yg)	3.22	1.50	0.61	0.86

Summary and conclusions

In this chapter, the analyses of the multiple choice items from the main administration of the Prismaston File in the small schools have been reported. In view of the nature of the exercise and the length of time and effort it demanded, response rates of over 50% and 80% at lower and upper junior levels respectively were considered to be more than adequate. The results were returned to teachers as quickly as possible in the form of profiles for each child.

The major part of the chapter was devoted to the factor analytic study of the Prismaston responses in an attempt to identify sub-scales empirically. Four factors were extracted at each age level which appeared to be based on resources and topics rather than skills alone. At upper junior level separate, slightly correlated factors based on using graphs and charts, maps and written materials involving literal and more advanced comprehension skills were found. At lower junior level, four uncorrelated factors were identified which were defined in terms of the topic or subject matter of the items such as transport, houses, the town plan and the past. There were some common resource elements within the factors particularly in relation to maps and charts at this level. It was suggested that there may be a shift from topic dependence at lower junior level towards resource dependence at upper junior level.

It is suggested finally that the importance of context and topic in particular in influencing performance should be taken into account in the proposed development and interpretation of context-based national assessments for children aged 7 and 11.

CHAPTER FIVE

The Prismaston File : Resources and Teacher Help

Introduction

An essential feature of the Prismaston File assessment materials was that the children were encouraged to seek help from printed resources, and were permitted to consult friends or the teacher in order to be able to answer the questions. They were asked to record this help when it was used by circling the appropriate code letter(s) beside each item in the answer book. A clue to show which resource might be helpful for any particular item was included beside the items in the text. Items which required the child to look at the map, or a picture, for example, included the hint 'map' or 'picture' in the margin; having consulted this reference, the child was expected to circle the 'code' letter 'p' beside the answer choices. Items which required the use of the reference book included the hint '*' (this symbol was introduced to the children as standing for the use of the reference book) together with the name of the appropriate sections or type of reference book e.g. 'dictionary'. If help from the teacher was needed, the teacher was asked to tell the child which of four 'types' or grades of help had been given so that the child could record it. (These codes are listed in Table 5.1.)

In this chapter, the children's records of their help and resource use will be presented. First, the number of recorded uses of the various resources will be considered along with the question of whether they were used for the appropriate items. Secondly, the relationship between performance and resource use will then be discussed. The recorded use of teacher help, which was very infrequent, will be reported thirdly, and finally, the idea of asking children to record their sources of information will be evaluated in the light of the data collected. Some of the problems associated with this self-report method of recording resources will be pointed out.

5.1 Children's records of their use of resources

In Table 5.1 the mean recorded use of each resource is shown. The mean number of times that the use of 'p' (pictures, maps and charts) was recorded by the upper and lower junior children was 21.66 and 20.61 respectively. These figures corresponded well with the number of items for which the use of a chart, map or picture was suggested (20 and 28 respectively), plus items which used this type of resource but where no clue was given. Similarly, the means for the recorded uses of the reference book (13.08 and 4.22 at upper and lower junior levels respectively) corresponded satisfactorily with the number of items which included a hint to use the reference book (24 and 13 respectively). Lower juniors recorded more consultations with the teacher and with friends than did the upper juniors, who rarely recorded teacher help. The use of apparatus was very low; this was predictable as no more than five items at either level required the use of apparatus. This resource code acted essentially as a check on children who repeatedly and inappropriately circled the resource codes. In Appendix C1 the percentage of recorded uses of each type of resource for each item are shown. For apparatus, it is clear that one per cent of the children circled 'a' inappropriately for many items in both versions.

A few items required the children to refer to a chart or picture, without a hint in the text. In the tables (Appendix C1), the resource needed is shown in brackets. These items provided an indicator of whether

Table 5.1 To show the means and standard deviations of the resource and teacher help records

RESOURCE		UPPER JUNIOR mean	UPPER JUNIOR s.d.	LOWER JUNIOR mean	LOWER JUNIOR s.d.
p	plan/map/picture	21.66	12.84	20.61	15.09
*	reference book	13.08	11.29	4.22	8.09
a	apparatus	0.85	2.81	0.54	1.64
f	friend	5.49	10.71	7.76	12.02
Teacher help with:					
Tr	reading	0.23	0.81	0.80	3.01
Th	hint	0.64	1.40	1.72	4.71
Tx	explanation	0.57	1.42	1.39	3.98
Tm	omit item	0.16	0.69	0.16	0.60

Upper junior N = 216; Lower junior N = 202

Note: Details of the resources used were computed for the PRISMS target pupils only. All of the items have been included in the analyses of help and resource use although some were excluded from the scores analyses.

the children did adopt the routine of actually recording the source of the information, in the absence of any hint.

(a) Plan/chart/picture/map

Pictures, plans and charts were the most common resource on which items were based, and the tables in Appendix C1 show that 'p' was the most frequently recorded resource code. The highest frequencies were 80 per cent and 67 per cent by the upper and lower juniors respectively. 't' tests were carried out to compare the mean recorded uses for the items which required a resource with the mean recorded uses of that resource for items which did not require it, in order to test whether resources were recorded more frequently for appropriate than for inappropriate items. Recorded uses of plan/pictures were significantly higher for the items which required these resources than items which did not, particularly where a hint was given in the text (upper junior: $t = 16.54$; $df = 41$; $p < .001$: lower junior: $t = 9.56$; $df = 39$; $p < .001$) (full details appear in Appendix C2). A small but significant number of the children (10 - 20 per cent) recorded their use of charts and pictures appropriately for items where no hint was given. The mean percentage of recorded uses of 'p' for items which used pictures or charts but did not give a hint was significantly greater than the equivalent percentage for non-pictorial items (upper junior: $t = 2.53$; $df = 37$; $p < .05$: lower junior: $t = 2.46$; $df = 25$; $p <.05$). In other words, a small proportion of the whole sample at each age level recognised and recorded the nature of the resource they were using in the absence of a hint in the text.

(b) The reference book

The actual pattern of recorded uses of the reference book was a good reflection of the suggested uses, and significantly more children used the reference book for the appropriate items than for those items which did not require the reference book (upper junior : $t = 9.27$; $df = 57$; $p < .001$). At lower junior level the use of the reference book was recommended for only nine items, and as many of the resources at that level were contained in the question book. Nevertheless, the '*' symbol denoting use of the reference book was used significantly more for items where it was recommended than for other items (lower junior : $t = 7.29$; $df = 27$; $p < .001$).

At upper junior level, the comprehension passage about castles was contained in the reference book and so its use could not be avoided. The percentages of recorded uses ranged from 46 per cent to 65 per cent. Comparison with the item facility indices in Appendix B3 indicated that a large proportion of the children forgot to record the source of their information.

(c) Apparatus

Very few items demanded the use of apparatus in either version and no apparatus hints were given in the text. The mean number of recorded uses as shown Table 5.1 are very low at both upper and lower junior levels, and the percentage frequencies reveal that only one per cent (two or three children) used this resource code frequently and probably inappropriately. The frequencies are slightly higher for items which were likely to require the use of apparatus. At lower junior level, the items about journeys which involved comparison of the lengths of different routes (jc, jd, jg), showed a very slight increase in reported usage of apparatus, and this also applied to the items about length and area (co, cp; gb, gc) in the upper junior version, where use of rulers would have been appropriate.

(d) Friend

The recorded use of 'friend' was below 20 per cent, at both age levels for almost every item. These figures probably understimated the actual amount of discussion. The recorded of use of friends declined as the children progressed through the tasks at both upper and lower junior levels.

5.2 Relationship between performance and use of resources

The relationship between the children's performance and their records of the resources used was investigated by computing product-moment correlations between the reported use of each resource and overall score. These are shown in Table 5.2. These correlations are all positive except for the use of 'friend' at upper junior level, which suggests that collaboration was not beneficial to the performance of those who recorded it at this level. It could be that those who sought their friends' advice did not take it, or that they were given misleading advice.

Table 5.3 examines this in more detail by showing the statistically significant correlations between the children's records of resource use and their performance on groups of items which used certain resources. At upper junior level, these correlations indicated that resources were recorded for the appropriate item groups, and that there were negative correlations between the recorded use of 'friend' and performance on these item groups.

Table 5.2 : Correlations between recorded resource use and overall score (Upper junior N = 216; Lower junior N = 202)

	RESOURCE			
	chart	reference book	apparatus	friend
TOTAL SCORE				
Upper junior	.20**	.24**	.01	-.19**
Lower junior	.19**	.07	.10	.02

* p < 0.05   ** p < 0.01   *** p < 0.001

At lower junior level, there were some surprising negative correlations in Table 5.3. For example, the significant negative correlation between performance on items based on information from pictures, and the recorded use of the code 'p' is difficult to explain. It could be that children who could find the information quickly and correctly moved on rapidly to the next item without stopping to record that a picture had been used, whereas those who had difficulty with the item lingered longer over the items and recorded their use of a picture even if the selected answer was incorrect. On the other hand, many of the items which were based on pictorial information did not have hints beside them because the pictures usually accompanied the text. It could have been, therefore, that the hints served as a signal to record a resource as

Table 5.3: Significant correlations between resource use and performance on groups of items which required certain resources (Upper junior : N = 216; Lower junior : N = 202)

	Items requiring use of...			
RESOURCE RECORD	MAPS	PICTURES	GRAPHS	REF. BOOK
UPPER JUNIOR				
P (plan/picture/map)	.14*	.15*	.14*	-
* (Prismmem)	-	-	.27***	.21**
f (friend)	-	-	-.19**	-.18**
LOWER JUNIOR				
p (plan/picture/map)	-	-.33***	.17*	.25**
* (Prismmem)	-	-	-	-.34***
f (friend)	.46***	-.44***	.16*	.38***

being used whereas many children did not spontaneously record the use of a resource if there was no such hint. The negative correlation between use of the reference book and performance on items for which the Prismmem reference book might have been helpful suggests either that the lower juniors had not been able to use the references successfully, or that children who already knew the answers selected the correct answer without referring to the reference book, and that those who did not know the answer were unable to find it.

The records of resource use were broken down by gender and boys' and girls' records were compared using one-way anovas. The results are tabulated in Appendix C3 and show that there were no significant differences between boys' and girls' records of resource use of teacher help.

5.4 Inter-relationships between the use of help and resources

The lower junior children appeared to have been less successful than the upper juniors at using and recording their use of resources appropriately described in section 5.2 above, and so no further analyses were carried out on the lower junior data. At upper junior level the children's help and resource records were intercorrelated and the coeeficient are shown in Table 5.6. Although these correlations are rather low, a number of them were significant and these have been shown graphically in a dendogram in Figure 5.1. The dendogram shows two small 'clusters' which might be labelled 'teacher dependent' and 'independent use of resources'. The 'teacher dependent' cluster consists of the three forms of actual help from the teacher, as opposed to the teacher telling the child to omit an item. Thses teacher help associations suggest that a significant group of the children tended to rely more often on teacher

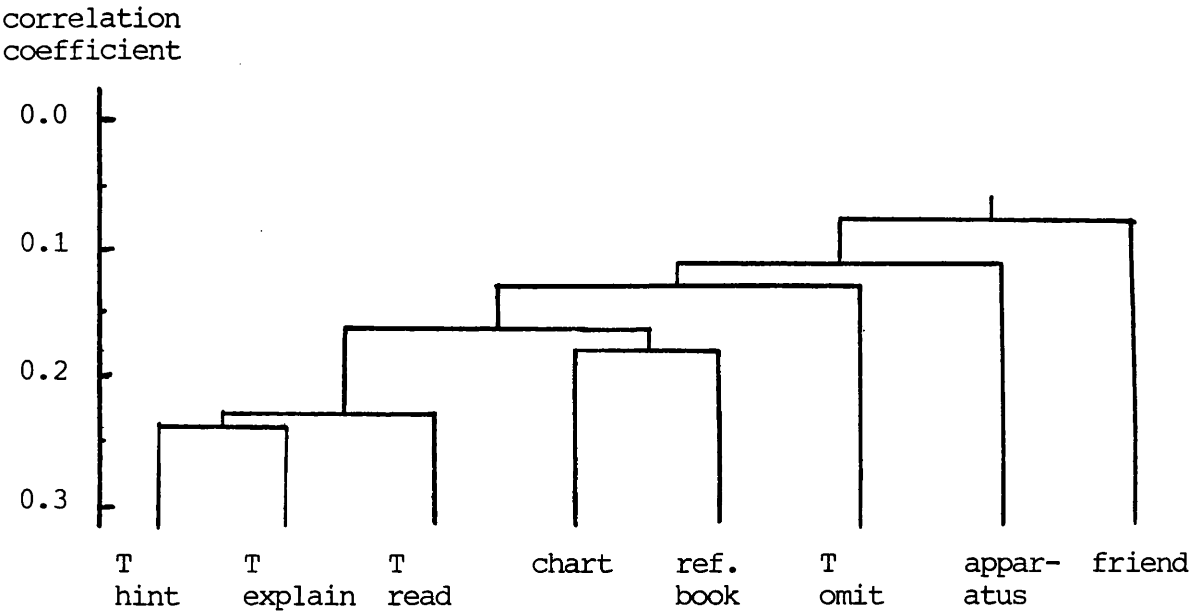
Table 5.6 Product-moment correlations between upper junior help and resource records

	chart (p)	Prismmem (*)	app'tus (a)	friend (f)	T read (Tr)	T hint (Th)	T expl'n (Tx)
Prismmem	18''						
apparatus	05	10					
friend	-01	-08	02				
T read	02	13	-03	02			
T hint	-05	16'	00	-05	15'		
T explain	-08	10	-04	02	23'''	24'''	
T omit	-17'	02	11	08	-01	02	13

N = 223

T : teacher
p : charts, maps, pictures
* : Prismmem or reference book
' : $p < .05$; '':$p < .01$; ''':$p < .001$

Figure 5.1 Dendogram to illustrate positive associations between use of teacher help and resources at upper junior level.



help and received hints, explanations or help with reading than on consulting and recording use of the 'independent' resources. The second separate association in the dendogram is between the recorded use of maps and charts, and of use of the 'Prismmem'. This suggests that a significant group of children who referred independently to the maps and charts, and remembered to record this, were those who also referred to the Prismmem for information and recorded this.

The teacher dependent group and the independent group come together at the point where 'teacher hints' and the use of the reference book ('Prismmem') are correlated ($r = 0.16$, $p < 0.01$) which suggests that a significant proportion of the usage of the reference book was at teachers' instigation: in other words, that a significant group of the children needed a hint before they consulted the Prismmem, or perhaps, having consulted it, about how to find the information.

Neither the use of friend as a resource nor the use of apparatus are significantly associated with any of the other variables, but the significant negative association between 'teach omit' and the recorded use of charts and maps is worthy of note. This negative association ($r = -0.17$, $p < 0.01$) supports the distinction between children who worked independently, recording their resource use as they went along, and the teacher-dependent group by demonstrating the dissociation between being an independent worker, and being told to leave out an item.

A factor analysis was used out to explore the pattern of resource use further. Three factors were extracted using a varimax rotation. These factors accounted for 49.4 per cent of the total variance, and the significant loadings are shown in Appendix C4 for interest. The factor solution supported the interpretation above. The first factor could be labelled the teacher help factor; the significant loadings on the third were the independent resources such as charts, the Prismmem and apparatus, whilst the second was bipolar with 'teacher omit' and use of charts at opposing ends.

The groups, of teacher dependent, and of independent resource users suggest patterns of response which could be the result of the items themselves, the children's habitual work pattern or the classroom atmosphere and teacher styles. Some teachers, for example, may have encouraged independence in use of resources and discouraged children from seeking help; others may have made themselves more available for children to ask for help, but perhaps inhibited consultations with friends. In other cases, the children may have felt free to consult friends. These possibilities are discussed further in the case studies reported in Chapters 8 and 9.

5.5 The use of self-report records of resource use

Asking the children to record their own use of resources and teacher help has been shown to have been partially successful. The means were congruent with the number of items requiring particular resources. The correlations between the resource records and the groups of items based on those resources suggested that the upper juniors were more successful than lower juniors in locating information and/or recording use of the appropriate resource.

At the same time, four problems were associated with asking children to record their own use of the resources. The first was that many children must have used a resource without recording it. This was shown by the comparison of facility levels with the resource use frequencies for items such as those about castles: the frequencies obtained probably underestimated the actual usage. Secondly, a small proportion of the children tended to record the use of a resource for almost every item and so clearly did not understand how to use the 'code'. This is as shown, for example, by the apparatus category. Thirdly, it would have been possible to answer some of the items without using the resource: for example, a child might already know the answer or be able to guess it correctly, without using a resource. For example, items such as 'mx' (both levels) asked the children to use certain map symbols. The symbols were not obscure, and thus they could have been interpreted with a reasonable degree of accuracy without reference to the key in the reference book. Some children may not therefore have needed to use a suggested resource.

The fourth problem was where a record of resource use had been made, but the children had selected the incorrect response. This suggests that many of the children needed more opportunities to learn and practise study skills, and in particular in some guidance in interrogating resources especially reference books.

Summary

It has been argued that the upper junior children were capable of recording their resource use appropriately, but that the younger children experienced more difficulties in doing so. Although nearly 70% and 80% of the lower and upper juniors respectively recorded their reference to a picture, plan or chart at least once, it was evident that many children who answered questions correctly did not record the resource used, and, correspondingly, that a small proportion of the children recorded using resources for items which did not require them. Just under 10% of the upper junior children circled the reference book code even when the item did not demand it for example. If this proportion was combined with the number who did not record using the reference book where it was essential, we can conclude that less than half the children recorded resources appropriately.

It was also clear that the items could have been more dependent on children finding information in the reference book, particularly at lower junior level, although it would be difficult to prepare items to which none of the children could know the answer. The multiple choice format also presented a problem in that 25% of the children could simply have guessed the correct response and either circled a resource. In a smaller scale study, the use of open-ended questions would have avoided this difficulty.

The results indicated that the teachers were rarely asked for help, (or that children did not record the help that they had had) but that there was a significant tendency for the same children to record the three types of teacher help, and this association suggested a group of teacher-dependent workers. There was also evidence of a significant group who used the resources independently, without teacher help, or with a hint to use the reference book. It was evident, however, that the majority of the children were able to work independently on the Prismaston File.

CHAPTER SIX

The listening task: 'Draw a Prismon'

Introduction

The majority of items in the Prismaston File were multiple choice items leaving no scope for open-ended responses. An attempt to disguise the response mode was made by making each choice represent the opinion of a Prismon character but it was still possible for a child to simply circle response choices at random, with a one-in-four chance of being correct on each item. The multiple choice format had been adopted to speed the marking of hundreds of scripts, but was acknowledged to be incongruent with a major aim of the exercise: namely that it should have greater context validity than standardised pencil-and-paper tests. Furthermore, multiple choice items can test only certain aspects of performance such as recall, recognition, or interpretation of information. Accordingly, three tasks demanding more open-ended and non-verbal responses were included in the Prismaston File to counteract these limitations, and to further satisfy the intention to assess a wider range of the curriculum than that covered by standard tests. The tasks were:

1 the listening and drawing task, in which the children listened to a description of a 'Prismon' and then attempted to draw one,

2 the bar-chart task, at the upper junior level only, in which the children were asked to produce a bar-chart to show how ten children in the class had travelled to school that day, and,

3 the map-drawing task, at lower junior level only, in which the children were asked to draw a plan of their route from home to school.

This chapter is concerned with the first task, and the second and third tasks will be reported in Chapter 7.

6.1 Background to the listening task

The present task was included in the Prismaston File to provide a means of assessing children's listening skills. Frequent demands are made on children's listening skills in the course of a school day. In the PRISMS schools, listening was required in 30% of all the curriculum observations, and it accounted for nearly 50% of the total of the three 'input' modes (read, listen and observe). Listening therefore represents an important study skill. Tonjes and Zintz (1981) included listening in their classification of study skills under the category of 'organising information to extract meaning' (see Chapter 2), and Jasman included listening in the study tasks developed for the ORACLE project. These included the following exercises and a 'creativity' task (Galton and Simon, 1980). The children were asked to:

1 listen with concentration and understanding to a sequence of tape-recorded sounds and instructions;

2 make a picture incorporating a given design to test inventiveness and creativity;

3 acquire information by listening, observing and formulating questions.

The present task attempted to integrate some aspects of these tasks into one overall activity. The children were asked to listen with concentration and understanding to a detailed description and then to draw the object described. An opportunity for the children to demonstrate 'divergent thinking' was incorporated into the task, to parallel Jasman's 'creativity' task but no attempt was made to include tasks equivalent to 'listening to tape-recorded sounds' or 'formulating questions'.

Another relatively frequent demand made on the children is to 'map' information from one medium to another; from the observation of an object in three dimensions to drawing it in two dimensions, for example; from reading a printed text to speaking it aloud; from hearing a story to enacting it. Mapping was observed in 18% of all junior observations, and occurred slightly more frequently than any other 'processing criterion' ('copy' and 'create' were observed in 16% of the junior curriculum observations). The present task, 'draw a Prismon' was devised therefore to tap both listening and mapping skills.

The final PRISMS observation frequencies suggested that mapping from listening to drawing was, in fact, a relatively rare activity (only 5% of observations of 'listen' occurred with 'draw'), although the observers' informal observations had previously suggested that the task of drawing a picture to illustrate some aspect of a story or some information from a television programme, for example, was not an unusual task. A more common task for the children was to map from listening or observing to writing but this mode was rejected in the present context. On the one hand, it might have been too laborious and discouraging for children who disliked writing or found letter-formation, spelling or some other aspect of writing difficult, and on the other, these potential difficulties would have led to further demands on the teachers, especially at lower junior level. A drawing response was selected instead as a more immediate and less threatening medium than writing.

6.2 The 'Draw a Prismon' task

This task was presented to the children about a week after starting the Prismaston File so that they would be familiar with 'the story' and its characters. The teacher was asked to read a description of a Prismon to the children twice, and the children were asked to listen carefully to the description so that they could draw the best picture they could of one of these creatures. (Copies of the two descriptions are in Appendix B1.)

The task incorporated a 'divergent thinking' element in which the children were invited to 'develop' the Prismon's eighteen fingers and eighteen toes into useful implements, thus giving them ample opportunity to demonstrate their inventive fluency. A few suggestions of such implements such as a screwdriver, a knife and fork, a paintbrush, were given in the description. The fictional notion that some children might have unwittingly seen a Prismon was introduced to encourage careful drawing, whilst an appeal to their capabilities as 'good secret agents' was used to stimulate concentration and careful listening.

Two descriptions were provided. Although both presented the same information, the description intended for younger juniors was shorter (475 words) and more straightforward. The upper junior version contained more irrelevant details and was 765 words in length.

6.3 Scoring the 'draw a Prismon' listening task

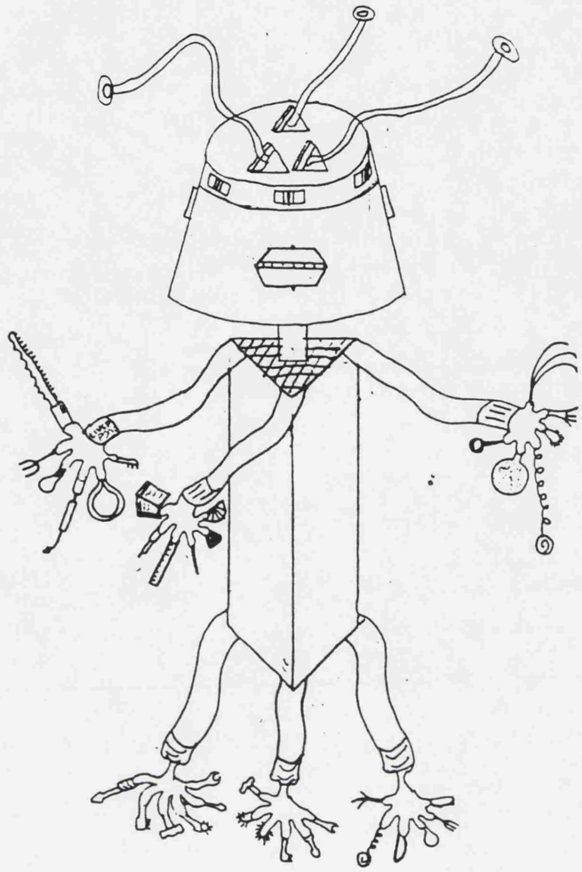
The scoring procedure was a lengthy one which involved over 50 points for the accuracy of each drawing plus the scheme for scoring the number and type of fingertips for the 'creativity' task. Marking was restricted therefore to the target pupils from each class. Full details of the mark scheme appear in Appendix D1 and the main sections are listed below. These were:

ACCURACY	drawing the correct numbers of limbs, fingers, eyes, etc.;
POSITION	placing these features in the specified positions;
SHAPE	drawing the correct shapes for the different features;
DETAILS	the inclusion of the finer details;
CREATIVITY	the number of finger/toe tips developed into implements;
HUMANNESS	the number of humanoid characteristics attributed to the Prismon in the drawing, such as eyelashes, clothing etc.

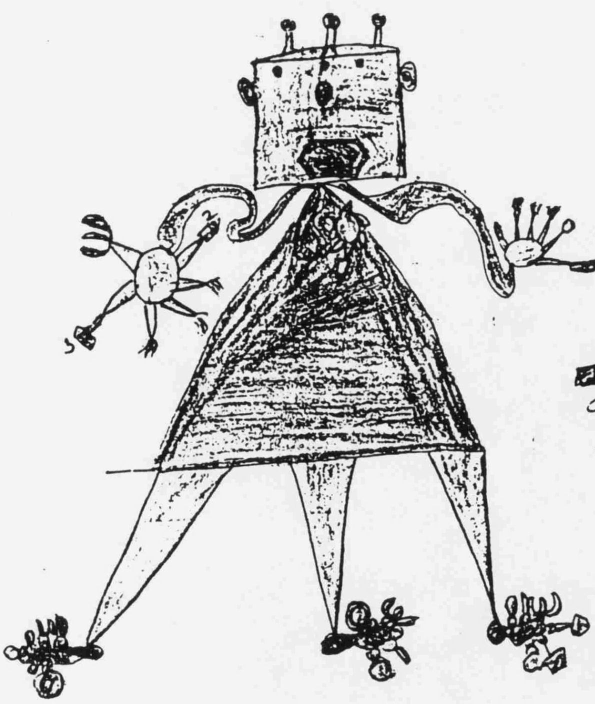
Figure 6.1 : Examples of high scoring Prismon drawings

a) 4th year junior (age 11) 21304

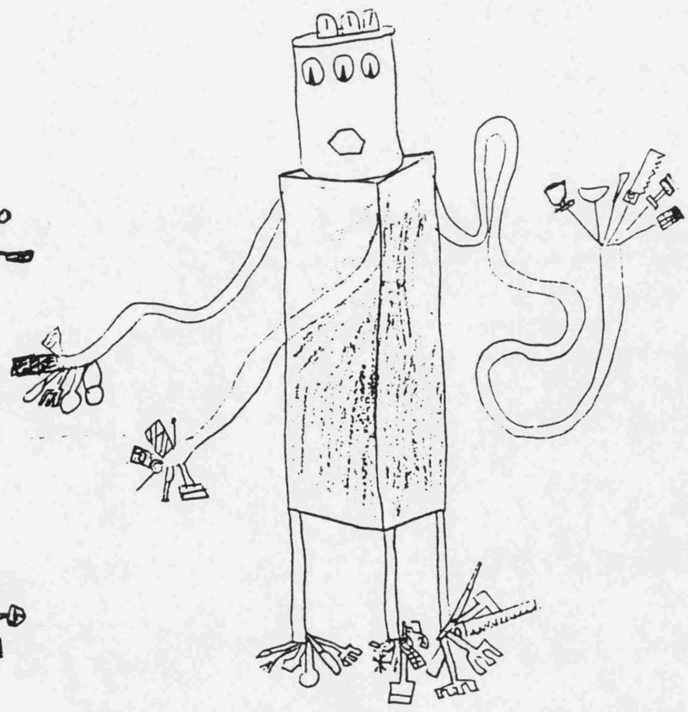
b) 4th year junior (age 11) 27303



c) 1st year junior (age 8) 12107



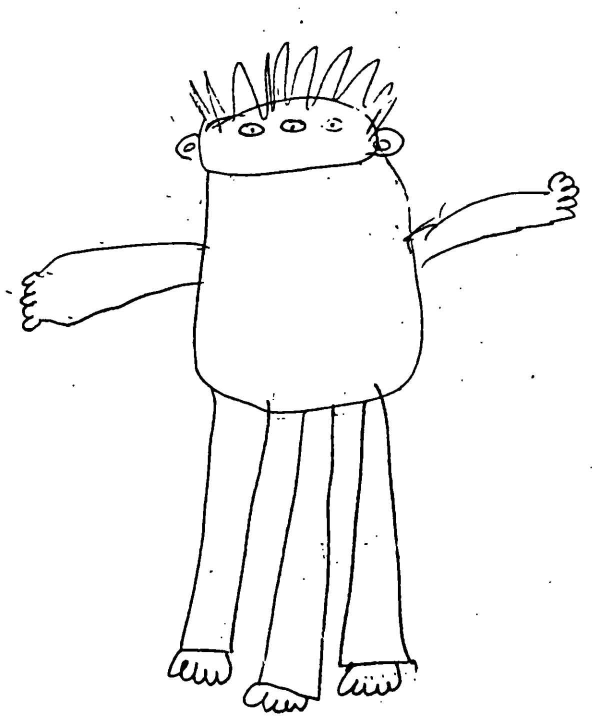
d) 2nd year junior (age 9) 75208



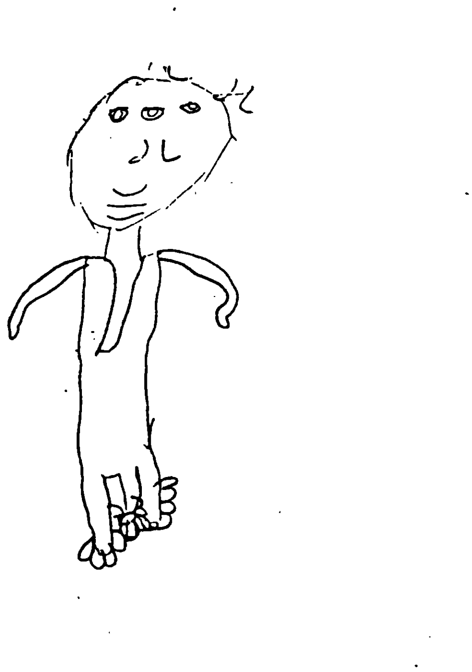
Score profiles for these drawings are shown in Appendix D4

Figure 6.2 : Examples of low scoring Prismon drawings

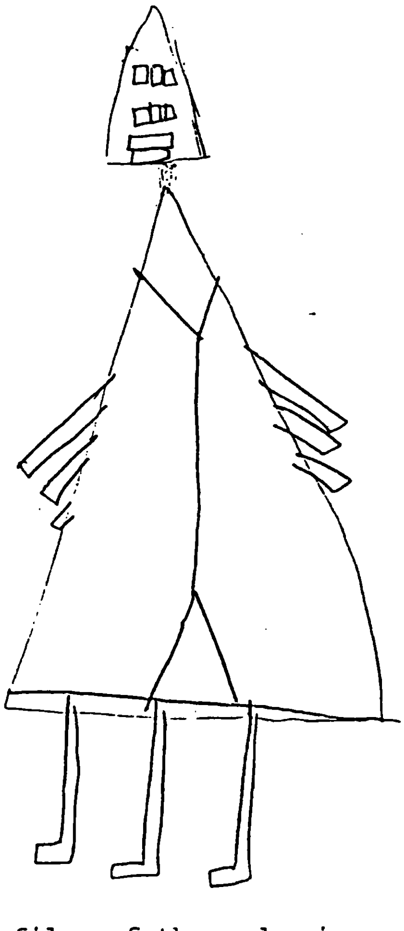
a) 3rd year junior (age 10) 85308



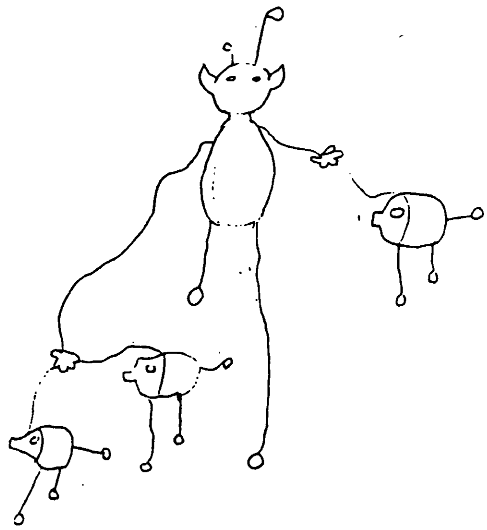
b) 2nd year junior (age 9) 42319



c) 4th year junior (age 11) 34401



d) 4th year junior (age 11) 71508



Score profiles of these drawings are shown in Appendix D4.

The first four of these sections were concerned with accuracy in reproducing the information provided in the descriptions and these could be summed to provide a total accuracy score. This score would provide some indication of a child's skill in organising and recalling information acquired by listening. The 'creativity' score provided a measure of the child's fluency in elaborating on the 'useful implements' theme provided in the descriptions. The 'humanness' score was expected to be inversely proportional to the accuracy scores since some features such as eyes or mouth could not count towards the accuracy scores if they were depicted as human features. The inclusion of human features such as hair, neck or clothing would not detract from the accuracy total, however.

Some examples of the children's drawings to illustrate these points are shown in Figures 6.1 and 6.2. Figure 6.1 includes examples of high scoring drawings all of which were accurate reproductions of the information in the descriptions. In addition, examples (b) and (d) achieved high 'creativity' or 'inventiveness' scores for their development of the fingers and toes. Figure 6.2 shows some low scoring drawings. (The score profiles for these drawings are marked with asterisks in Table 6.11.)

Two markers scored the drawings, although over two-thirds were marked by the same person. A random sample of 23 drawings were marked by both markers and intermarker agreement measured by product-moment correlations ranged from $r = 0.72$ to $r = 0.97$ (full list in Appendix D2). Comparison of the scoring criteria applied by the two markers indicated certain ambiguous points such as whether the ears were 'evenly spaced'. These criteria were subsequently excluded from the original sections and were incorporated instead into the 'details and context' section. The components of the final mark scheme are shown in Appendix D3. Table 6.1 shows the percentage of upper and lower juniors who satisfied the criteria for the listening accuracy sections of the mark scheme.

Table 6.1 : Percentage frequencies and content of mark points in Prismon task

mark point	Listening accuracy criteria	upper junior N = 294	lower junior N = 296	all N = 590[1]
ACCURACY (numbers)				
1	length (12cm/18cm)	28.9	22.6	25.8
2	3 eyes	87.9	93.6	90.3
3	3 ears	59.5	74.4	68.5
4	1 mouth	89.5	90.9	90.2
5	3 nostrils	85.4	90.9	88.1
6	3 arms	82.0	84.8	83.4
7	3 legs	86.7	93.9	90.3
8	6 fingers per hand: * 1 hand	3.4	11.5	
	* 2 hands	13.3	19.9	
	3 hands	66.0	57.8	61.9
	*4,5,6 hands	.3	1.3	
9	6 toes per foot *1 foot	4.8	6.1	
	*2 feet	10.9	13.9	
	3 feet	59.9	56.8	58.3
POSITION				
1	nostrils top of head	77.9	71.3	74.6
2	eyes top edge of head	24.5	9.1	16.8
3	arms at points or edges	41.8	30.1	35.9
4	legs at points or edges	35.7	25.0	30.3
SHAPE				
1*	head: circle/oval/curves	79.9	72.0	75.9
2*	parallel lines	76.5	68.9	72.7
3*	curves and p'llel lines	61.2	42.2	51.7
4	head: 3D cylinder	25.5	11.8	18.6
5*	body: triangle/angles	73.1	70.3	71.7
6*	parallel lines	68.0	59.1	63.6
7*	angles and p'llel lines	52.4	34.1	43.2
8	body: 3D triangular prism	27.6	8.8	18.1
9	mouth: hexagonal	48.0	54.1	51.0
10	fingers pointed	21.4	18.6	20.6
11	toes pointed	19.0	15.5	17.3
12	ears with earlids	48.3	54.4	51.4
13*	ear and earlid different	25.5	26.7	26.1
DETAILS and CONTEXT				
1	indication of texture	7.8	6.7	7.3
2	colour indicating context	20.8	49.7	35.4
3	other context indication	5.5	9.1	7.3
4	point for each of: 1	36.5	44.0	40.0
	extra 3/6 feature;) 2	18.4	20.8	19.6
	ears spaced; eyes) 3	6.1	3.0	4.7
	move; mouth size) 4	0.3	0.3	0.3
5	nostril stalks UJ: curly arms LJ	74.7	55.7	65.0
6	ears midline UJ: legs at angle LJ	22.9	45.6	34.3

1 10 missing cases (1.6%) throughout accuracy measures.

* Omitted from final score.

upper and lower junior percentage frequencies with which these features were drawn.

6.4 Age-group and accuracy

It was expected that the older children would obtain higher scores on the various accuracy measures (e.g. shape, position, numbers), and this was broadly confirmed in the frequencies reported in Table 6.1. The upper and lower junior frequencies are not directly comparable, however, since the upper junior version was longer and more detailed than the lower junior version. From the point of view of the teacher, however, which was an important consideration at the time of writing the Prismaston File, the use of two levels of difficulty seemed the most appropriate course of action. From the research point of view, however, it is clear that a single description or balanced design in which both descriptions were read to matched groups of upper and lower juniors may have been more appropriate. The adoption of two difficulty levels limits the age-based conclusions that can be drawn. Nevertheless, a linear positive relationship between age-group and accuracy does give a meaningful account of age-related improvement, since the scores of the older children presumably underestimate the scores they would have achieved had they heard the simpler version.

The majority of the children in both age-ranges drew the correct numbers of arms, legs, eyes etc. on the Prismon but the lower juniors were slightly more accurate (see Table 6.1). This could have been because this information was given within the first 100 words in the lower junior version, whereas the upper juniors had to listen to 200 words before hearing it. In both versions, however, this was the first 'drawable' information apart from the length of a Prismon, (which was not included in the accuracy of numbers measure).

Table 6.2 Year-group means for Prismon listening accuracy measures.

Measure	8+ [1]	9+	10+	11+	all	F
	lower junior version		upper junior version			
ACCURACY (numbers) (max. 12)						
mean	9.67	10.10	9.31	9.69	9.72	1.89 ns.
S.D.	2.55	2.50	3.31	3.33	2.94	
POSITION (max. 4)						
mean	1.21	1.48	1.61	1.97	1.58	10.12 ***
S.D.	0.98	1.09	1.18	1.43	1.19	
SHAPE (max. 6)						
mean	1.56	1.68	1.52	2.27	1.76	9.55 ***
S.D.	1.16	1.14	1.41	1.68	1.36	
DETAILS (max. 6)						
mean	2.68	2.57	2.24	1.26	2.44	3.35 *
S.D.	1.44	1.37	1.32	1.45	1.39	

* p < .05 ; ** p < .01; *** p < .001

N	126	179	135	150	590

* p < .05 ; ** p < .01; *** p < .001

[1] In all tables 8+, 9+, 10+, 11+ refer to 7 - 8 year olds, 8 - 9 year olds and so on in the first, second, third and fourth year junior groups respectively, where a 'school year' is taken from 1st. September to 31st. August.

Table 6.2 shows the means of the accuracy scores broken down by year group. There was no significant main effect of age group on accuracy in reproducing the correct number of features ($F = 1.89$, $p > .05$). The older children were significantly more accurate in recalling and reproducing the correct position and shape of the features ($F = 10.12$, $p < .001$; $F = 9.55$, $p < .001$, respectively). (The drawing of the correct shapes will be discussed below.) On the details measure, an increase with age was expected, but the reverse was found. This scale included indications of background colour, texture and 'camouflage' (see Figure 6.6), and details such as the size of mouth. It could be suggested that the older juniors reproduced fewer details because they had to listen to a much longer passage containing more (irrelevant) details.

The difference in difficulty between the two passages probably explains the apparent 'dip' in the means at the ten-plus level. Even so, the means obtained by the eleven-plus age-group are higher than would be expected if a constant increase existed from year to year-group.

6.5 The 'human-ness' scale and the effects of age-group

The Prismon drawings were scored on a number of points to show how many human features were incorporated into the drawings, and two examples of humanoid drawings are shown in Figure 6.4 (see profiles in Appendix D4). This was of particular interest where detailed descriptions of, say, the shape of Prismon features was not given (the eyes, for example); would the majority of children at a particular age substitute humanoid features, or would they adopt a 'draw an alien' approach and draw non-humanoid shapes, perhaps developing the basic Prismon theme of threes and sixes, hexagons and triangles?

Table 6.3 shows the relative frequencies on the 'human-ness' items for the upper and lower juniors and Table 6.4 shows the 'human-ness' means broken down by school year-groups.

Table 6.3: Percentage frequencies of inclusion of human characteristics in Prismon drawings

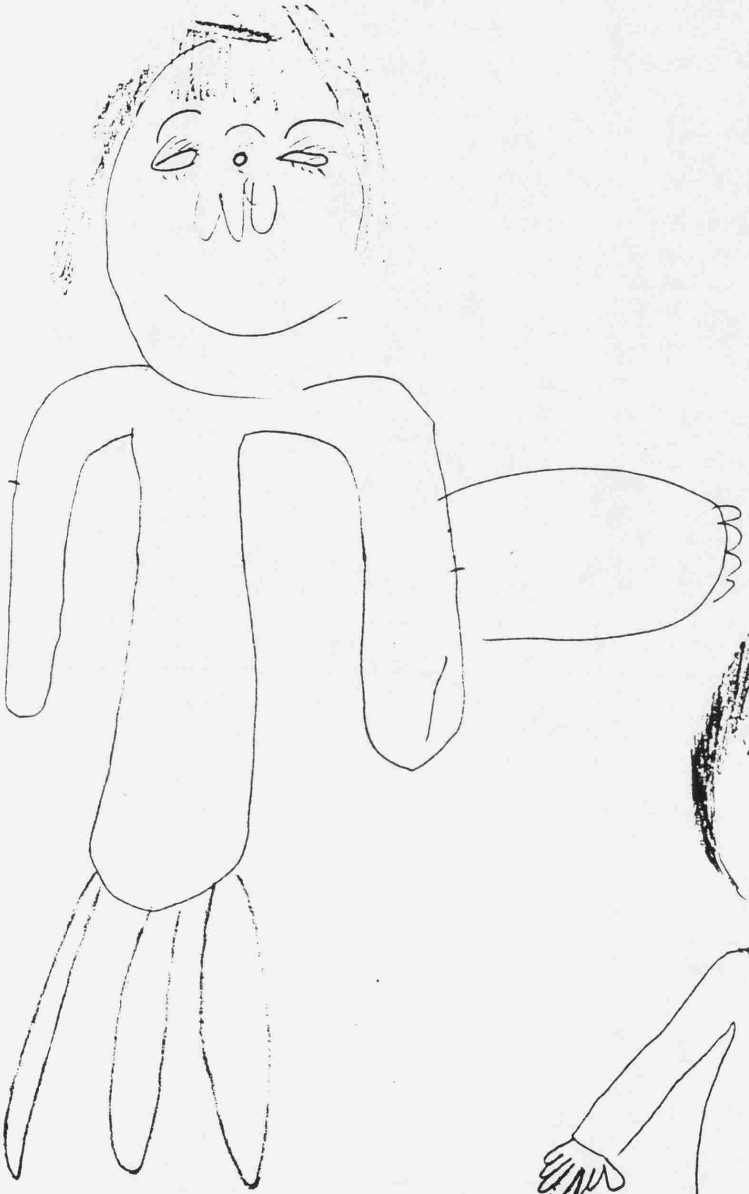
point	content	upper junior N = 294	lower junior N = 296	all N = 590
'HUMAN-NESS'				
1	human eye shape	31.0	22.0	26.4
2	eyelashes or iris included	59.5	64.9	62.2
3	nose in middle of face	21.8	9.1	15.4
4	ears single loop - human ears	20.7	31.8	26.3
5	human shape mouth; teeth	30.6	23.0	26.8
6	hair	9.2	8.8	9.0
7	neck	16.3	9.1	12.7
8	clothing - buttons; belt	13.9	11.1	12.5
9	arms with elbow	30.5	0.0	30.5
10	human hands and fingers	42.5	31.4	36.9
11	legs	20.2	3.3	12.1
12	toes/feet	52.7	37.8	45.2
13	No humanoid features included	5.1	7.8	6.5

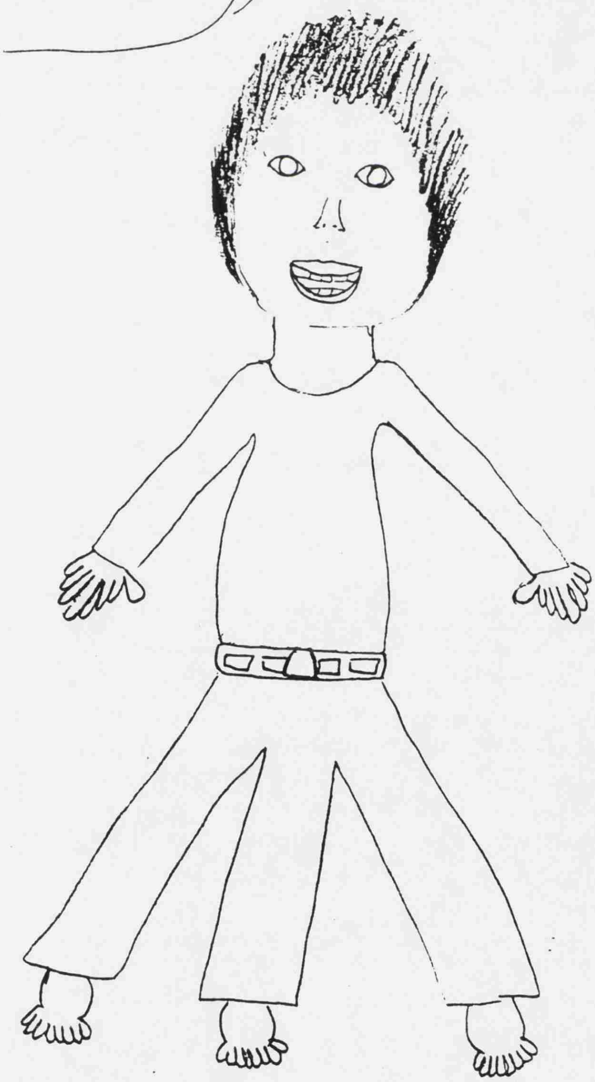
Table 6.4 'Human-ness' scores broken down by yeargroup.

'HUMAN-NESS'	8+	9+	10+	11+	ALL
mean	2.64	2.52	3.40	3.38	2.98
S.D.	1.61	1.47	2.14	2.34	1.92
N	126	179	135	150	590
F	$F = 8.57$	$.01 > p > .001$			

Figure 6.3 : Examples of Prismon drawings with high 'human-ness' scores

a) drawn by a 3rd year junior (age 10) 44310





b) Drawn by a 4th year junior (age 11) 15403 broken down by year group. It was expected that younger children would include more humanoid characteristics in their drawings as substitutes for unrecalled features, or for those not described in detail in the passage. Older children might have been expected to be more independent of any such 'human' schema.

It was surprising therefore to see in Table 6.4 that the 'human-ness' means increased with year-group. This can be accounted for in part by the fact that if high Prismon accuracy scores were obtained, certain human features or characteristics were precluded. On the other hand, most of the humanness points were for e.g. the shape of the eyes, ears, legs and the addition of hair or clothing about which no information was given, and so these two scores are not particularly interdependent. There remains a possibility that the 'human-ness' was a form of camouflage since the descriptions stated that the Prismons could adapt their appearance to their surroundings, but one would need to ask the children to confirm this.

Table 6.3 shows that the older children included more humanoid features on three quarters of the scoring points. The last 'humanness' variable denotes the small percentage of children who did not include a single humanoid feature; in both groups this figure is less than 10 per cent, but on the other hand. apart from the inclusion of eyelashes or an iris, almost all of the other 'human-ness' frequencies are below 40 per cent. In particular, more of the older children drew human eyes, noses, mouths, perhaps with teeth, necks, hands, feet and legs.

The development of human figure drawing in children is very precisely documented in the norms for the Draw-a-Person test (Goodenough, 1926; Harris, 1963) such that one can normatively expect a specific proportion of children at a particular age to draw human figures with or without certain parts of their anatomy. The fact that necks form part of the schematic plan for drawings of people and that children of this age tend to reproduce such schemes, leads to the expectation that necks would be included in the Prismon drawings most recently 'discovered' that they possess a neck-drawing strategy, to use the 'new' skill and so include, say, a neck, in the Prismon drawings. The older children, on the other hand, were expected to have gone beyond the stage of always employing their schematic repertoire and to be able to adopt the 'frame' of 'draw an alien' more readily. Thus the direction of the 'human-ness' means and frequencies was surprising. It may be that expectations based on drawing norms were inappropriate here, and that the substitution of humanoid features represented a response to a demanding listening task.

To summarise the results of this listening task, the oldest children were the most successful in reproducing accurately aspects of shape and position, but were the least accurate in including details and were more likely to incorporate humanoid characteristics in their drawings.

6.6 Drawings of three-dimensional shapes: the effects of age-group

The development of the ability to draw three dimensional objects is also well documented (see e.g. Freeman 1980, Cox 1986). Willats (1977) made a detailed study of drawings of a table with objects on it by children aged five to sixteen years, and identified six stages of perspective drawing. This task was a very complex one, however, and Cox (1986) reported the simpler task of asking children to draw a cube from a model. Cox (1986) presented a cube so that only its front and top faces could be seen. She compared the drawings of seven-year-olds, twelve-year olds and adults in two conditions (i) when subjects were asked to draw what they could see and (ii) when their attention had been drawn to the fact that they could only see two faces of the cube. The effect of the instruction given in the second condition had the most pronounced effect on the twelve year olds. Many had attempted 'standard' oblique views of a cube in condition (i), but in condition (ii) 90 per cent drew two-section views. Cox pointed out a that developmental trend exists in the way the top face was drawn. The majority of seven year olds produced perpendicular parallel lines; the twelve year olds drew parallel oblique lines; and the adults drew converging lines.

In the present task, the inclusion of a 'triangular prism' (likened in the description to a 'well-known type of chocolate packet') and a cylinder in the Prismon drawing presented a potentially interesting problem. These solid shapes were to be drawn from memory; the lower juniors were given an example of a cylinder to remind them of the shape but the older juniors were expected to be familiar with this shape. The following simple criteria were used to record the children's attempts to draw the shapes. One point was awarded for an ellipse, a circle or curved lines: one point for parallel lines, and a third point was gained if parallels and curves/circles were combined. A fourth point was awarded for the drawing of a successful cylinder. A similar system was used to code attempts at a triangular prism as shown in the mark scheme (Appendix D1). Figures 6.4 and 6.5 show examples of these approximations to the final shapes and the scoring system which was used is shown in Appendix D4.

The frequencies in Table 6.1 show that 70 per cent of both age groups included the correct basic components e.g. a circle/ellipse or triangle and that over 60 per cent included parallel lines. Only 42 per cent and 34 per cent of the younger group managed to combine the circle and triangle, respectively, with the parallel lines in an attempt at a three dimensional drawing, whereas 60 per cent of the older group attempted a cylinder and just over half attempted a triangular prism. These figures have a significance for this task as a listening rather than a drawing task, since they indicate a recognition of the shapes involved but limited strategies for drawing them. Successful three-dimensional shapes were achieved by only a quarter of the older children and about a tenth of the younger group.

An analysis of the relationship between age and the ability to draw a successful version of these shapes is shown in Table 6.5 which shows the percentage of the children in each junior year group who drew particular approximations to the cylinder and triangular prism. Chi-squares were carried out on the frequencies. Categories 2 and 3 of the scoring schemes were combined to satisfy the minimum expected frequency requirements of the chi-square statistic. There were significant progressions with age-group from drawing a circle to drawing a cylinder (chi-square = 56.09; df = 6; p < .001; N = 558) or a triangle to drawing an accurate triangular prism (Chi-square = 78.26; df = 6; N = 537; p < .001).

Table 6.5: Attempts to draw a cylinder and a triangular prism: showing relationship with age-group

Approximations to cylinder (N)	Percentage of children in each age-group 8+ (122)	9+ (176)	10+ (122)	11+ (138)	all (558)
circle/oval/curves	63.1	46.6	30.3	28.3	42.1
circle and parallel lines	25.4	41.5	48.4	38.4	38.7
cylinder	11.5	11.9	21.3	33.3	19.2

Chi-square = 56.09; df = 6; p < .001
42 cases failed to meet any of these shape criteria.

Approximations to triangular prism (N)	percentage of children in each age-group 8+ (122)	9+ (168)	10+ (118)	11+ (129)	all (537)
triangle	71.3	55.4	43.2	30.2	50.3
triangle and parallel lines	23.8	33.3	33.9	27.9	30.0
triangular prism	4.9	11.3	22.9	41.9	19.7

Chi-square = 78.29, df = 6, p < .001
63 cases failed to meet any of these shape criteria.

Figure 6.4 : Examples of attempts to draw a triangular prism and a cylinder

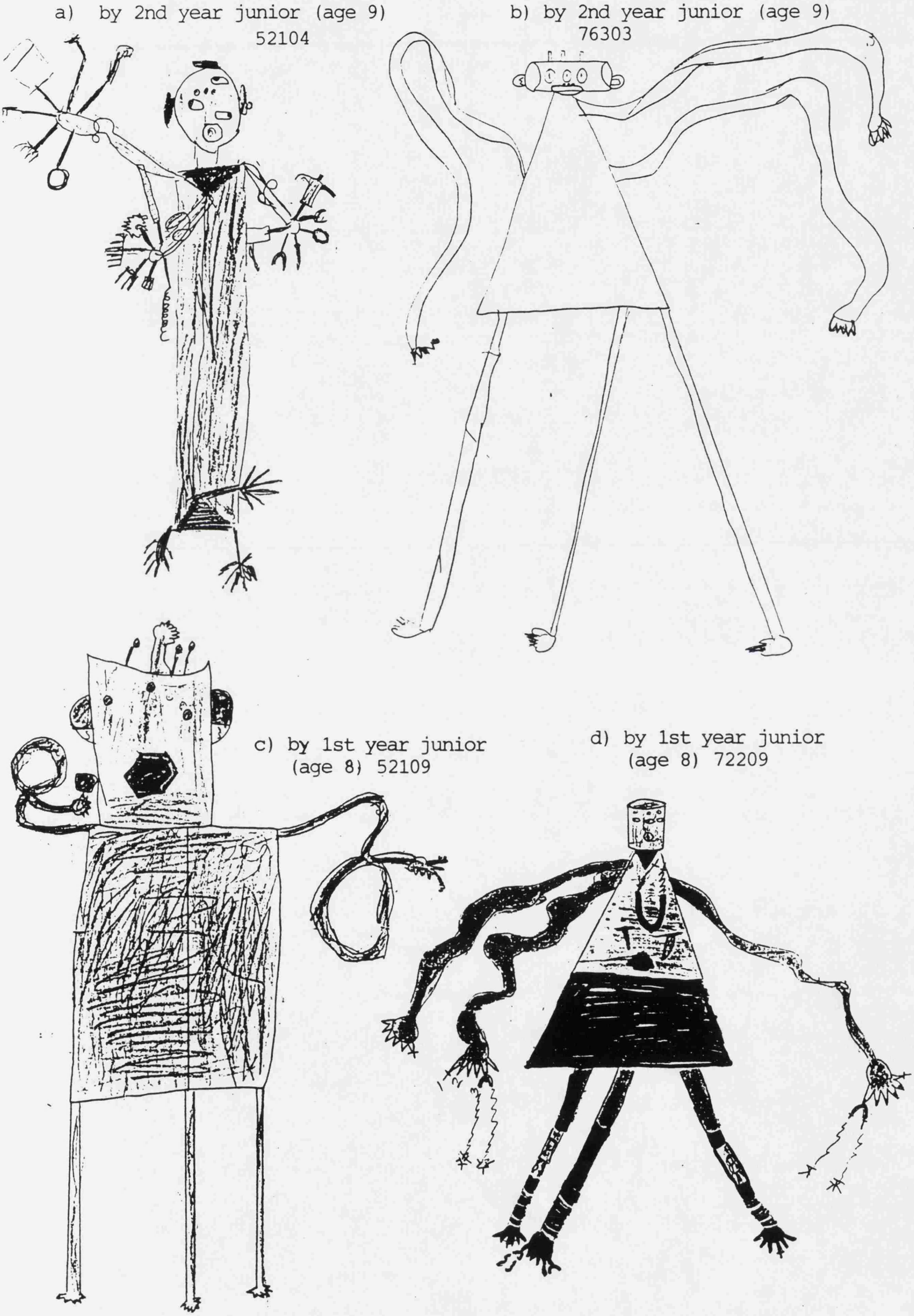
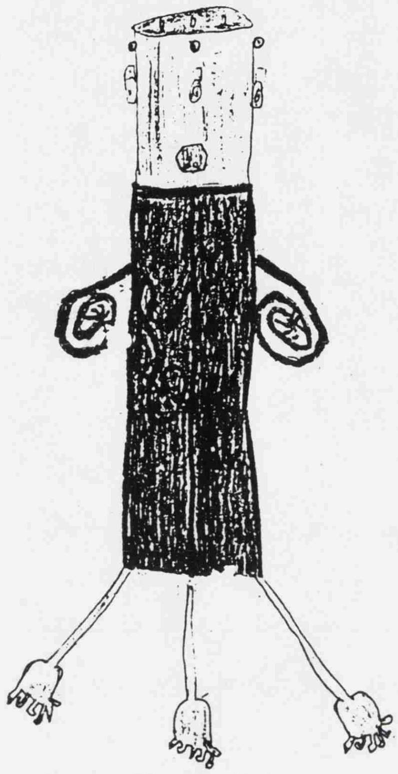


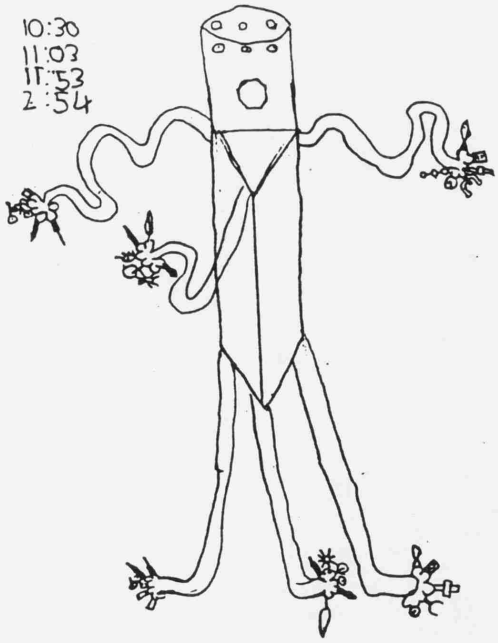
Figure 6.5 : Further examples of attempts to draw a triangular prism and a cylinder in two dimensions

a) by 1st year junior (age 8) 33204

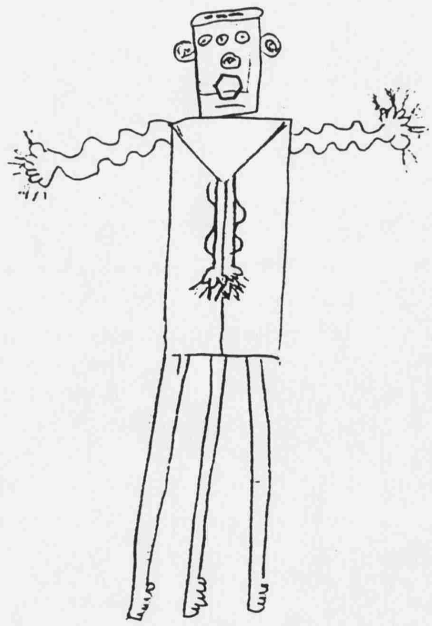
b) by 2nd year junior (age 9) 33206



c) by 2nd year junior (age 9) 75206



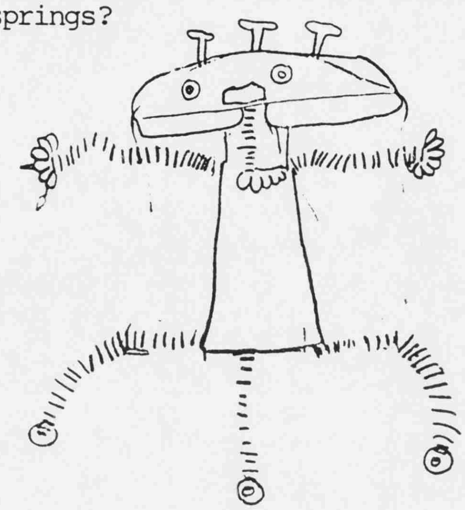
d) by 2nd year junior (age 9) 53102



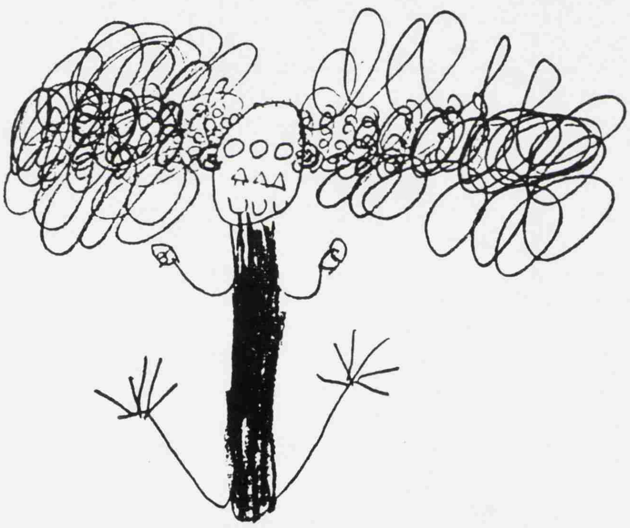
Score profiles for drawings in figures 6.4 and 6.5 are shown in Appendix D4.

Figure 6.6 : Examples of Prismon drawings which appear to indicate some 'camouflage' or context

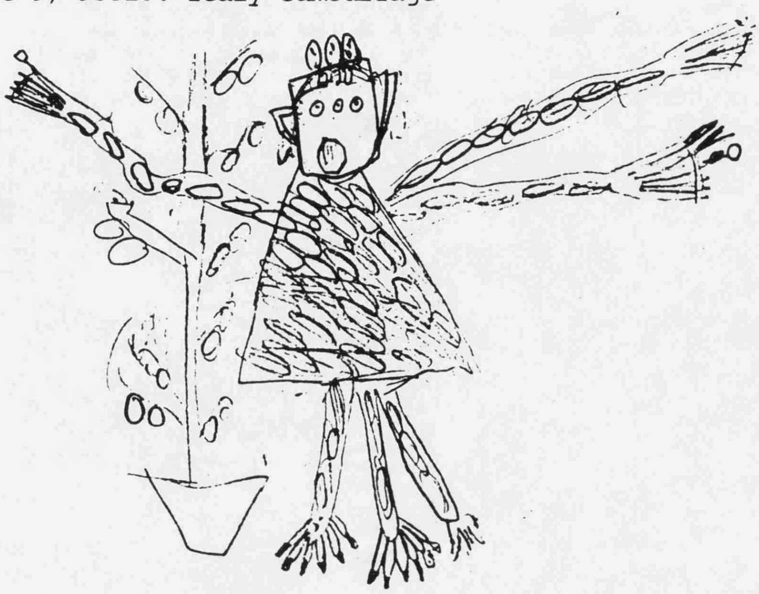
a) by 2nd year junior (age 9) 54110: springs?



b) by 1st year junior (age 8) 95310: batteries and wires? string?



c) by 2nd year junior (age 9) 93310: leafy camouflage



6.71 Finger and toe tips

The description of the Prismon informed the children that it could grow useful tools as finger and toe-tips, according to its interests. We shall consider the suggestions for such tools that were given in the descriptions before going on to the children's own ideas. Three suggestions (paintbrush, screwdriver, pencil) were made in the lower junior version and the same three with four more suggestions (spanner, knife, fork, spoon) were made in the upper junior version. The percentage frequencies with which the children did actually include these tools in their drawings are shown in Table 6.6. 37 per cent of the upper juniors and 42 per cent of the lower junior did not include any recognisable given finger tips in their drawings, whilst 9 per cent and 18 per cent of the upper and lower juniors respectively included all of the suggestions in the version they had heard.

Table 6.6a Percentage frequencies of Prismon finger-/toe-tips

point	content	upper junior N = 294	lower junior N = 296
Fingertips given in both versions		per cent	per cent
1	paintbrush	44.0	43.3
2	screwdriver	33.1	35.6
3	pencil	39.2	43.3
Fingertips given in upper junior version			
4	spanner	28.0	
5	knife	47.8	
6	fork	47.4	
7	spoon	46.1	

6.72 The 'creativity' measure: invented fingertips

The children were invited to elaborate on their drawings by inventing more ideas for useful Prismon finger tips. The frequencies in Table 6.7a show that about 50 per cent of them did invent at least one extra fingertip. The frequencies appear to show that the younger children were more inventive than the older group in that a lower proportion of them (48.3 per cent) failed to invent any new fingertips. This allows for the 25 per cent of the older children who included six or seven of the suggested tips, thus reducing their scope in the number of 'spare' fingertips available for modification. More of the lower juniors (6.6 per cent) invented over ten fingertips, than did the upper juniors (2.6 per

Table 6.7a: Percentage of children who invented shown number of finger-/toe-tips after hearing upper or lower junior version (excluding given and repeated ideas).

total invented tips drawn	upper junior	lower junior
0	54.6	48.3
1 - 5	37.5	34.2
6 - 10	5.4	10.7
11 or more	2.6	6.6

Table 6.7b Mean number of invented finger-/toe-tips broken down by age-group

Invented tips	8+	9+	10+	11+	ALL	F
N	126	179	135	150	590	
mean	2.18	2.86	1.63	1.73	2.15	
S.D.	4.78	4.27	2.76	2.80	3.77	3.61*

* $.05 > p > .01$

cent), but only 2.8 per cent of the whole sample invented more than 15 new tips. The highest number of invented finger- and toe-tips was 18 by an upper junior and 30 by a lower junior.

The means for each school age-group are shown in Table 6.7b. It is clear that of those who heard the lower junior version of the description, the second year children invented more fingertips on average that the first year children. Similarly the fourth year children invented more fingertips on average than the third year children.

6.8 Inter-relationships between the Prismon measures

The inter-relationships between the various aspects of the drawing, such as shape, position and accuracy in numbers, were examined by means of product-moment correlations within each age-group.

6.81 The Accuracy measures

Table 6.8 shows that the majority of the Prismon accuracy measures exhibit significant positive intercorrelations as expected. It is noticeable that this is particularly true for the third and fourth year juniors, i.e. those who had heard the more difficult description. At first year level, the coefficients are lower and those involving the 'details' scores are not significant. One possible explanation for this is the order in which the information was given; the numbers, position and shape information appeared sooner in the lower junior description, than in the upper junior version. In the latter, although the general order was the same, the information comprising the details score (e.g. nostrils on stalks, size of mouth) was interspersed with the basic information to a greater degree.

Table 6.8 Correlations amongst accuracy measures for each age group

age-group (N)	numbers position	numbers-shape	numbers-details	shape-position	position-details	shape-details
8+ (126)	26**	28**	14	29***	10	14
9+ (179)	20**	31***	16*	35***	14	26***
10+ (135)	40***	43***	48***	47***	50***	45***
11+ (150)	49***	46***	48***	50***	33***	39***

* p < .05 ; ** p < .01; *** p < .001

6.83 Human-ness, accuracy and ideational fluency

It was explained earlier that a negative relationship was expected between the Prismon accuracy scores (numbers, position, shape) and the 'human-ness' scale. The results in Table 6.9 show slightly negative, near zero correlations throughout the range of measures for the first three year groups. Significant negative coefficients between the human-ness and accuracy measures appear at fourth year level. This pattern gives some support to the idea expressed earlier that the older children might be more likely to adopt a 'draw an alien' frame than the younger children who might still be locked into human figure drawing routines. At the same time, however, it conflicts with the evidence in Tables 6.3 and 6.4 which show higher 'human-ness' scores for the older children. Taken together these results suggest that a larger proportion of older children were more likely to include humanoid features and were less accurate in reproducing the correct Prismon features than the younger children, but that those who <u>were</u> accurate elaborated the theme without humanoid features where information was not supplied. There is no evidence for a predicted significant negative relationship between the fingertip fluency scores and the humanness scores however, although the correlations are in the expected direction.

Table 6.9: Relationships between 'human-ness' scale and accuracy measures for each year-group

Age-group (N)	Correlations between 'human-ness' and:					
	numbers	position	shape	details	ftips(gvn)	ftps(inv)
8+ (126)	04	-21*	-18	05	-14	-14
9+ (179)	02	-09	-10	-06	-08	-06
10+ (135)	-02	-13	-16	-08	-03	-02
11+ (150)	-28***	-26***	-30***	-11	-20*	-14

* p < .05 ; ** p < .01; *** p < .001

6.84 Accuracy and invention

Table 6.10 shows the inter-correlations between the accuracy scores and the number of invented finger-tips and toe-tips. These correlations were performed to determine whether the same children whose drawings were accurate translations of the information given also invented more finger- and toe-tips. The positive correlations in Table 6.10 generally support this hypothesis, although since as many as 40 per cent of the children did not draw any modified fingertips, these results might arise from the number of children who were neither accurate nor inventive (Tables 6.6 and 6.7). At second year level, the high and significant correlations together with the mean number of invented tips for this age group (see Table 6.7b) might suggest that at this age, the passage presented was of optimum length to permit retention of all given aspects of the drawing, whilst the children's drawing skills permitted them to draw the Prismon and remain sufficiently motivated to include the details and to invent fingertips.

Table 6.10 Correlations between number of invented finger-tips and toe-tips and accuracy scores for each age-group

age-group	Correlations between invented finger-and toe-tips and:				
(N)	numbers	position	shape	details	ftip(givn)
8+ (126)	26**	16	18*	10	49***
9+ (179)	20*	23**	29***	56***	55***
10+ (135)	08	22**	17*	22**	26**
11+ (150)	22**	19*	15	19*	54***

* $p < .05$; ** $p < .01$; *** $p < .001$

These figures are based on the whole range of each value. We shall look finally at the mark profiles of high and low scorers on the 'draw-a-Prismon' task.

6.9 'Draw-a-Prismon' task: mark profiles

The discussion of the Prismon drawing and listening exercise so far has been conducted in terms of separate sets of scores for different aspects of the task. Although an overall score for the Prismon drawing can be obtained easily, a single score gives no information about its constituents. For this reason, profiles giving the score on each separate measure are more informative and were used to provide results for the teachers. For the present purpose we shall consider the profiles of the extreme groups. Table 6.11 shows a set of profiles for children whose overall Prismon score was in the top 5 per cent (38 or over) or the bottom 15 per cent (12 or less:) (inspection of the drawings in the bottom 5 per cent (6 or less) revealed that a number were probably unfinished). The profiles show the number of criteria met under each heading, and from left to right the columns are:

1 pupil identification;

2 pupil's year-group;

3 NUMBERS: of limbs and features;

4 SHAPE: including the total scores for successful drawings of three-dimensional shapes; the approximations would be examined separately;

5 POSITION: the position of the Prismon's limbs and features. It should be noted that this scale included only four mark points and was the least reliable in the inter-marker comparison;

6 DETAILS: include e.g. 'curly arms', or indications of a background and 'camouflage' (see example in Figure 6.6 of a 'leafy Prismon' beside a plant);

7 FINGERTIPS: inclusion of suggested fingertips only;

8 TOTAL ACCURACY: i.e. the sum of the scores on numbers, shape, position details and (given) fingertips.

Table 6.11 : Prismon drawing profiles

High scorers (Accuracy + Invention > 37)

ID	year	nos. (12)	shape (6)	posit'n (4)	details (9)	f-tips given (7)	total accuracy (36)	invent'n (36)	human-ness (12)
10105	4	10	4	1	3	7	25	7	3
18208	4	12	4	4	3	6	29	10	0
27303*	4	11	3	4	4	7	29	18	6
21304*	3	12	6	4	5	6	33	5	2
15302	3	11	2	4	3	6	26	7	2
17107	3	10	2	4	5	7	27	5	4
41118	2	12	5	2	1	4	24	28	5
43313	2	12	2	1	3	6	22	12	0
75208*	2	11	3	3	2	3	22	18	1
12107*	1	12	5	4	6	4	31	11	0
99203	1	12	2	2	4	3	23	15	3

Low scorers (Accuracy + Invention < 13)

ID	year	nos. (12)	shape (6)	posit'n (4)	details (9)	f-tips given (7)	total accuracy (36)	invent'n (36)	human-ness (12)
26302	4	8	0	1	3	0	12	0	2
44309	4	8	1	0	0	0	9	0	6
34401*	4	3	0	0	0	0	3	0	1
42319*	4	4	0	1	0	0	5	0	5
71508*	4	1	0	1	1	0	3	0	4
85308*	4	4	1	0	0	0	4	0	3
10108	3	7	1	1	2	0	11	0	4
34404	3	4	1	3	0	2	10	2	4
54103	3	6	0	1	2	1	10	0	4
76408	3	5	0	2	2	0	9	0	1
19102	2	3	0	1	1	3	8	0	1
35306	2	3	2	0	1	0	6	0	6
93319	2	5	1	1	2	0	9	1	1
33205	1	8	0	0	3	0	11	0	2
36209	1	8	0	1	0	0	9	0	1
53101	1	5	2	2	2	0	11	0	2
73202	1	6	0	0	4	0	10	0	7

* Indicates drawings reproduced in text.

9 INVENTION: number of invented finger or toe-tips;

10 'HUMAN-NESS': number of humanoid characteristics such as hair, eyes with pupils; clothing.

The totals possible for 'total accuracy' and 'invented fingertips' are both shown as 36. If, however, a child included all seven given ideas, this would limit the number of 'spare' tips to 29 (if six fingers/toes had been accurately assigned to each hand or foot.) Conversely, if the child had invented 36 new tips, then their given fingertips score would be zero. Comparison of the profiles of high scorers and of low scorers shows clearly that the high scorers were both more accurate and invented more fingertips, whereas the low scorers generally added no new fingertips and rarely included any given ideas. The frequencies for the invented fingertips in Table 6.7a show, however, that only about half the children invented any new fingertips, and only a tenth invented more than six.

Summary and Conclusions

The 'Draw-a-Prismon' listening task was introduced as a means of assessing children's listening skills through recall rather than recognition and without requiring a written response. The drawing response made it possible to assess their attention to main points as well as details. The main points of the descriptions which were read to the children included aspects such as the number of limbs and the shapes of the parts of the Prismon. Over three-quarters of the children throughout the junior age range reproduced these main features accurately although the children in the 10-plus and 11-plus age groups were more accurate in their reproduction of the shape and position of the Prismon limbs. It was acknowledged, however, that this might result from their better knowledge of shapes, and a significant improvement with age was shown in the drawing of three-dimensional shapes.

An analysis of the children's attempts to draw the three-dimensional shapes revealed that only about one quarter of the older children (10-plus) and about a tenth of the younger children could draw a cylinder or a triangular prism successfully. Since over 70 per cent of both the upper and lower juniors included a circle or a triangle in their drawings of the head or body respectively, however, and over a half and a third of the upper and lower juniors respectively combined these basic shapes with parallel lines in an attempt to draw the three-dimensional shape correctly, it is clear that a large proportion listened to and recalled the information accurately. Their representation of it was limited by inadequate drawing strategies.

It was surprising to find that the younger age-groups included more details accurately in their drawings and elaborated them to a greater extent in terms of extra finger-tips. More of the older children included humanoid features and this had not been expected, but it was suggested that they may have responded to the over-demanding listening task by making these substitutions.

Finally profiles were presented to show the children's marks in the different aspects of the task. Profiles such as these would be of most use to the teacher in adapting a task of this sort, and this theme will be taken up in Chapters 8 and 9.

CHAPTER 7

The map-making and bar-chart tasks

General introduction

This chapter is about two more tasks from The Prismaston File which employed graphic display of information and which required the children to generate their own responses, rather than merely to respond to multiple choice items. Both tasks concerned children's journeys from home to school. The lower juniors were asked to draw a picture or plan to represent their home-school journey. The upper juniors were asked to conduct a survey of how ten children had travelled to school that day, and to construct a bar-chart to show the results. Both tasks involve the conversion of information from one medium to another and would BOTH, therefore, be considered examples of mapping in the PRISMS curriculum codings. The lower junior task involves conventional, geographical mapping and so the term will be used in that sense throughout this chapter, unless it is stated otherwise.

Both tasks are tests of graphicacy, which has been a neglected aspect of the primary curriculum, and so the chapter will begin with a brief introduction to graphicacy. The chapter will concentrate almost entirely on the lower junior mapping task, which is representative of a relatively new field in primary education, and will begin with a review of the associated literature. The upper junior bar-chart task is a more common feature of primary work, however, and its results will be presented very briefly at the end of the chapter.

7.1 The importance of graphicacy

Balchin (1962) introduced the term 'graphicacy' to cover the wide range of activities which involve the understanding and production of spatial and graphic arrays in the presentation of information. The traditional curriculum, which emphasised literacy, numeracy, and to a lesser extent, oracy, was considered unbalanced in that it omitted this vital means of information exchange, thereby not only ignoring a whole sphere of intellectual activity, but perhaps also the dominant mode of thought for many children.

Graphicacy had a wide scope in Balchin's original view, taking in all forms of graphic, or spatially dependent arrays. It included the construction and interpretation of graphs, drawings, diagrams, and maps, as well as signs and symbols. It would seem that some recent developments have increased the opportunities for children to practise graphicacy: the use of 'turtle' graphics and logo in primary computing studies; the introduction of technology; and the requirement to include science, art and geography in the curriculum provide for more graphic presentation of information.

The same imbalance can be seen in much of the study skills literature which tends to emphasise advanced reading skills, although some writers take a wider view e.g. Tonjes and Zintz (1981). Nevertheless, far more time and effort is currently devoted to the research and teaching of literacy, and than towards the production and understanding of graphic displays. Research on visual imagery has enjoyed a renaissance in cognitive psychology however, and spatial cognition is included in recent 'multiple intelligence' theories (e.g. Gardner 1983, 1985). This has not as yet impinged upon educational circles, except perhaps in geography where the use of cognitive maps has recently been encouraged at primary level.

7.21 Cognitive maps: Literature review

In 1978, Catling published an article entitled 'Cognitive mapping exercises as a primary geographical experience' which, as its title suggests strongly advocated the inclusion of cognitive mapping in the primary curriculum. Catling suggested that teachers should encourage children to produce cognitive maps which he defined as freehand memory maps to represent the locality of their school, regular journeys, areas visited on outings and so on. These freehand memory maps are referred to as cognitive maps in the geographical literature, although the term was originally used by the psychologist Tolman (1948) to refer to hypothetical internal representations of mazes by rats who could find their way, not only around the mazes, but also across them, 'inventing' short cuts.

In drawing a cognitive map, the child has to externally represent his or her internal image of an area too large to be seen either from above or all at once. The child has to devise strategies for the representation of:

orientation:

which viewpoint to adopt and how the buildings etc. will look from that viewpoint. Convention requires a vertically overhead viewpoint for every point on the map, i.e. a coordinated network of vertical viewpoints. For the child this means that any developing sense of perspective in drawing has to be ignored;

scale:

how much to reduce the features of the landscape and how to represent them in proportion to each other;

selectivity:

which landmarks to include and what degree of detail to adopt;

symbols:

whether to devise and use symbols in place of accurate representations of landmarks and landscape features.

During the 1970s, research on cognitive maps burgeoned in both psychology and geography, stimulated by the debate between constructivist views of the development of mapping skills, represented by Piaget and others (e.g. Piaget and Inhelder, 1956, Shemyakin, 1962, Siegel et al., 1978) and incrementalist views, represented, for example, by Downs and Stea (1977).

The former view is that cognitive mapping skills develop in a series of qualitatively different stages such that mapping becomes increasingly integrated and abstract, shifting from a personal, self-oriented frame of reference to an independent, outside-oriented frame of reference. The incrementalist view, on the other hand, takes a quantitative approach. This acknowledges age-related changes but does not specify qualitative differences between different stages of development; rather, it explains advances in mapping skills as the result of differential learning opportunities.

Studies such as that of Matthews (1984a), which will be described in more detail later, have contributed to both sides of the debate. Longitudinal studies, such as the work of Feldman (1980) may provide one resolution of the issue in that they ensure that sequence is not confounded with age-group, as is inevitable in cross-sectional studies. Meanwhile, experimental studies of mapping tasks which involve the provision of a logical context, and/or active involvement on the part of the child result in more advanced skills than stage theories would suggest (e.g. Brown and Lawton, 1975; Herman and Siegel, 1978). These psychological and experimental studies, and Piaget's original research, will be described next, and then the

the educational context of geography at primary level will be described to set the scene for the present study.

7.22 Piaget's model village study

An influential study of children's attempts to draw or reconstruct a plan of a model village was carried out by Piaget and Inhelder (1956). One might expect the problems of orientation, scale, symbolic representation and selectivity to be reduced if the child was asked to draw a plan of a model landscape. Surprisingly, however, the drawings produced from memory of life-size districts have very similar characteristics to those produced from miniature landscapes.

Piaget and Inhelder's (1956) study included a hill, a stream, two different houses, a few trees and a bridge arranged in a village layout, which could be varied in complexity. The children were asked to draw a plan of the village on paper, and, in the case of the younger children, to reconstruct it using identical models. Piaget and Inhelder identified four stages through which children typically passed in carrying out this task.

The first stage, typical of under four year olds, was characterised by the phrase, 'No spatial correspondence except for a few elementary proximities'. Conventionally significant features such as the hill or bridge were often omitted; the houses were drawn iconically, as they would appear in a picture, in spite of the use of a bird's eye viewpoint, and the spatial arrangement of the landscape features in terms of front-to-back and left-to-right positions, as well as the distance between features, appeared to be disregarded. When asked to reconstruct the model layout using identical pieces, however, the children at this stage were more accurate: some were able to show 'nextdoor to' relationships.

In the second stage of 'partial coordination', the 4 to 7 year olds were still only able to coordinate small groups of objects, and most had a 'timorous attitude towards the empty space' (i.e. on the paper or the table). Piaget writes,

> '..It is astonishing to observe the difficulty which the children experience at the beginning of this stage in using all the space at their disposal... In the drawings the effect is even more noticeable...since the child arranges the items either in a straight or curved line, or else spreads them over the entire sheet and leaves large spaces between them' (p.435).

This difficulty was attributed by Piaget and Inhelder to the stronger influence of perceptual over operational factors, coupled with a need for cohesion amongst the elements of the display. Extracts from individual case studies provide extra insights into individual strategies and problems with the task. At least one six year old child was aware that what he had drawn was not equivalent to what he saw: when questioned he reported that he would have had 'to pierce the paper' to draw the tree behind the house; he 'wanted to draw the whole house and church, as you see it, complete', although he had stated that he could see only the roof from above.

Children of 7 or 8, however, were found to draw maps which showed the 'Beginning of general projective and Euclidean coordination' (Substage IIIA). These children could make a correspondence between two dimensions on the model and on the paper, incorporating depth and left-right relationships correctly, depending on the given point of view. They had begun to differentiate between a bird's eye view of a house and one from 45°.

By 9 to 10, (Substage IIIB), further developments in the 'Mastery of distances and proportions', were identified. The children had begun to make more accurate representations of distance and scale. Careful account was taken of relative distances and the buildings were scaled down to more appropriate relative sizes.

It was not until the age of 11 or beyond, in the fourth and final stage ('The abstract plan with metric coordinates') that 'a ...transition from natural to conventional, or rather, from physical to abstract coordinates is once more apparent' (p. 445). Children at this stage could set up axes, e.g. by folding the paper into four, and locate the objects by means of coordinates. They took account of the distances between the objects, many children measuring the distances and scaling them down precisely. They used rectangles and squares in scale to represent the houses.

Piaget and Inhelder's descriptions have not been challenged as accurate observations of the maps children typically produce. Subsequent research on the development of mapping skills, however, has examined the role of experience, action and context and has challenged some of the developmental assumptions in Piaget's explanations and judgements.

7.23 The incrementalist view

The incrementalist view is put by Downs and Stea (1977) for example. In contrast to Piaget's judgements of the maps made by younger children in terms of their inadequacies, Downs and Stea focus on the spatial achievements of young children. They argue, for example, that three to five year olds could make primitive mental maps by arranging a set of small toys on a large sheet of paper. Referring to a study which separated internal from external representations, they report that 6 year olds could not only recognise and interpret aerial photographs, but could also identify houses and roads, trace them, name the shapes drawn on the tracing after the photograph had been removed, colour code the shapes, and draw a pencil route over roads connecting two widely separated houses (Blaut and Stea, 1971, 1974).

Downs and Stea expressed the view that...'despite Piaget and Inhelder's plausible arguments, the child's struggle to attain Euclidean functioning is only an assumption. .. (which shows that)...culture exercises an irresistible power over the course of cognitive development and learning, since our culture's geometry is fundamentally Euclidean' (Downs and Stea, 1977, p. 198).

Downs and Stea consider that young children's cognitive development and environmental learning are in fact much more advanced than is generally thought, but that these skills are untapped because the opportunities to demonstrate and further develop them are not available. Whilst acknowledging that maturation and development lead to increases in ability, they suggest that society, whilst on the one hand dictating 'what is to be required' of a learner, on the other hand ...' determines when, how and under what circumstances an individual is permitted to experience the things of which he is now capable. Thus while a person cannot be required to do that which he is not yet able, he can be prevented from experiencing that of which he is capable' (p.208).

7.24 The importance of context and action

In the area of environmental cognition, the experimental evidence used to support the incrementalist approach pivots around the degree to which the map-based tasks demand some active and purposeful response by the child, and are set into a context other than the experimental situation.

Brown and Lawton (1975) for example, experimentally compared the effects of three conditions on preschoolers' reconstructions of the journey of a baby elephant through a model jungle. The first group of children were <u>actively</u> involved, walking around the model and placing the elephant at different locations on the journey. A second 'passive' group were seated at the side of the model and watched the experimenter move the elephant; and, a third group heard the elephant's journey described in terms of a story which linked and ordered the elephant's stops. The first 'active' group were more successful at reconstructing the elephant's journey than either of the other two groups.

Another example of the importance of active experience was shown in an experiment by Herman and Siegel (1978) in which children aged 5, 7 and 9 were taken on three walks through a large layout of model building in a large room. After one walk, and on one reconstruction, the pattern of results matched predictions based on Piaget's findings: the 5 year olds placed just over half the buildings in the correct quadrants, whereas the 9 year olds and the 7 year olds made 90 per cent and 75 per cent correct placements, respectively. After three walks, however, the 7 and 9 year olds were 100% correct and most importantly, the 5 year olds were very close to this level (97% correct placings). The rapidity with which the 5 year olds moved from near chance to near perfect reconstructions within just three exposures suggested that their capacity for forming and using cognitive maps is present, but often untapped.

The results of these two studies suggest firstly, that the way in which tasks are presented, whether for teaching or assessment purposes, may be critical to the child's performance; and secondly, that a reassessment of age-related stage theories of spatial cognition is necessary. Feldman's longitudinal study of mapping is relevant to this second issue.

7.25 Feldman's longitudinal study of map-drawing

Feldman (1980) repeated Piaget and Inhelder's model village task with two elaborations: the village lay-out was 'Americanised', and a three year longitudinal design was employed, which began with ten year olds. The maps were analysed using a rigorous breakdown of the mapping features identified by Piaget (arrangement, proportion, perspective, symbolisation) into 20 discrete elements, so as to locate them within six 'developmental levels' derived from Piaget and Inhelder's work (1956). At any given time, a child's map was found to exhibit characteristics which covered three or four mapping levels but which typically included a majority of elements in one of those levels. By laboriously charting the progress of individual elements, Feldman found that certain elements lagged behind the 'modal' stage for a time, but then 'leapt' forward more than one stage, as if the child were risking a new representational strategy in mapping the layout. This 'novelty', or more advanced form, then frequently dropped back a stage, whilst other 'novelties' were experimented with, and then dropped. Eventually, sufficient 'risks' or experiments had been tried and the whole system of representation moved on to a higher modal stage. Even so, the configuration of mapping elements could still span three levels as this process of 'leaping' and 'lagging' continued.

Feldman's analysis is important in explaining 'stage variation' or 'level mixture', but is too detailed either for the purposes of present study or for the assessment of children's maps in the classroom.

7.26 <u>Landmarks, routes and configurations</u>

An alternative approach would be to find out which general features of maps are learned before others. Siegel and White (1975, cited in Siegel et al. 1978) suggested the following sequence: First, <u>landmarks</u> are noticed and remembered. Subsequently, as landmarks and action sequences become associated with repeated exposure, so the recognition of <u>routes</u> develops. Landmarks and routes form into small clusters which are still uncoordinated with each other, until <u>configurations</u> of landmark-route clusters are completely coordinated. These configurations are seen as representing a higher order development.

This sequence has a built-in dependence on action, and is consistent with the sequence of adults' cognitive mapping of new environments. It is supported by the work of Shemyakin (1962) who asked children and adults to draw sketch maps of their neighbourhoods. 7 year olds drew only the routes they used regularly, whereas the 9 and 10 year olds produced more complex drawings, which included 'branches', i.e. routes braching off the main route, although these were often not connected. By the age of 12 however, the routes were presented as a 'closed aggregate', or complete network of streets. This is equivalent, in Siegel's terms, to the use of configurations, which is a more efficient form of storage of spatial information, and which depends on the use of an objective frame of reference.

This section has presented some of the background research relevant to the present task. In particular, the role of action, experience and context in enhancing mapping skills have been illustrated. The findings of Feldman's study, suggest the value of individual monitoring of mapping skills, over a long period. Finally, Shemyakin's work suggests a developmental scheme of increasing complexity which is simple enough to apply to children's maps.

7.3 The educational context

7.31 Cognitive mapping as a primary level task

It is evident from the foregoing review that major developments take place in children's mapping skills during the primary years, and Catling's (1978) article was an attempt to draw this to the attention of teachers. In the same year, however, Her Majesty's Inspectorate's survey of primary schools found little evidence of any work involving maps:

> 'There were substantial numbers of classes where no use was made of atlases, maps or globes. ... ...the use and making of maps and plans was given little attention even in relation to geographical aspects of the work' (H. M. I., 1978, para. 5.14)

HMI reported also that local studies often failed to include reference to a map of the locality.

The PRISMS observations suggested that this was still the case in 1984: observations of children using maps of any kind were extremely rare. Only 0.2 per cent of observations included the use of any 'network' such as a road-map, and only 2 per cent involved the use of any chart, picture or map as a source of information. We must assume that the figures for maps alone would be even lower. Geographical content of any sort was observed in only 3.6 percent of the junior level observations.

In 1986, however, Boardman made cognitive mapping the focus of the only chapter on primary school geography, in his edited book, New Directions in Geography. Boardman stated that the ... 'value of mental maps for the teacher..(is)..not so much in the maps themselves, which may be odd, strange and even eccentric, but in what they reveal about the perception of the people who draw them' (p.123).

For the present task, the work of Catling (1978) and Matthews (1984a) is the most useful in providing accessible schemes for categorising cognitive maps. Matthews' work also includes a set of data for comparative purposes. These studies will be introduced here, and used for reference throughout the discussion of the present task.

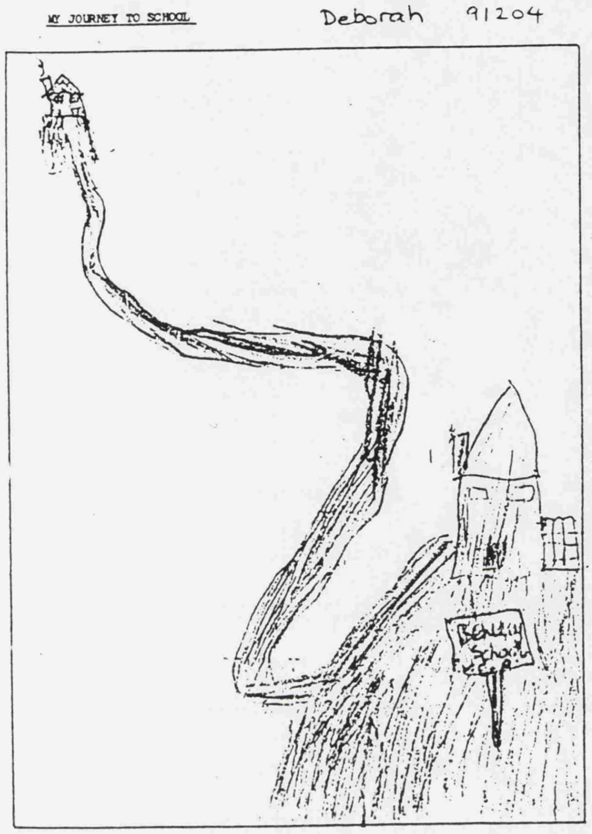
7.32 Catling's account of stages of cognitive map representation

Catling (1978) provided a 'composite overview of cognitive map representation' which is simple enough to use at classroom level. The scheme closely parallels Piaget's stages, as the child's mapping style progresses from topological to Euclidean maps. He suggested that teachers might classify maps into four stages of cognitive map representation. These four stages are described below. Examples of PRISMS' children's work to illustrate each stage are shown in Figure 7.1.

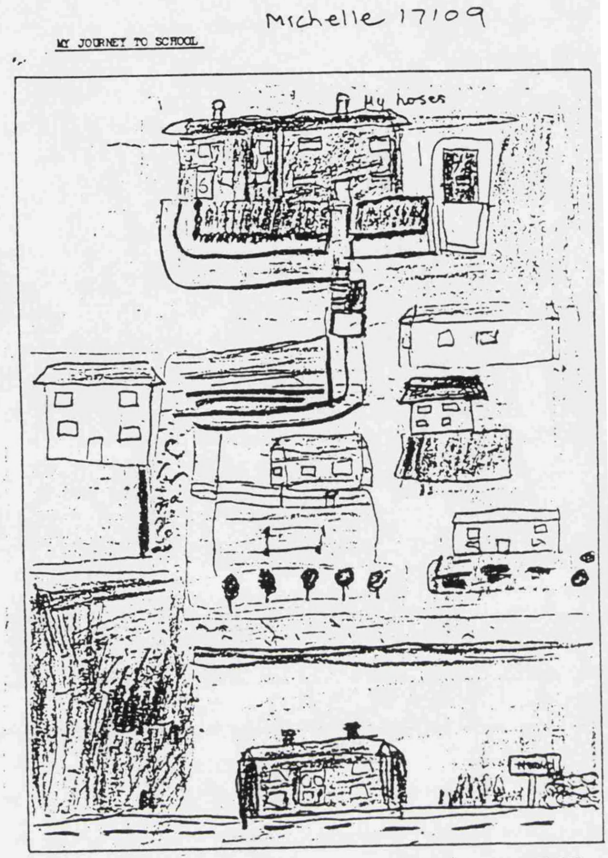
TOPOLOGICAL (egocentric) LINK-PICTURE MAPS (e.g. Deborah's map)

- highly egocentric
- roads begin at home and end at destination
- buildings and objects represented iconically
- no regard for direction, orientation, distance or scale

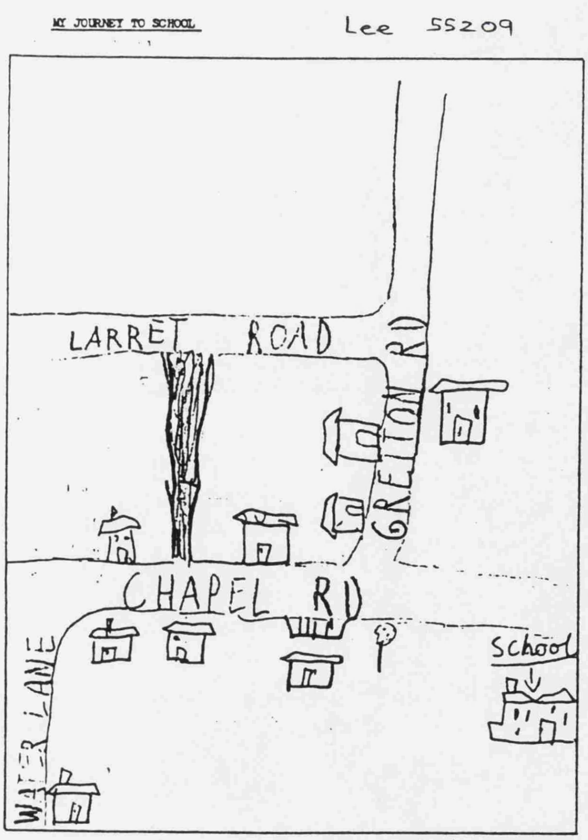
Figure 7.1 Catling's Stages of Cognitive Map Representation



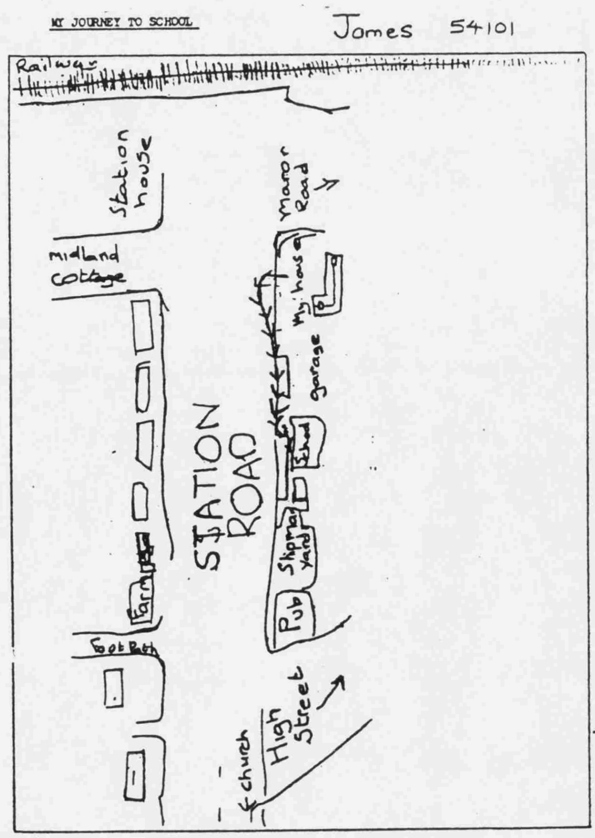
1 - Topological : link picture map



2 Projective I : picture map



3 Projective II : quasi-map



4 Euclidean : true map

PROJECTIVE 1 (quasi-egocentric) PICTURE MAPS (Michelle's map)

- partial coordination and connection of known places:
- roads shown in plan form but still lead home
- buildings still shown iconically
- direction more accurate
- scale, distance and perspective are not yet accurate.

PROJECTIVE 2 (quasi-abstract) QUASI-MAPS (Lee's map)

- better coordination of routes etc.
- may include more detail
- improvement in direction, orientation, distance and scale
- roads are now drawn as continuous routes, going beyond home
- some buildings and objects in plan form

EUCLIDEAN (abstract) TRUE MAP (James' map)

- maps roughly accurate in all respects
- roads plan form
- buildings plan or symbol
- direction, orientation, distance, shape, size and scale roughly accurate
- key is necessary because objects are now shown in symbol form.

Catling's stage classification has been used to grade the PRISMS children's home-to-school-journeys plans. It has been applied using the synthetic examples and cursory comments (listed above) provided by Catling for teachers to use.

7.33 Matthews study of 'The journey from home to school'

Matthews (1984a) carried out a study of the 'personal geography' of children aged six to eleven. The children were asked to draw freehand maps of (a) the area around their homes and (b) their journey from home to school. Matthews was concerned with changes in mapping ability or 'cartographic competence' with age and gender, and he used a variety of schemes for categorising different aspects of the maps. A number of these have been used in the present study.
To classify the map as a whole, Matthews developed a set of grades of 'cartographic competence' which are based on Beck and Wood's (1976) analysis of the cognitive operations involved in mapping. These are rotation, verbalisation, scaling, generalisation, representation and externalisation. Each grade indicates which cognitive operations have been mastered by the child, whilst the inclusion of verbal labels in the plan is deemed to be a more advanced form of each grade.

Matthews' grades of cartographic competence have been used in the present study to form the basis of the grading exercise.
Unfortunately, as in the case of Catling's stages, Matthews (1984a) provides only minimal definitions and a very limited set of examples for each grade.

Matthews' Grades of Cartographic Competence

GRADE Ia PICTORIAL
Ib PICTORIAL-VERBAL

Grade I maps, which include pictorial views of objects drawn 'lying down', indicate that the child cannot yet perform the operation of mentally rotating the objects to depict them in plan view. The verbalisation or labelling of objects and routes on the map is taken to show an awareness that the drawn information needs elaboration.

Grade IIa PICTORIAL-PLAN
IIb PICTORIAL-PLAN-VERBAL

Grade II maps show some rotation. There is some evidence of scaling in the children's selection of what to include and what to leave out. Both plan and pictorial views are likely to appear on the same map.

GRADE IIIa PLAN
IIIb PLAN-VERBAL

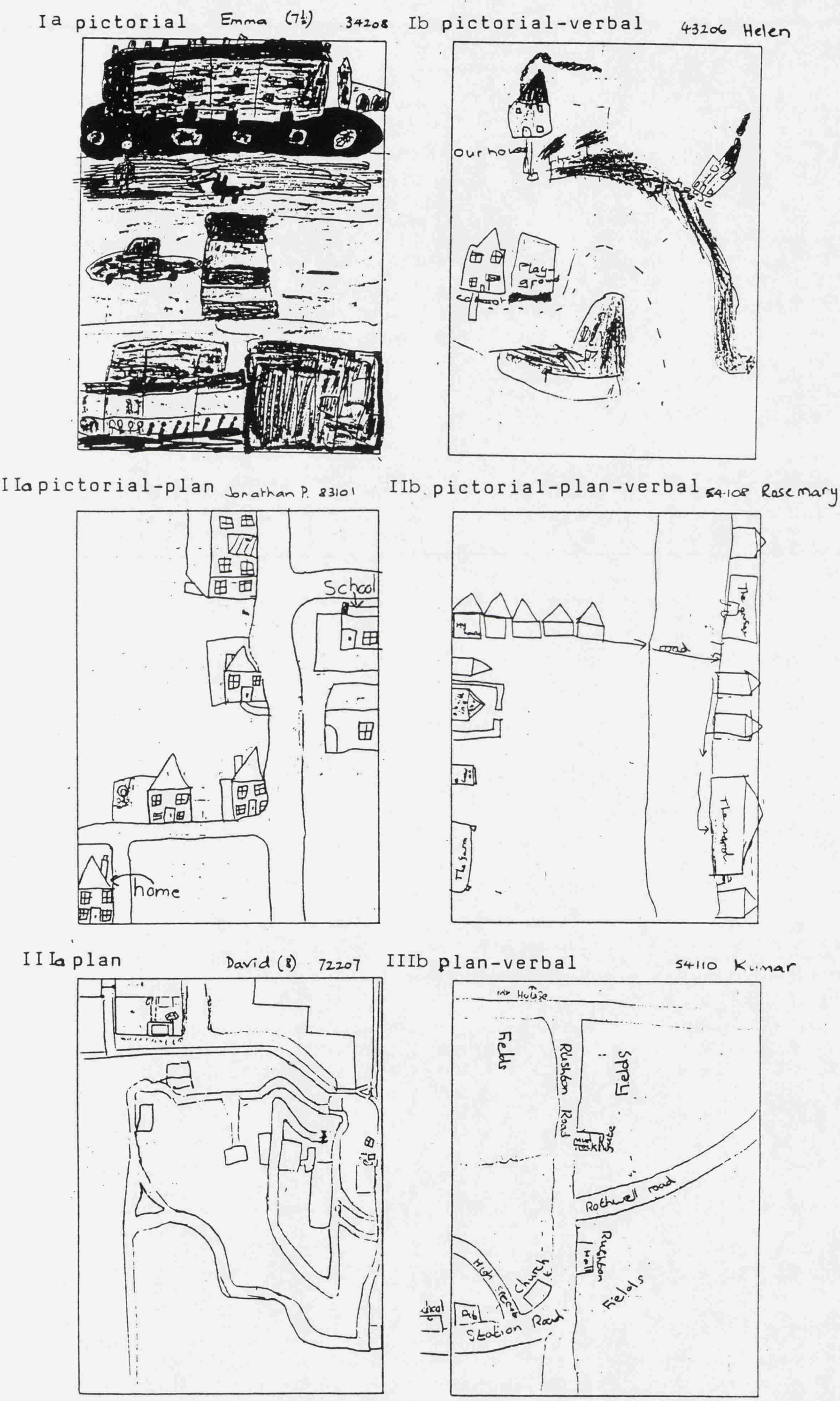
Grade III maps are completely orthogonal; buildings are all shown in plan form; they are in the correct positions and orientations relative to each other and to the orientation of the map such that the position of a point on the map could be expressed in terms of coordinates. At this stage, all of the postulated cognitive operations of rotation, scaling, generalisation, representation have been achieved and are consciously employed in the drawing of the map.

Examples of maps drawn by the PRISMS children and representing the three grades are shown in Figure 7.2.

7.34 <u>Gender differences in cognitive mapping</u>

The differences between boys' and girls' cognitive maps are of particular interest in the classroom. Matthews (1984b) describes the differences between boys' and girls' maps in his study of home-area maps, but does not report gender differences in the journey-to-school maps. When asked to draw a map of the area round their homes, boys aged 8, 9 and 10 drew a much wider area and were significantly more accurate in their maps than girls of the same age. The girls, on the other hand, made more detailed maps which covered smaller areas and included more landmarks. The boys were more likely to emphasise paths rather than landmarks and a significantly higher proportion of the boys exhibited higher grades of cartographic competence throughout the junior age-range. Matthews cites the work of Hart (1978) to explain these differences. Hart (1978) was able to keep records of the daily journeys of a sample of girls and boys over a long period of time and found that boys ventured further away from home at

Figure 7.2 Examples of Matthews Grades of Cartographic Competence



younger ages than the girls, who stayed within a restricted area and were more often chaperoned. Matthews found these gender differences in relation to the 'home area' maps and did not report on the journey-to-school maps. It is possible that he found fewer gender differences in the journey maps, and this will be tested on the present data.

7.4. The present study

7.41 Presentation of the task

As part of the Prismaston File, the lower junior children were asked to draw a 'picture or plan' of their journey from home to school. The instructions and questions which introduced the task (see Figure 7.3) were intended to take the children through the journey mentally. They were asked to record their means of transport, various features passed en route, to say what type of house they lived in, and then to include these features in their picture or plan for which a 12 x 16cm rectangle was provided. Thus, the present task aimed to guide the children towards map drawing, without making the assumption that they would necessarily be able to draw a map. This approach is consistent with the level of work in, for example, the New Oxford Geography series (Elliott, 1980) for this age group.

Given the rarity of mapwork in the primary schools, the instruction to draw a map of the journey from home to school could have been perceived by the teachers, and/or the children, to require substantial teacher input. The 'picture or plan' instruction was used to obviate this, since a major aim of the Prismaston File was that the children could work from it independently. This instruction presented the children with a choice of representational forms, rather than forcing a map.

Figure 7.3 Extracts from Prismaston File to show instructions and pupil record of the 'home-school' journey task

i) Instructions from (lower junior) 'datacheck 1'

Your journey to school

This section is slightly DIFFERENT from the others so read it carefully.
We are interested in how YOU travel to school.

xa How did you come to school today?
a) walk b) car c) bus d) bike e) taxi f) another way

(Just circle the right letter in your code-book.)

xb Which of these do you pass on your way to school?

a) a church	e) a hill or mountain
b) a petrol station	f) water (lake; river;..)
c) a shop	g) a tree
d) fields	h) a large building

If you pass some thing unusual or special, like a windmill or a statue, or something you always like to see, write what it is in the space in the code-book. It could be lovely garden .

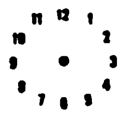
xc What kind of house do you live in?
a) terraced b) detached c) cottage d) flat
e) bungalow f) farm g) semi-detached

In the CODE-BOOK, there is a space for you to draw a picture or plan of your journey to school.
DRAW ....your house ; your school; yourself ; the way you get to school ; three of the things you pass on the way.
Draw the best picture/plan that you can. Use pencils, felt tips, crayons or whatever you usually use for drawing.

ii) Pupil record of responses to 'Your journey to school' items (extracted from 'Agent's Code-book 1')

Your journey to school

time-box [:] or



xa	a	b	c	d	e	f		
xb	a	b	c	d	e	f	g	h

Do you pass something you think is interesting?................

xc	a	b	c	d	e	f	g

Find the space near the middle of the book. DRAW a picture/plan of your journey there. Remember to draw the things you have put on this page.

7.42 Issues to be considered

A primary aim of the present study was to determine which aspects of children's cognitive maps a teacher might most usefully record for both formative and summative assessment purposes. Catling (1978) suggested that cognitive maps could be:

(1) a useful diagnostic guide to children's developing spatial skills,

(2) an informative guide to the important points in the landscape for the individual child, or the class as a whole, and,

(3) an instructive activity which might develop children's spatial and environmental conceptions as well as their cartographic skills.

These suggestions will be examined later in the light of the present task. First, however, the following general predictions and questions will be tested on the Prismaston File data.

(1) Mapping skills, defined in terms of Matthews' Grades of Cartographic Competence, are expected to increase with age. In view of the instruction to draw a plan or picture, the relative proportions of picture and pictorial maps obtained will be compared with Matthews' results.

(2) Children in the older age-groups are expected to show higher levels in Catling's stages of Cognitive Map Representation.

(3) Map complexity, using Matthews' classification of map 'lines' (see below) is expected to be positively associated with age. Few examples of complex road configurations would be expected in the present sample, following Shemyakin's work. More complex patterns, or more detailed maps may be expected from children who walk to school rather than from those who are driven there.

(4) Gender differences in mapping skills were described by Matthews (1984b). He found differences between the maps drawn by boys and girls over the age of eight in home-area maps, but did not report any differences in the data from his sample of journey-to-school maps. The present sample is composed of children aged 7 to 9 years. On the basis of Matthews' results we might expect gender differences amongst the 9 year olds in cartographic competence and map-style.

(5) Although the relationship between the adoption of plan form mapping and the acquisition of three-dimensional drawings is of interest, there seems little literature on this topic. In the present study, the children's methods of representing houses on their maps was recorded (see details in coding scheme), and will be related to road complexity and agegroup.

7.43 Coding the Prismaston cognitive maps

The following categories of information were coded from the children's maps:

1 Responses to items:

xa transport to school
xb landmarks passed on the way
xc kind of house

2 'Pure' picture

An initial distinction was made between 'pure' pictures and some attempt to show the route or journey landmarks. Some children simply drew a car, bus or themselves walking and these fall into the former category.

3 Matthews' grades of cartographic competence

I	pictorial	pictorial- verbal;
II	pictorial-plan	pictorial-plan-verbal
III	plan	plan-verbal

A small proportion (4.4 per cent) of the maps were too idiosyncratic to categorise with confidence.

It was necessary to combine verbal and non-verbal maps within each grade to satisfy the minimum expected frequencies for chi-square.

All maps were graded by the same person but a sample of 25 maps (12.5%) was coded independently by a second person to test for the application of categories. This resulted in 84 per cent agreement in the categories assigned to the maps, and a correlation of r = 0.97.

4 Catling stages of cognitive map representation

1	topological	link-picture maps
2	projective 1	picture maps
3	projective 2	quasi-maps
4	Euclidean	true maps
	'can't code'	

Catling's categories were much more difficult to apply and inter-rater agreement on the same sample of 25 maps was only 60% (r = 0.79). This figure rose to 72 per cent when the two 'projective' stages (2 and 3) were combined.

5 Map conventions

Attempts to use symbols, a scale and a key were recorded: some examples are shown in Figure 7.4.

6 Map Contents

The inclusion on the map of the following elements was recorded.
home, school, transport, self, route taken (indicated by arrows, footprints, dotted line etc.)

7 Map style or complexity

A simplified version of Matthews' 'line-point-area' classificationwas applied:

LINES i.e. roads, paths, rivers etc.

L1 single line  L2 line-focal 

L3 line branch  L4 line-loop 

L5 line-net 

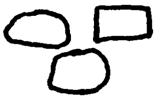
This feature was not always easy to classify although inter-rater agreement of 80% ($r = 0.81$, $p < .001$) on a sample of 25 maps was achieved.

POINTS i.e. landmarks such as buildings, trees, specific features:

Matthews 'few-many' classification was modified to:

P0 no points shown
P1 1 - 5 points
P2 6 or more points

AREAS i.e. fields, woods, gardens, play area, shopping area:

A1 segmental  A2 stellar 

6 Houses

The child's method of representing houses or buildings was coded as follows:

Iconic views 1  2  3 

Aerial views 4  5  6 

If both picture and plan views were used, both were recorded.

A complete list of all the characteristics of the children's maps which were recorded, and full details of the coding schemes appears in Appendix E1.

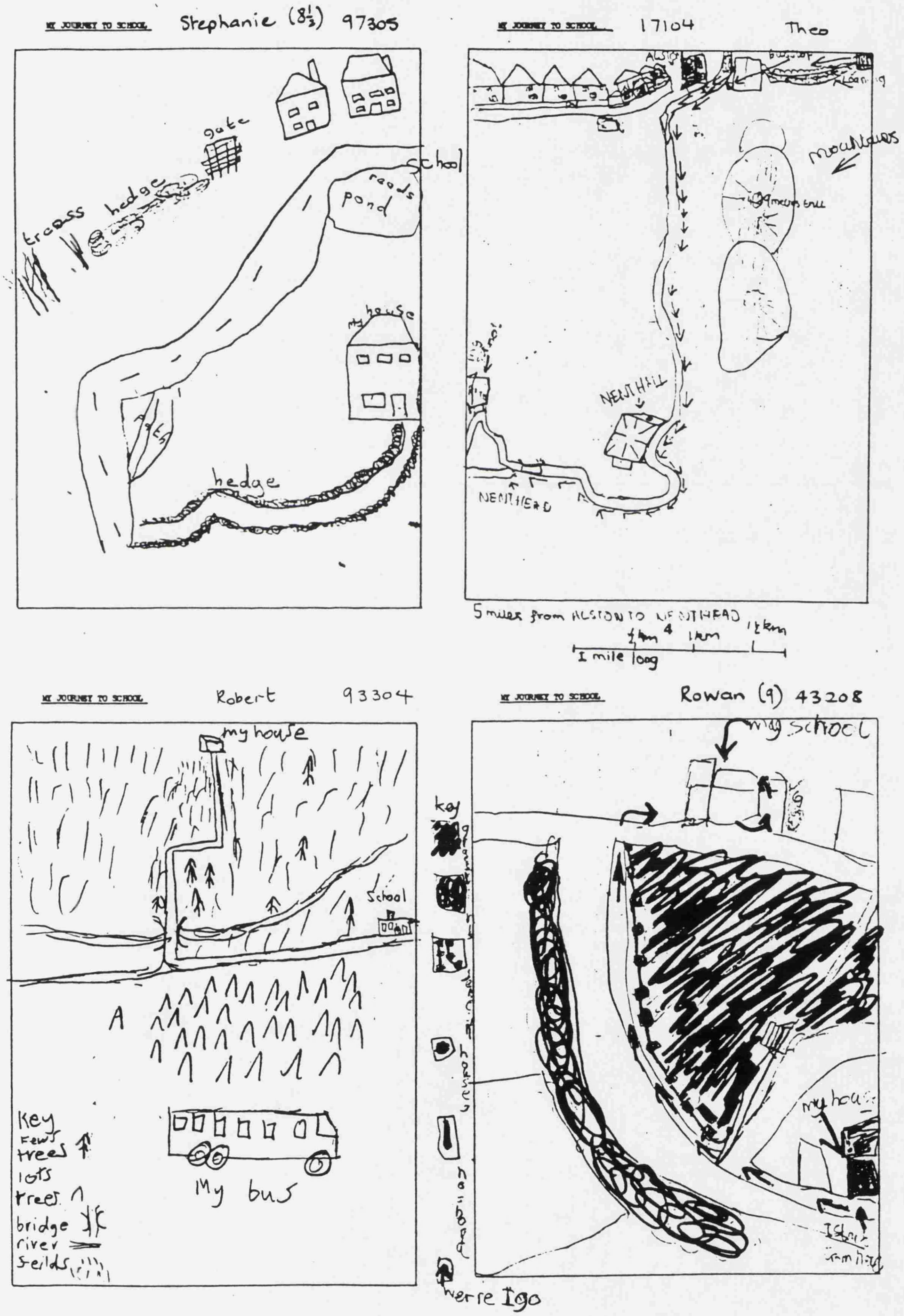
7.5 Results and Discussion

7.51 Cartographic competence

Table 7.1 shows the distribution of map grades across the lower junior year-groups, and it is clear that the maps of the older children exhibited higher grades of cartographic competence than those of the younger children (chi-square = 8.82; df = 2; $p < .05$) . Over half the children drew pictorial-plans; there were relatively more pictorial/verbal maps amongst the 7 to 8 year olds and more plan/verbal maps amongst the 8 to 9 year olds. This confirmed Matthews' results.

There remained the possibility that the present results underestimated of the cartographic skills of the children because they were asked to draw a picture or plan. Comparison with Matthews'

Figure 7.4 Inclusion of symbols, scale or key



results showed that this may have been the case. Whilst 7.8% of the PRISMS sample drew pictures with no attempt at a plan, a further 24.5% of the maps were placed in Grade I: an age-equivalent sample from Matthews' study contained only 14.5% pictorial maps. On the other hand, 18.1% of the PRISMS maps were placed in Grade III compared with only 7.8% in Matthews study. In the absence of detailed instructions for grading the maps (carried out largely on the basis of the illustrations provided by Matthews) it is possible that the grading criteria differ slightly.

7.52 Stages of cognitive map representation

Table 7.2 shows the distribution of cognitive map stages between first and second year juniors. Year-group appeared to exert a significant effect on the distribution of map stages across the four stages (chi-square = 11.52; df = 3; $p < .01$). More Stage 1 maps were drawn by the younger children, and more true maps were drawn by the older children than would have been expected under the null hypothesis. This result supports Catling's model and confirms the expectation that there should be a positive association between map stage and age.

7.53 Levels of map complexity

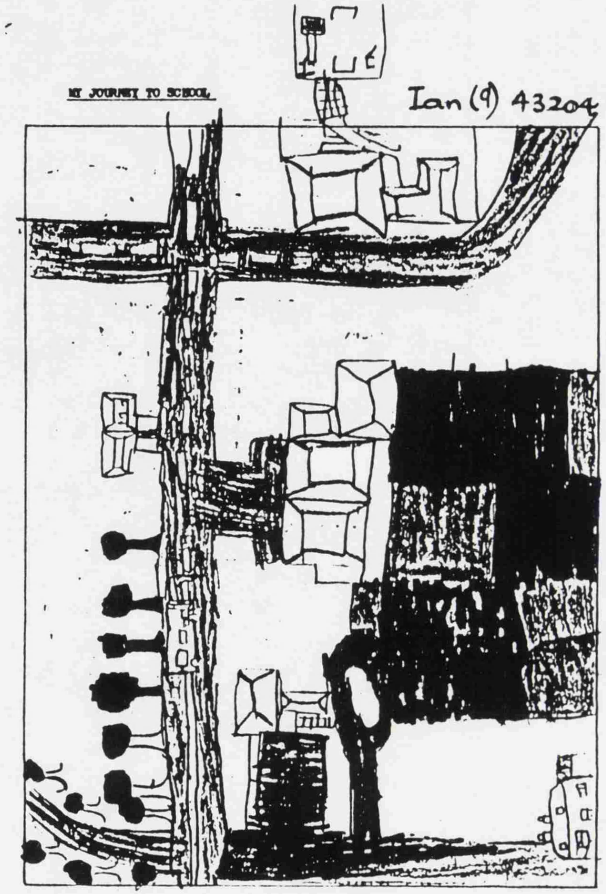
Matthews used a line-point-area classification scheme as a measure of 'map style' and 'sophistication', but his definition of 'the dominant feature' was too vague for application here. Instead, the line-point-area classification was used to indicate map complexity. A map with a branched road, and six or more landmarks (points) was taken as more complex than a single line road and five or less points. Shemyakin (1962; see Matthews, 1984a), suggested that survey representation i.e. showing the relationships between homogeneous areas of the landscape rather than exhibiting a path or landmark emphasis, would not appear until the age of about twelve. Any indication of the representation of areas by this young sample was therefore regarded as advanced.

7.53 (a) The representation of areas

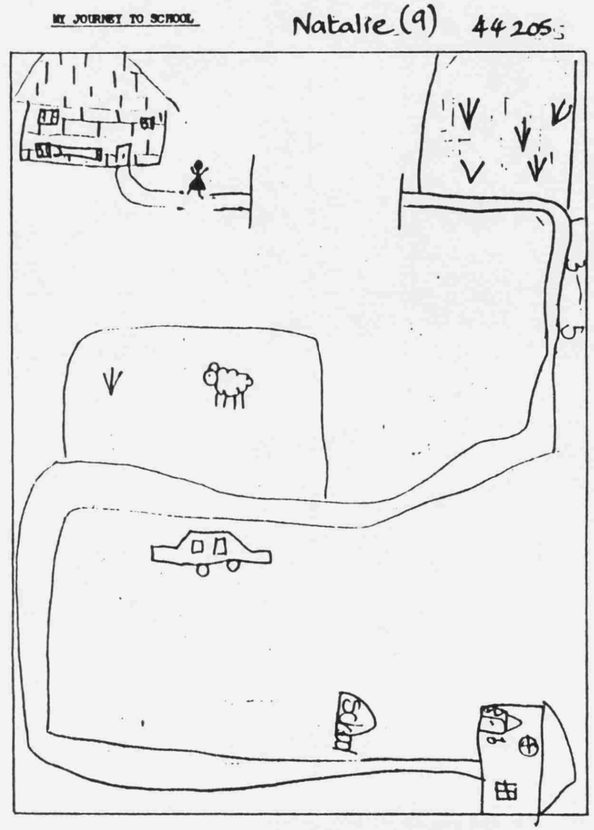
27.9 per cent of the children responded to item xb that they passed fields on the route to school but only 18.2 per cent of the sample attempted to represent any defined areas, such as fields. 12.8 per cent of the children drew 'segmental' areas in which adjacent areas were joined together (see section 7.43 above), and 5.4 per cent drew 'stellar' areas in which separate isolated areas were drawn, but they did not share common boundaries (see examples in Figure 7.5). In Matthews' (1984a) study, only 9 per cent of the seven year olds, none of the eight year olds and 7 per cent of the nine year olds included areas in their school journey maps and, surprisingly, the figures for the home area maps were similar, and in all cases lower than the present result. It could be that the introduction to the present task, noting what was passed on the way, had been helpful in promoting more complex maps. Matthews interpreted the proportion of 'areal' (the term used by Matthews) representations in his data as a refutation of Shemyakin's landmark - route - survey sequence, with survey style not appearing until age twelve. The present study strongly reinforces Matthews' view.

Figure 7.5 Examples of area representation

A1 segmental



A2 stellar



7.53 (b) Line complexity

Table 7.3 shows the percentage frequencies of the line style categories of those maps that included roads or paths. It is clear that the most common road patterns were the single and branched line patterns. The frequencies obtained in the present study are very similar to those reported for Matthews' eight-year-olds: 42.8 per cent drew single-line maps, and 32.6 per cent drew branch-line maps, compared with Matthews' 41 per cent and 37 per cent respectively. The present sample drew 14.3% 'focal' maps as compared with 4 per cent of the children in Matthews' study, although this may be due to the inclusion of T-junction maps in the 'focal', rather than in the 'branch-line' category.

Table 7.3 Frequencies of map line characteristics (all ages)

Line style		Percentage of children who used each line style	
single line	L1	42.8	
focal (X-roads; 'T'junctn)	L2	14.3	
branch (offshoots)	L3	32.6	
loop	L4	2.9	
net (network)	L5	7.4	
total		100.0	(N = 175)

Table 7.4 shows the line style characteristics listed in Table 7.3 broken down by age-group. Shemyakin (1962) suggested that children under eight tend to produce single line routes, equivalent to the present L1 category; that eight year olds tend to include other roads as off-shoots (L3), but that interconnecting roads were not typically produced until the age of twelve. Over one third of the PRISMS children drew more complex patterns than Shemyakin would suggest on this basis, and almost a tenth drew loop or network plans.

Table 7.4 Line complexity of the maps produced by first and second year juniors

age-group (years)		7 - 8	8 - 9	total
single line	L1	36	34	70
focal (X roads/ 'T' junctns)	L2	11	12	23
branch/loop/network	L3,4,5	21	53	74
total		68	99	167

X^2=8.48 d.f. = 2 p = 0.014

(37 maps not included because they were 'pure' pictures; because they did not depict roads, or because the children were outside the two age groups.)
'loop' and 'net' combined with 'branch' to satisfy minimum expected frequencies for chi-square.

7.53 (c) Points

Over 80 per cent of the children included some landmark points, and 32% drew six or more. Children who drew more complex road patterns also tended to include more landmark points on their maps (X^2 = 8.46; df= 2; n = 161; p = 0.015). Whilst it might be argued that they have more 'sites' available on their maps, another possible explanation is that they are beginning to adopt a survey - configurational style earlier than Shemyakin would predict. There was no significant age-related pattern in the use of 'few' or 'many' points however, (X^2 = 0.74; df = 2; n = 158; ns).

7.54 Map complexity and means of transport

Active involvement with an area was shown earlier (e.g. Brown and Lawton, 1975) to lead to greater accuracy in reporting journeys, or mapping routes

(Herman and Siegel, 1978). In the present study it was hypothesised that the children's mode of transport to school might influence the sophistication of their maps. The children recorded their mode of transport to school in item xa. Their maps were classified on the basis of whether they walked or cycled to school, or were brought to school in a car, bus or taxi. Chi-square analyses were carried out between this 'mode of travel' variable and three map characteristics: grades of cartographic competence, stage of cognitive map representation and line complexity. None of these analyses reached statistical significance (map grade: X^2 = 1.56, df = 2, ns; stage: X^2 = 0.57, df = 3, ns; line complexity: X^2 = 0.90, df = 2, ns.)

This seemed surprising in the light of the studies cited above, but there are a number of possible explanations. Firstly, it could result from the children's familiarity with the routes: in other words they had travelled them so often that if any initial differences resulting from active and passive involvement in learning the route had existed, they were no longer in evidence. Secondly, it could be result of the long distances covered in travelling to school, particularly in rural areas, where children may travel from another village, or an outlying farm. Thirdly, it may be that accuracy measures obtained by comparing ordnance maps of the area with the children's cognitive maps might reveal a difference, but this was not appropriate in this study.

There was no tendency for more of the younger children to be driven to school, which would have confounded age and travel; in fact, a slightly higher proportion of older children, and boys, fell into this category. In this study, then, no evidence was found to support the role of independent interaction with the environment leading to more advanced cognitive mapping.

7.55 Gender differences in cognitive maps

No significant differences were found for map grade, stage or line complexity between boys' and girls' maps in the present study. This confirmed Matthews' (1984b) finding that gender differences in cognitive mapping were not apparent until beyond the age of nine.

Boys' and girls' maps were compared for level of cartographic competency and stage of cognitive map representation within year groups, There was a tendency for boys maps' to occur more frequently at Matthews' Grade II (pictorial-plan) and in a non-egocentric stage (Catling's stages 3 and 4) at second year level (8 to 9 year olds) but not at first year level, although chi-square was not great enough to lead to a rejection of the null hypothesis. This slight trend is in the direction predicted by Matthew's study such that gender differences become apparent in the upper junior age-range. The tables are shown in Appendix E4.

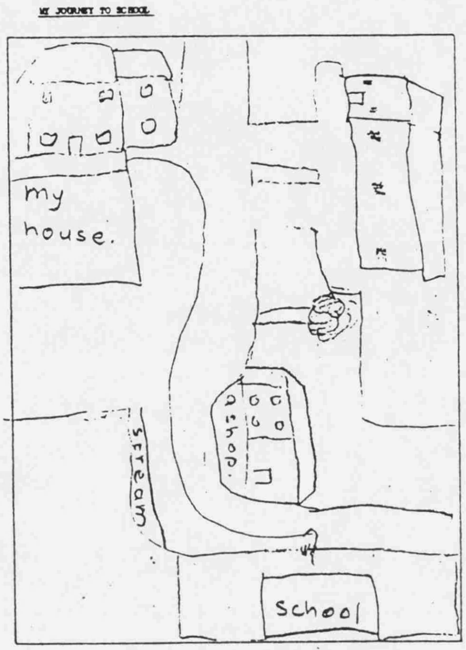
7.56 The representation of houses

The children's methods of representing houses on the plans were recorded and the frequencies of different methods employed are shown in Table 7.5. Examples from the PRISMS' children's maps are shown in Figure 7.6. Just over half of the children simply drew the front faces of the houses. The next largest group were symbolic vertical projections showing buildings as rectangles. Only 7.9% of the children adopted the method used on the Prismaston plan (6.2% used the Prismaston 'skyviews' exclusively, and 1.7% mixed 'skyviews' and 'front-face' houses). This suggests that approximately one quarter of the children drew houses which were at an intermediate stage between 'front-face' (iconic) and plan-form houses.

Figure 7.6 Methods of representing houses and buildings

House type 1

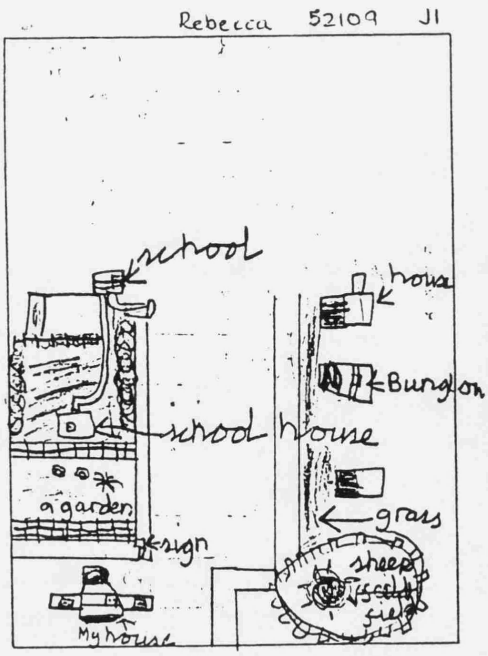
front face only

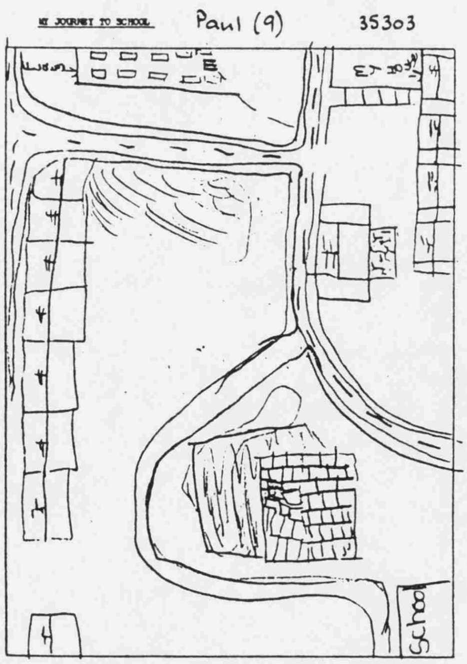


House type 2

Front and side faces shown - a 'net'
Note plan form school.

See also Daniel's map in Figure 7.6 which shows a mixture of styles, and Theo's map, Figure 7.4, which shows a mixture and an unusual vertical view.





House type 5

'skyviews' as used in the Prismaston town plan, showing roof contours and chimneys and television aerials. Note, again, plan form school - plan forms were used to represent large or complex buildings by a notable number of children

The house styles were combined into three categories:

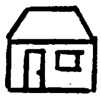
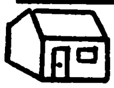
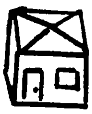
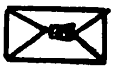
1 : 'front face only' (category 1)

2 : mixture of perspectives or styles (categories 2,3,4)

3 : plan or 'skyview' (categories 5,6),

and were cross-tabulated with age and gender.

Table 7.5 Percentage frequencies of house drawing methods

		%	
1		52.2	front face only
2		5.6	
3		1.7	attempts to show depth
4		2.8	
5		6.2	90° vertical projection
6		20.8	
Mixture of two or more		10.7	

(N = 178; 26 cases excluded because they were either 'pure' pictures, did not include any buildings or children were outside age-range.)

The effect of gender was in the same direction as the map grades and road styles results, but again failed to reached significance. Girls tended to draw more front views than would be expected, whereas boys drew more plan views and more mixtures. (X^2 = 4.72; df = 2; N = 178; p = 0.09). The influence of yeargroup on the distribution was in the expected direction.

Relatively more plan views and mixtures were drawn by the second year juniors (8 - 9 year olds) whereas as more front views were drawn by the first year juniors (7 - 8 year olds) (X^2 = 8.76 ; df = 2; N = 170; p = 0.013). There was also a significant association between road style and house style. Children who drew more complex road maps tended to draw plan view houses (X^2 = 11.17; df = 4; N = 165; p = 0.025).

The methods adopted by the children for representing roads and buildings on their cognitive maps are key constituents of Matthews'grades of cartographic competency. Whilst progression through these grades occurs with increasing age, however, it may be that road mapping style is independent of house style. The present data suggest that this is not the case; that the two progress together. At the same time, it could be argued that since 25 per cent of the children's maps combined either complex roadstyles with iconic houses, or plan-view houses with complex road patterns, the 'joint' development of road-mapping and house-mapping style is not inevitable as might be expected if a stage system were underlying mapping skills. Feldman's longitudinal study would still seem to provide the best means of charting this process in more detail.

This shift from iconic to plan views requires more detailed study, perhaps in conjunction with the child's developing ability to represent perspective. It was interesting to note, anecdotally, that the children's representation of trees, cars and large buildings did not always correspond to the house style adopted. Iconic houses, for example, were sometimes accompanied by 'nets' of cars or plan-view shops, and idiosyncratic strategies were adopted by some children to depict large buildings such as the school: a school with transparent walls, for example, or a transparent roof to reveal the classroom layouts.

None of the foregoing takes account of the effect of giving instructions or the role of the teacher. These will be considered next.

7.57 Evaluation of the mapping task

This task will be evaluated in two ways. First of all, a quantitative analysis of the effects of the presentation of the task will be reported. Secondly, and as a means of summing up, Catling's claims for the value of cognitive mapping exercises to the primary teacher will be considered in the light of the present results.

The mapping task was introduced to the children by means of a series of questions about their transport, their own house, and landmarks and features of their journey to school. This was intended to help the children visualise the journey before trying to map it. It can be seen from Table 7.6 that circling a feature passed did not guarantee that it was drawn, however. The task might nevertheless have provoked recall of other features which were drawn.

A crude evaluation of the effectiveness of these introductory items was to look for an association between the line and point complexity of the map and the children's responses to the items. Means of transport was found to have no effect on map grade or line complexity (see section 7.53). The children's use of item xb, in which they were to note features of the route, was recorded and compared with the number of 'points' or landmarks drawn, by means of chi-square.

Only 12 children (5.9%) did not circle any of the features in item xb; 50% circled one feature, and 13.2% (27 children) circled at least four items. The detailed percentage frequencies are shown in Table 7.6. It is clear from this that many children passed features which they included in their maps, but did not 'circle'them in item xb.

When usage of item xb was compared with map points, the children who circled three or more features in xb also included more points on their maps, although chi-square just failed to reach the 5% level of confidence (X^2 = 5.84; df = 2; p = 0.054; n= 156; maps with no landmarks were

Table 7.6 Features 'passed on the way' to school:

(responses to item 'xb' : N = 204)

feature	passed %	passed and drawn %	drawn only %	no response %
church	17.2	6.4	2.5	74.0
petrol stn	6.9	2.0	2.5	88.7
shop	16.7	10.3	3.9	69.1
fields	27.9	12.3	5.9	53.9
hill	4.4	1.0	1.5	93.1
water	6.9	4.4	2.5	86.3
tree	26.5	19.6	6.4	47.5
large building	6.9	5.4	1.5	86.3
something interesting	17.2	5.9	0.0*	77.0

* Many children responded 'yes' to the question, 'Do you pass something you think is interesting?', but it was not possible to identify which feature unless it was named.

excluded). This result suggested that the introductory items were helpful in producing more complex maps in terms of landmarks, although there was no relationship at all between road complexity and xb usage. Interestingly, girls were significantly more likely to have circled three or more xb features whereas over half the boys circled only one feature. (X^2 = 9.91; df = 2; p = 0.007; n = 192).

7.6 Summary of results

The results of the present study have indicated a positive change to more advanced forms of cognitive mapping over the first two years of junior school. Furthermore, in agreement with Matthews (1984a) they have shown that children in the seven to nine age range have more advanced spatial and mapping skills than earlier work would suggest (Piaget and Inhelder, 1956). In general, our results suggest that nine to ten year olds would be more likely than seven to eight year olds to draw higher grade maps; to use plan forms and more complex road patterns; to use external rather than egocentric frames of reference; and to have more accuracy in representing scale, distance and orientation.

On the other hand, there is insufficient evidence in the present data to support a discrete stage view; an incrementalist explanation better accommodates the variety of styles and the combinations of features which were evident in these picture/plans.

7.71 Implications for the teaching of graphicacy

The present evidence for progression to more advanced (conventional) forms of mapping is based on children whose educational opportunities to practise graphicacy have been very limited (as shown by the PRISMS' observations). As Downs and Stea (1977) forcefully pointed out, the effects of regular activities in which children make and use maps to convey information with some practical value (e.g. Walker's (1980) playground treasure trails) could transform the present 'ethological' view in which children are presumably expected to develop mapping skills without specific training. (An absurd parallel would be to ask at what age/stage the child would achieve the ability to multiply fractions in the absence of regular opportunities and training in numeracy!)

Nevertheless, in order to chart the effects of regular geographical activity or teaching, a profile of the key skills or dimensions might be drawn up. It could include:

1 frame of reference: egocentric - external - abstract;

2 viewpoint or projection: pictorial - mixed - plan;

3 line complexity: none - line - focal - branched - loop - net;

4 landmark density: none - few - many (cut-off points may be specified);

5 representation of area: none - segmental - stellar;

6 the inclusion of verbal labels

7 the child's strategies for the inclusion of features such as hills

8 accuracy, or awareness of scale and distance

9 accuracy, or attempts to show correct location and orientation

10 the use of conventional or invented symbols and a key.

Clearly the setting and purpose of the mapping task would influence which of these features would be used, and which particular criteria were adopted. Some of these profile components may be discrete (e.g. line patterns), others might follow a continuous scale, e.g. point density, or scaling.

7.72 Individuality in children's maps

The quantitative analyses reported so far have taken no account of the individuality of cognitive maps which is prized by environmental psychologists (e.g. Canter, 1977). In the present study a wide variety of map contents and styles were evident in most classes. Each child may select different features for inclusion. In this sense, the cognitive maps are a form of psychological 'projective' test.

The maps in Figures 7.7, 7.8 and 7.9 have been chosen to show the range of picture/plans which can emerge from single classes. They reveal very clearly the differences in the choice of significant features. In Figure 7.9, for example:

Neil T. has simply shown his own house and the school, whereas

Katie has provided carefully drawn houses, a notice board, the school gate and even a glimpse into the school. Compare Katie's version of the rectory house and garden with Mark's.

Neil C. on the other hand, has emphasised roads and ignored houses except for the bungalows near the school. Neil's response to

Figure 7.7 Individuality in children's cognitive maps: different representations of approximately the same geographic area by children from the same class

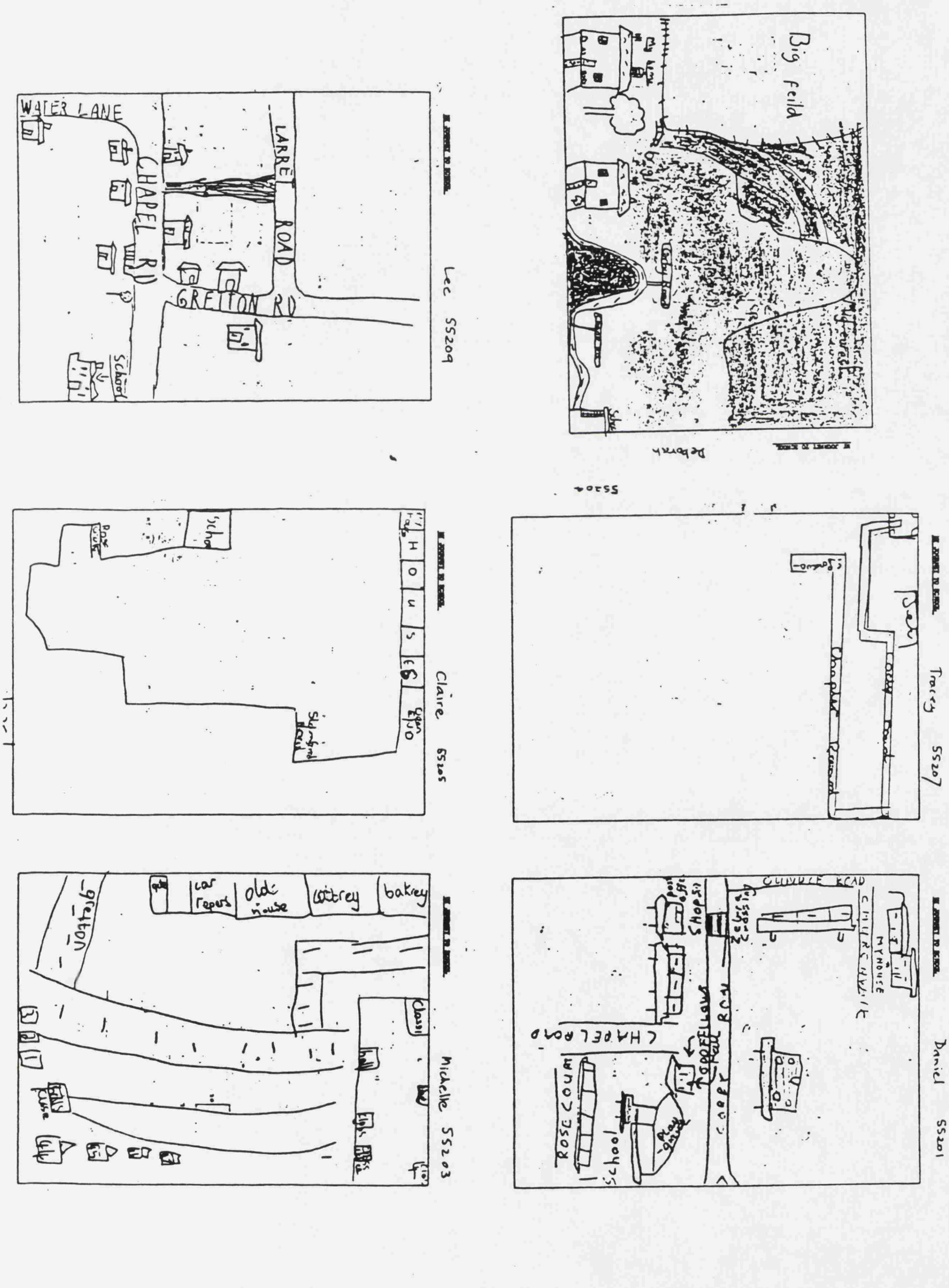


Figure 7.8 Individuality in children's maps: a set of maps from the same class of children

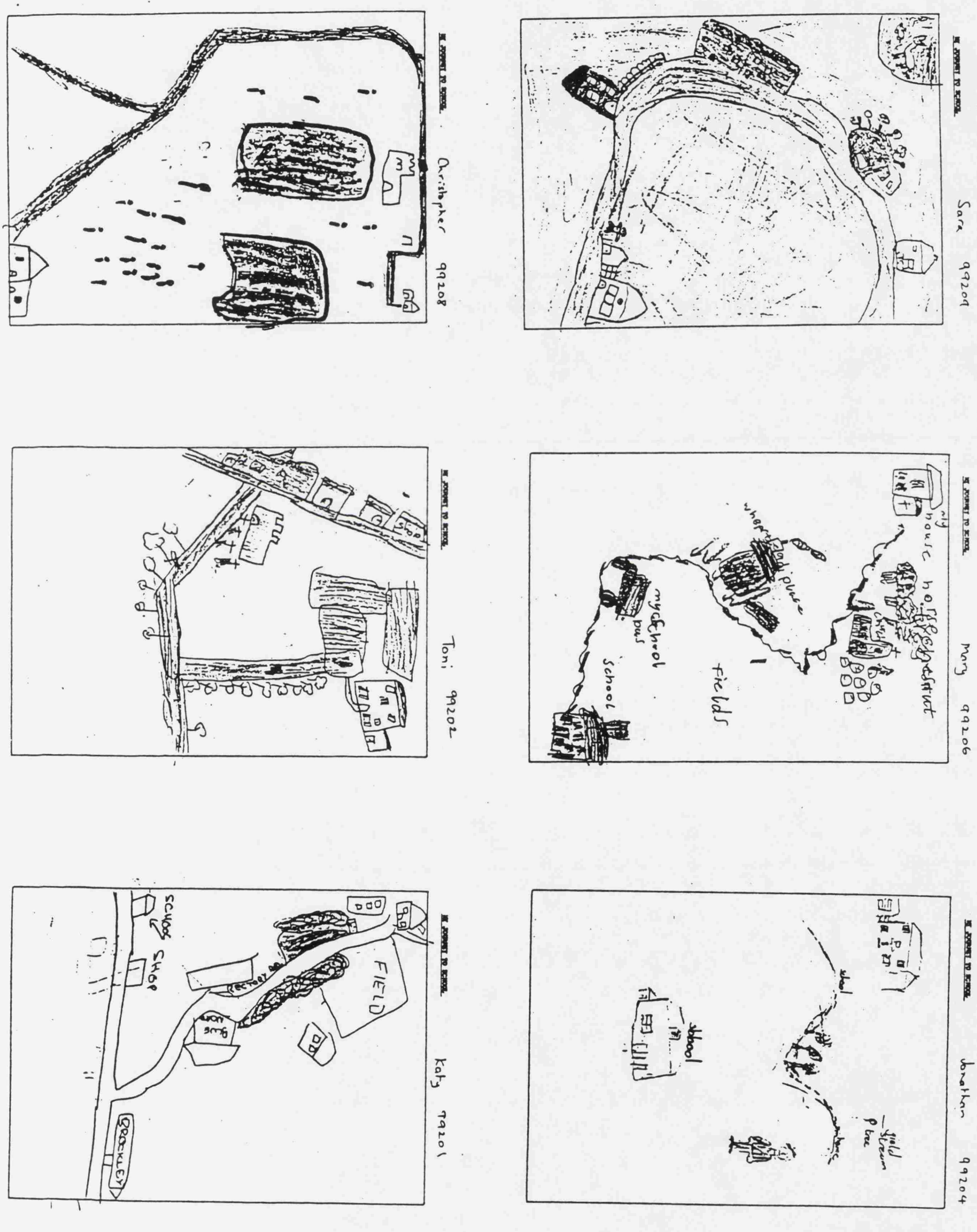
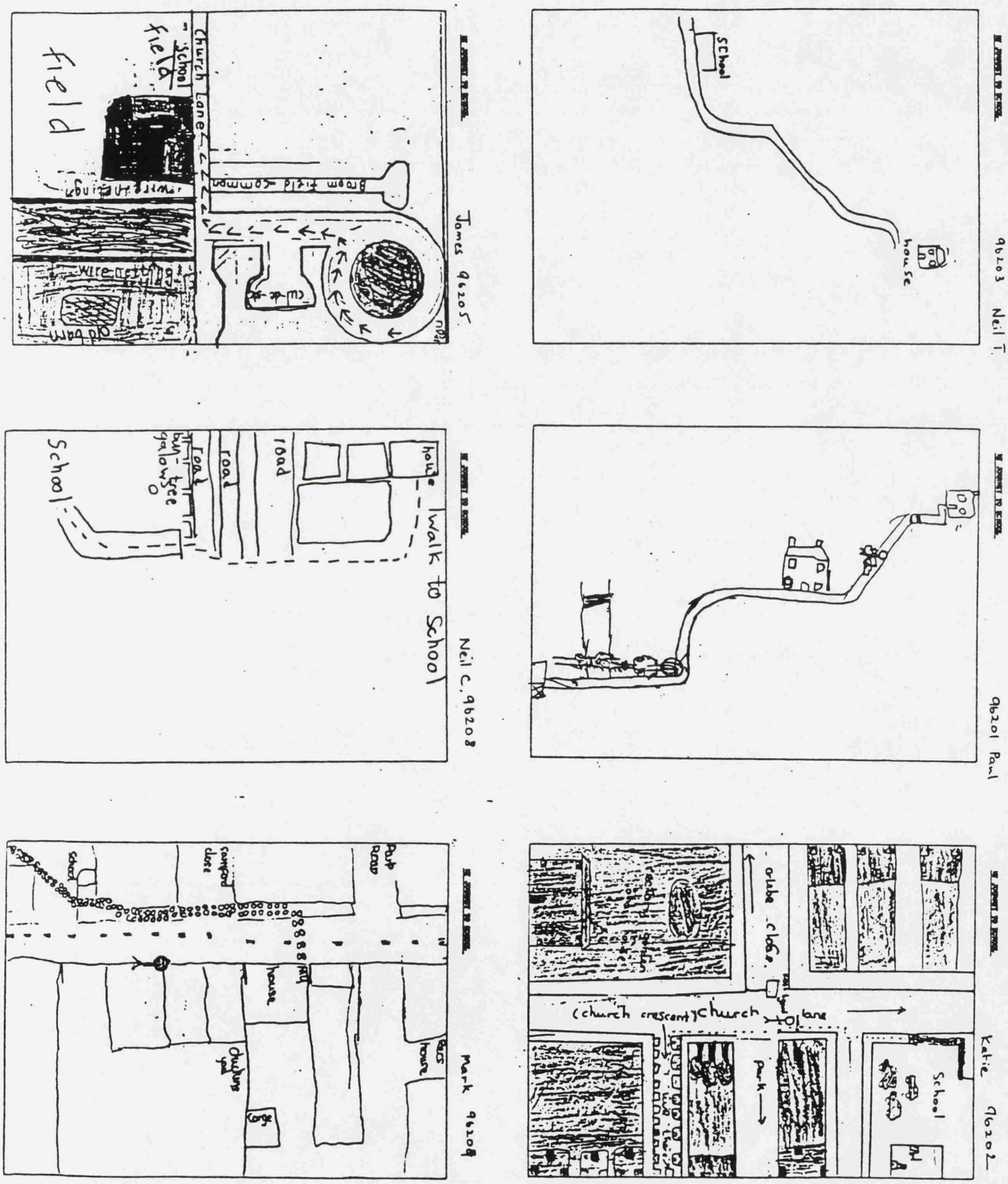


Figure 7.9 Individuality in children's cognitive maps



the question of whether he passed anything interesting on the way to school, was that he passed a duck, but, in keeping with conventional mapping selectivity he has omitted it from his plan.

James evidently found the rows of wire netting between the school and the old barn particularly noteworthy, although he has decided to leave out other forms of boundary, such as fences, hedges or walls, which must exist in that neighbourhood.

Thus cognitive maps of the same area reveal children's differing perspectives on it.

Children's personal strategies for representing features such as hills need to be recognised rather than ignored; see, for example, the solutions to drawing hills devised by Theo (Figure 7.6), Deborah (Figure 7.8 and Jonathan (Figure 7.9), and Michelle's attempt to show her school in Figure 7.7.

The decision to teach children conventional mapping skills, and the way in which this might be done could be critical to the preservation of this individuality. A further development of the present study would be the comparison of map characteristics within and between classes given the information (from the PRISMS data) about curriculum time devoted to mapping, geography or graphicacy tasks.

The maps in Figures 7.10 and 7.11 reveal the more restricted yet possibly more advanced maps found in a few classes: this may suggest some teacher input. In Figure 7.10, the class had perhaps been encouraged to use 'rooftop' only views, as in the Prismaston plan. Neverthless, these maps show the children's individual interpretations, and, referring back to Catling's first claim, show wide differences in understanding and representation of scale (compare the maps by James, Rachel and Joanne). (Melanie's map is a rare example of the dislocated rooftops mentioned by Piaget and Inhelder, 1956). The maps in Figure 7.11 reveal an unusually consistent emphasis on roads which is incongruous with the rest of the data; it may be that the teacher encouraged the children to map the road

Figure 7.10 A class emphasis on plan or roof views: have these been influenced by The Prismaston town plan, or the teacher?

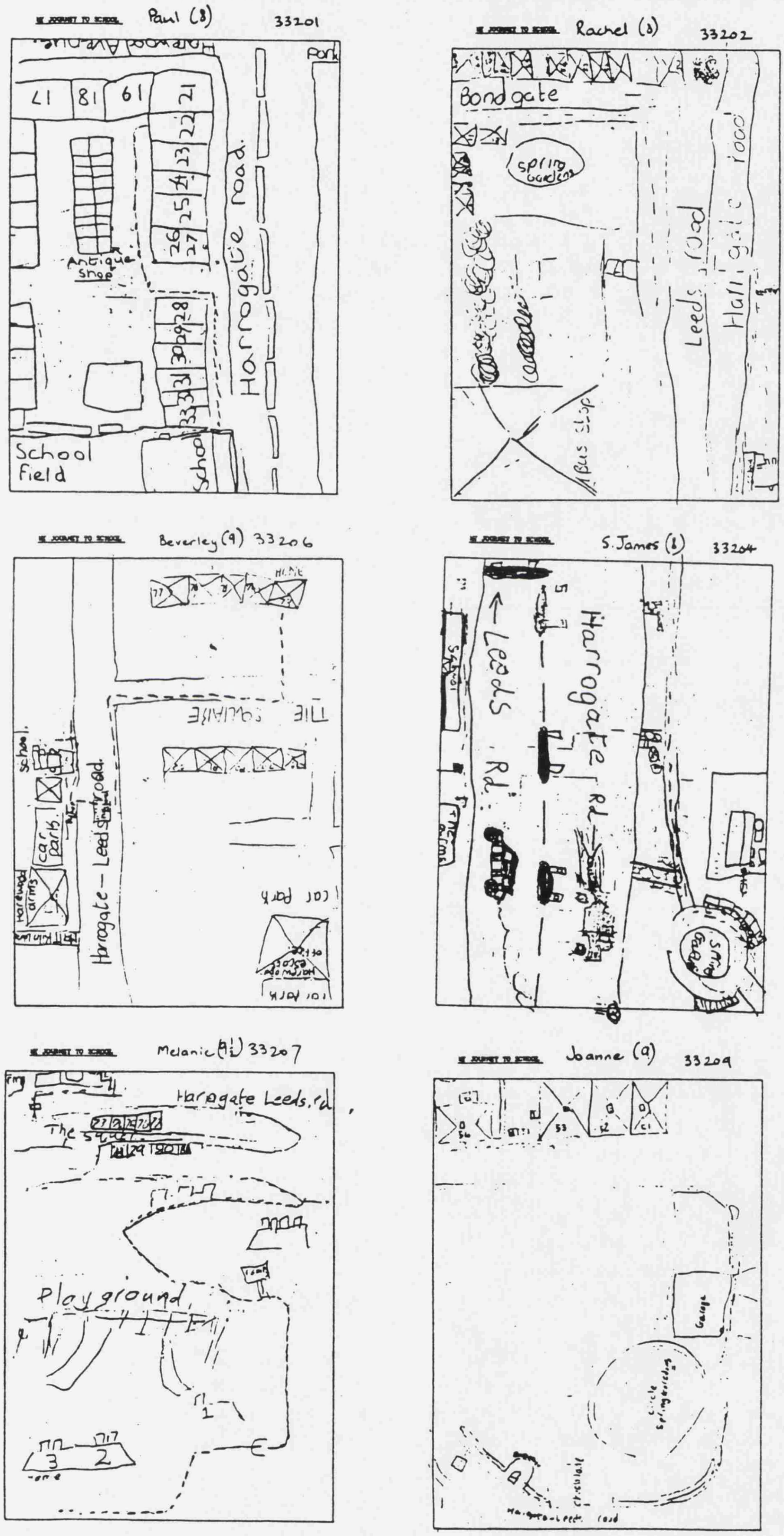


Figure 7.11 These maps from the same class show an unusual emphasis on roads. The proximity of the dual-carriage way and the roundabout to the school suggest that they might be highly salient features of the environment, whilst the label 'New Road' implies a fairly recent road-building programme.

The uniformity, however, suggests teacher influence.

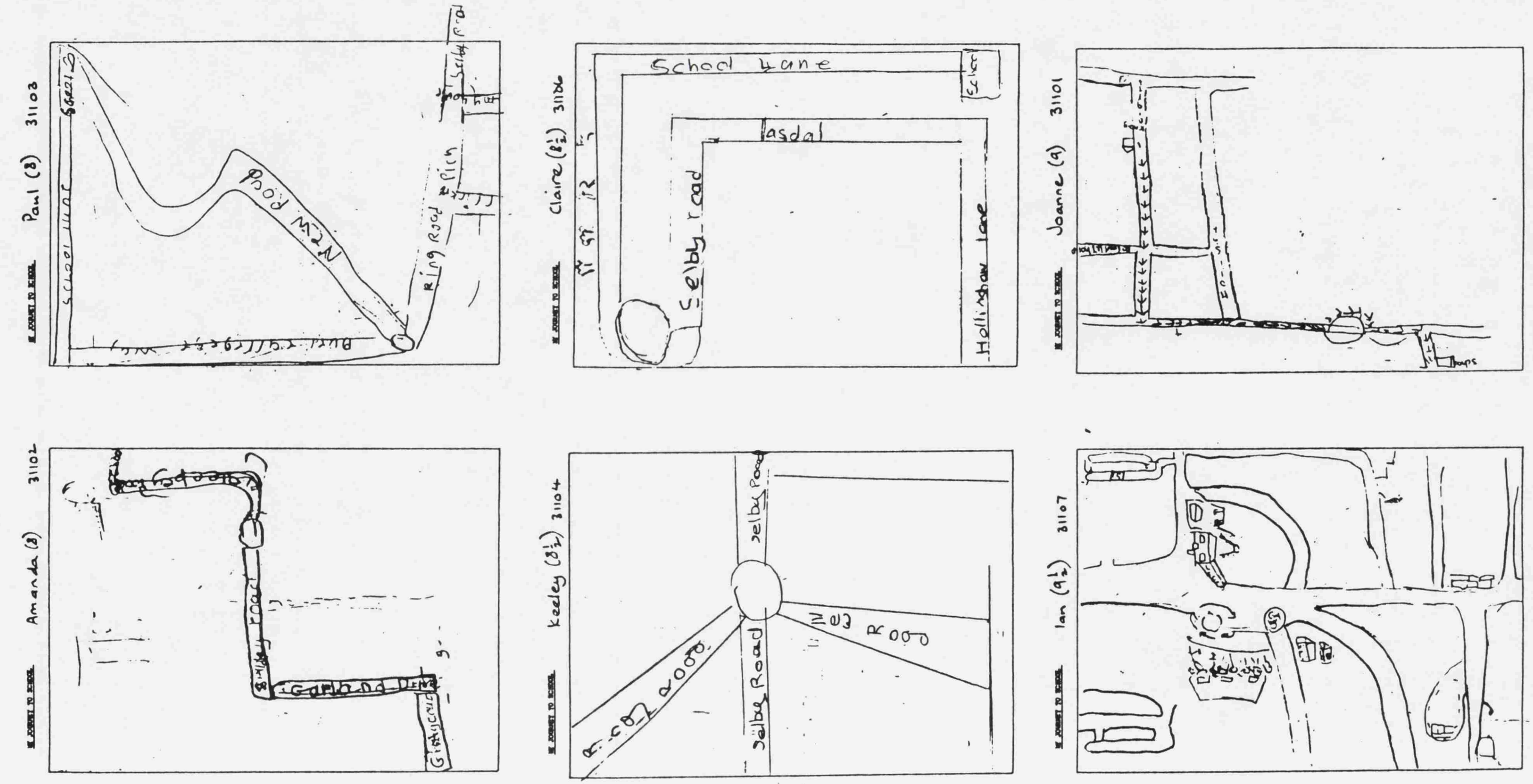
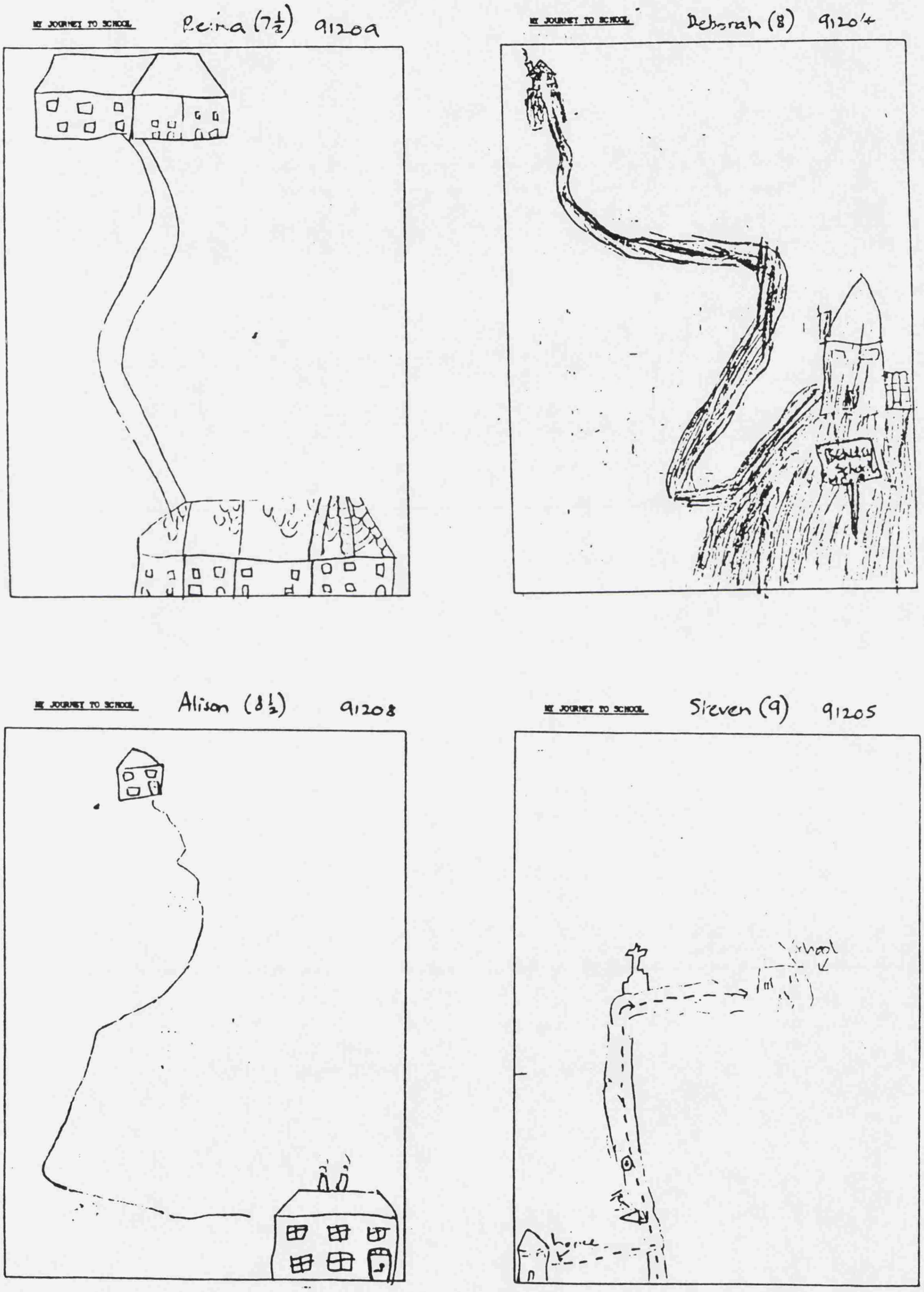


Figure 7.12 Basic maps from the youngest and oldest children in a class: some teaching might lead to more complex or advanced forms



pattern first but it is possible that the area near the school was indeed dominated by a road system.

In contrast, the maps in Figure 7.12, however, the maps of the oldest and youngest children in one class are all equally egocentric, and here more opportunity for mapping and some teacher time or attention devoted to mapping might be very effective.

7.8 Cognitive mapping task: conclusion

To conclude this discussion, we shall briefly consider Catling's (1978) assertions about the value of cognitive mapping tasks as a primary exercise. His first point (see section 7.42 above), that cognitive maps could be a useful diagnostic guide to children's developing spatial skills is fully supported. The present results indicate a progression in mapping skills with age and the use of a number of intermediate strategies as children find ways to solve various mapping problems. Secondly, the varied contents of the maps drawn by children from the same class support Catling's second point; namely that cognitive maps provide an informative guide to the important points in the landscape for individuals and for a class. The third point, that cognitive mapping is an instructive activity which might develop children's spatial and environmental conceptions cannot properly be answered by the present study; this assertion could be tested by asking children to make maps of the same area at intervals to look for individual progress.

The results of the present study reinforce the view that cognitive maps are a unique and accessible medium which can be both exact and expressive. They could provide a useful means of assessing children's spatial awareness and cartographic skills, and of evaluating the effects of different teaching approaches.

The journey-to-school task formed a graphicacy task for the lower junior version of the Prismaston File but was not included in the upper junior version. Instead these children were asked to construct bar-chart to represent data that they themselves would collect. A cursory analysis of the results of this task was carried out and will be reported now.

7.9 The Bar chart construction task: upper junior Prismaston File

The graphicacy task in the upper junior version asked the children to carry out a small survey of the transport used to get to school that day by ten other children in their class. This task was intended to parallel an exercise described in the Prismaston question booklet in which the story children carried out a similar survey, and presented the results as a bar-chart which was shown in the question book. This provided the children with a model on which to base their own bar-chart. In addition a series of multiple choice questions was intended to guide their bar-chart construction. These questions included one which asked them to select the best title for the chart. The Assessment of Performance Unit second survey of mathematics at 11 (APU,1980b) had shown that 11 year olds were surprisingly poor at producing bar-charts without pre-drawn axes. In the ORACLE study, however, it was concluded that block graph construction was well within the capability of fourth year children.

The scoring of the Prismaston bar charts was based on fourteen features of the charts. These took into account features rated as important in bar-chart construction by most of the small group of teachers who worked with Jasman on teacher-based assessment. Table 7.7 shows the percentage of the third and fourth year groups who included each feature correctly.

Table 7.7 Percentage frequencies of third and fourth year junior performance in bar-chart construction task

Feature	percentage of each age group 9 - 10	10 - 11
data list		
names of pupils	99	99
transport used	86	95
vertical axis		
origin correctly placed	65	68
numbers correctly placed	33	36
explanatory label	2	6
horizontal axis		
explicit categories	84	89
explanatory label	1	5
title		
any appropriate title	62	73
fully adequate title	24	46
plotting		
correct number of units	82	86
correct number of columns	80	94
one column correct	90	95
all columns correct	71	81
shading/differentiation	47	57
(Total number of children	92	124)

Although there was a tendency for the fourth years to be more successful in all categories, they were significantly more frequently correct than the third year juniors in only three categories in terms of chi-square analyses. These were: (1) adequacy of data collection in recording the transport used ($X^2 = 4.58$; df = 1; $p < .05$); (2) the use of an adequate title ($X^2 = 10.14$; df = 1; $p = .002$); (3) plotting the correct number of columns ($X^2 = 7.38$; df = 1; $p = .007$). Six features were poorly represented by both age groups. Five of these are concerned with adequate labelling of the axes and the graph as a whole, and one with the correct placement of the numbers in relation to gradations on the y axis. With the exception of these categories, this task would appear to have presented little difficulty to the majority of children in this age-group. This result is in agreement with the conclusions of the ORACLE study skills exercise (Galton and Simon, 1980) but contrasts with the APU (1980) conclusions, although a direct comparison with the latter is not possible since the present task was an active task in which the children collected their data; in the APU items the data had already been collected.

7.10 The assessment of graphicacy skills: conclusion

Two tasks designed to tap children's graphicacy skills have been described in this chapter; one in detail and the other very briefly. The mapping task revealed a clear progression with age and as such would be a useful exercise by means of which teachers could assess childrens cartographic competency and skills of spatial representation. the results of the upper junior bar-chart task suggest that this task was peformed with relative ease by most of the PRISMS children although there was evidence of imnprovement with age on some of the finer points, in particular in the selection of an adequate title for the chart. In retrospect, the extension of both of these tasks across both age-ranges would have provided a much fuller picture of age-related developments in these skills.

The review in Chapter 2 revealed a tendency for educational study skills literature to group the interpretation of different types of graphically presented information together as though a single set of skills were required; different aspects of the interpretation of verbal information on the other hand, are allotted several categories. The present findings may be interpreted to support the need for separate consideration of tasks involving different forms of graphic display. The results presented in Chapter 4 provided some evidence for separate factors for the interpretation of information from charts or graphs and from maps. The latter items were found to be less successfully answered. The present mapping task and the literature reviewed earlier suggest that children's cartographic skills would appear to have been a neglected area which, with more opportunity and guidance at primary level, would show marked improvement. At the same time, the present results suggest that the construction and interpretation of the charts, graphs and pictures was not difficult for older junior children. This medium could therefore be developed further to more advanced graphic displays on the one hand, and as an alternative to the traditional emphasis on literacy which presents considerable problems for a sizeable minority of children.

CHAPTER 8

Case studies of the Prismaston File in practice

8.1 Introduction

The recent and rapid developments in primary educational assessment, in particular the appointment of teams to prepare Standard Assessment Tasks, would seem to give added importance to the central argument of this thesis: namely the need for some informal yet systematic context-based method of assessment to bridge the gap between the supposed objectivity of standardised achievement tests and supposed subjectivity of teachers' judgements. These current developments, resulting from the Education Reform Act and from the progress of the concept of context-based assessment will be discussed in the final chapter. In the meantime, the case studies reported in this chapter form the basis of a critical evaluation of a prototype project-based assessment exercise: The Prismaston File.

The conventional course of development of assessment materials would involve successive trials of approximations to the final 'test' until the specified, or established criteria for reliability, validity, and usability were satisfied. The career of The Prismaston File differed somewhat from this pattern because of the time constraints within the PRISMS research project, and because of its prototypical nature. The pilot study reported in Chapter Three was followed immediately by the production of the materials which were distributed to the small schools participating in the PRISMS project. The time required for a class to use the materials was too long to permit any further trials before the materials were sent out.

The length of time which must be devoted to project-based assessment emphasises the need for thorough and critical evaluation of the method and materials. The opportunity to carry out such an evaluation of the Prismaston File occurred during the second phase of the PRISMS project when curriculum observations were carried out in two large primary schools. The children in four classes, two at first year junior level and two at third year junior level were observed regularly as they used the materials. These classes will be described in more detail below.

It is important to keep in mind that the 'Prismaston File' was written for use in small British primary schools mostly in rural areas. Its theme and contents would have little context validity in a large inner city multi-ethnic school, for example. For wider distribution the contents would need to be revised to take these factors and the National Curriculum requirements into account. The Prismaston File has served its purpose within the PRISMS project, but the evaluation to be reported here is relevant to the viability of any project-based assessment, and it will have implications for the national assessment proposals.

8.12 The aims of the case studies

The Prismaston File case studies had five basic aims and the attempt to achieve them will be described in this chapter and the next. These aims were concerned with the evaluation of the practical feasibility of The Prismaston File, of its content and concurrent validity, and of its value as a method of assessment at primary level. They are listed below.

1 to examine the practical feasibility of the approach:

a) how did the teachers absorb it into the classroom routine?

b) did the children have difficulty managing the materials?

2 to examine the content validity of The Prismaston File as an assessment of study skills:

a) did children actually use the resources?

b) did the children use the information obtained?

3 to produce a manageable scoring system for use by teachers, which would result in a 'Prismaston Profile' for each child;

4 to validate the Prismaston File as an assessment of study skills by comparison with children's performance on standardised tests of study skills, namely the Work-study tests in the Richmond Tests of Basic Skills (France and Fraser, 1975);

5 to examine the congruence of three forms of assessment:

standardised tests,

teachers' judgements,

Prismaston project-based assessment.

The first three aims and their outcomes will be described in this chapter. These were primarily qualitative, and involved information from informal observation, field notes and interviews with children. Aims 4 and 5 were based on correlational data from the measures listed above, and the outcomes will be described in Chapter 9. First, the schools and classes which provided the settings for the case studies will be described.

8.2 The schools and classes

The subjects of the case studies were the children in four classes, two from each of two large primary schools. The first school, Woodstock, served a deprived city area of council houses and high unemployment. The school building was an austere long-corridored, rectilinear two-storey 1950s building on a large site. The other school, Kirby, was an all-through county primary school, housed in a Victorian building which had been extended to provide some modern (1970s) classrooms, but was still dependent on some mobile classrooms.

The atmosphere and organisation within the classes differed between the two schools. The classes at Woodstock covered single age-groups; one was a first year junior class of 7 to 8 year olds, and the other was a third year junior class of 9 to 10 year olds. The teachers in both classes maintained high profiles. The whole class, in both cases, would work on one curriculum area at a time and the work was timetabled and regulated by bells. On one afternoon per week, each teacher ran a 'club' such as science, technology, history, singing, and children from any yeargroup could attend.

At Kirby both classes included children from two year groups: the class which will be referred to as the first year junior class consisted of older first year children and younger second year children, selected so that their dates of birth fell within one calendar year. Similarly, the third year class consisted of older second year and younger thir year children, whose birthdays also fell within one calendar year. The first and third year labels will be retained, however. Both classes used integrated day systems in which children were free to choose the order in which they completed the day's assignments.

The number of children who took part and the gender ratios from each class are shown in Table 8.1 together with the class age-range at the time of testing. The Woodstock classes and the Kirby third year group completed the Prismaston File in February 1985, and the Kirby first year group did so in May 1985 (delayed due to change of teacher in January.)

In the Kirby first year class (K1), the original plan had been to work through The Prismaston File with six or eight children, and make detailed records of their progress and attitudes to the work. The class was also 'contracted' to contribute to the Domesday project, however, and so it was split into a 'Domesday' group and a 'Prismaston' group.

Table 8.1 : Number of children in each class who completed* The Prismaston File

school	yeargroup	number	boys:girls	age-range
Woodstock	junior 1 (W1)	23	13 : 10	7y 3m - 8y 5m
Kirby	junior 1 (K1)	13	2 : 11	8y 0m - 9y 5m
Woodstock	junior 3 (W3)	27	14 : 13	9y 4m - 10y 3m
Kirby	junior 3 (K3)	33	19 : 14	9y 1m - 9y 11m

* A few children failed to complete enough items, through absence, withdrawal, reading difficulties etc. The number of these is as follows: W1 7; W3 1; K1 3; K3 1

8.3 Practical feasibility: field notes and informal observations

As part of the evaluation of the practical feasibility of this project-based assessment, observations were made of children working from the materials in four classes. Since the observer had been carrying out observations for the PRISMS' project in these classes, the children were familiar with the classroom observation routine, and seemed to accept close observation of their Prismaston work, and questions about it. In three of the four classes the teacher was in charge of running the Prismaston File. In the remaining class (of seven to eight year olds), the observer introduced the Prismaston work acting as teacher for that group. The two main aims of these informal observations were to see how difficult it was for the children to use the Prismaston File, and to see whether they actually used the resources such as the map and the reference book.
A number of general points for improvement of the materials also emerged.

The introductory session took longer than the hour suggested in the teacher's notes, particularly in the third year classes, and an hour and a half, or even two hours (with a break) turned out to be more realistic. The children appeared to enjoy the story and all four groups entered into the secret agent roles with enthusiasm. They produced 'TOP SECRET: NO UNAUTHORISED PERSONNEL'-type notices for their classroom doors, and speedily cleared away evidence of Prismaston work when 'aliens' from other classes appeared, just as the children in the pilot study, and in some main study classes, had done.

8.31 The Prismaston File in the lower junior classes

The children's interest in the work and their motivation to do it was maintained throughout. Some children had no apparent difficulties, or, after an initial hint, were able to continue completely independently. Consequently, the unsystematic observations which follow were based on children who needed help. This may appear to represent an unbalanced view, but it nevertheless provides an accurate representation of the viewpoint of teachers whose policy is simply to respond to requests for help: problems may seem to outweigh progress.

The first problem encountered was that the 7 to 8 year olds at Woodstock could not cope at first with the initial reading requirements of the Prismaston File. These children were only a third of the way through the school year, whereas the main study in the small schools had taken place at the end of the school year, in July. Furthermore, although acceptable readability estimates had been obtained, these estimates are based on assumption of standard prose, as explained in Chapter 3. In the Prismaston File, the main problem for these children was probably not word or sentence length, but rather their unfamiliarity with the structure of the writing and its departure from conventional sentence format. They soon became accustomed to it, however.

In spite of the detailed and lengthy introduction, the lower junior groups had difficulties with the first section. These included difficulties in coordinating the two booklets; not, as in the case of the pilot study, because they were too big, but because they had to get used to the small print size and found the crowded nature of the answer books confusing at first. Some had difficulty in cross-referencing between the question and answer books.

In addition to these technical difficulties, the first section introduced too many new ideas too quickly for this age-group: the children had to interpret maps, pictures and 'skyviews' in the first few items and would have found this easier if each new feature had been introduced in a separate section.

Two features of the younger children's approach recur at both schools. The first of these was their reluctance to read the instructions or paragraph of story preceding each section. The second was their reluctance to use this information, in spite of enthusiasm for the Prismaston File as a whole. A tendency to try to skip straight to the items had been anticipated in the teacher's notes, but it was surprising that this tendency continued throughout in some cases. For competent readers, this probably reflected the desire to press ahead. For others, the reading itself may have demanded so much attention that they were reluctant to begin to read the explanatory sections, or that the effort devoted to decoding print may have obliterated its informational content. At Woodstock, for example, Jitesh (49226) read aloud...

'Look carefully at the plan of Prismaston.

mx There is no ...... on the plan.'

but appeared, according to the observation notes, to be 'in a total fog, with no thought of actually looking at the plan, or reading the options'. Larry (49216) needed considerable persuasion to actually look in the book, and then at the map, yet he was quick to find locations when he did so. Kerry (49209), who had asked for help whilst working on the 'It's quicker by bus' section, re-read the relevant section and discussed and selected the correct response aloud; she then chose a different response as her final answer.

At Kirby, where the observer directed the group, similar problems arose, although the age range of this group was a chronological year older than the Woodstock children, and most of these children were competent readers. One boy Stuart (48325) progressed quickly after a slow start, but the other boys tended not to use the clues given and needed regular hints and 'pushes' to use the resources. Almost all of the girls were less dependent on teacher help than the boys, however and collaborated with each other more frequently. One girl Kym (48242), who had considerable reading difficulties, worked with her friend Lucy (48315) throughout and they spontaneously recorded their collaboration using the 'f' codes.

One group of four girls referred appropriately to the reference book and the dictionary and recorded their use of these resources correctly. They recorded their use of apparatus (string and a tape measure) to compare the lengths of the routes in the Journeys section. Even so, the tendency to 'go through the motions' of using the map or the dictionary, and yet not to use the information gained reappeared with this group. Serena (48205), for example, used the dictionary to look up 'bunpenny' but then ignored the definition. Gary (48228) whilst doing item 'pb' which asked the word meaning one hundred years, said, ...'I think it's a century'. He decided to look up the meaning of 'decade'....'ten years'...'Oh, so it's A' (i.e. decade).

The need for observational research on children's study skills was pointed out in Chapter 2, since previous studies have tended to rely on self-report measures. The present study included informal observation of the children's study behaviour, but revealed the need to record of the <u>outcome</u> of the behaviour. It was only because certain children asked for teacher help that their failure to use the information gained became apparent. The more systematic observation which was possible with the older children who were capable of consulting the resources independently, does not show whether the children used the information they gained appropriately.

8.4 The Prismaston File in the upper junior classes

In both third year groups the teachers administered the Prismaston File. They did this in different ways which were compatible with their normal practice, which had been observed in the PRISMS project. At Woodstock, all of the children worked from the same section at the same time. The teacher introduced some sections, pointing out potential pitfalls. This teacher took a very active role, usually walking amongst the desks and tables, 'trouble-shooting'.
At Kirby, in contrast, the Prismaston File was placed on the list of assignments for the children, along with Fletcher mathematics and various English language workbooks. The teacher remained at her own desk most of the time, leaving the children to get on with their work, whilst she listened to readers and responded to requests for help.

These differences in style were reflected in the children's records of the help and resources they had used. Teacher help was distributed more evenly at Woodstock: only two children did not record any teacher help, compared with 11 children at Kirby. The Kirby children, however, recorded more collaboration with their friends than the Woodstock children: 58 per cent of the Kirby third year class did so, compared with only 26 per cent of the Woodstock third year class. The means for the use of friends were significantly different (Kirby: mean = 4.77; s.d. = 6.93; N = 32; Woodstock: mean = 0.77; s.d. = 1.85; N = 21: $t = 3.11$; $.01 > p > .001$). In view of the highly skewed nature of these distributions, the use of a non-parametric test seemed more appropriate and so Mann-Whitney U tests were carried out. The results for both age-groups are shown in Table 8.2.

Table 8.2 Comparison of children's reported use of resources and help in the case study classes (Mann Whitney U tests)

Resource		N	mean rank	U	z (corrected for ties)	p (2-tail)
Lower junior classes (children who omitted 8 or less items)						
picture/	K1	13	21.8			
map/chart	W1	20	13.9	67.5	-2.31	.02
Prismmem	K1	13	21.0			
(reference book)	W1	20	14.4	78.0	-2.02	.04
apparatus	K1	13	20.4			
e.g. rulers	W1	20	14.8	85.5	-2.44	.02
friend	K1	13	19.3			
	W1	20	15.5	100.0	-1.11	.27
teacher	K1	13	13.9			
	W1	20	19.0	90.0	-1.49	.14
Upper junior classes (children who omitted 10 or less items)						
picture/map	K3	32	27.5			
/chart	W3	21	26.3	321.0	-0.27	.79
Prismmem	K3	32	26.0			
(reference book)	W3	21	28.5	304.0	-0.58	.56
apparatus	W3	32	28.8			
	K3	21	24.2	278.0	-1.55	.12
friend	K3	32	30.8			
	W3	21	21.2	214.5	-2.47	.013
teacher	K3	32	22.1			
	W3	21	34.5	179.0	-2.91	.004

In contrast to the first years, the initial sessions in the third year groups presented few problems. By this age, the coordination of the two booklets, the small print in the answer book and reference to resources did not cause difficulties for the vast majority. As Table 8.2 shows, there were no significant differences between the two older classes in the reported use of resources.

The children's use of resources and friends was observed and recorded by means of a simple checklist which consisted of a list of resources such as the map, the reference book, the teacher and so on, and pupil behaviour such as reading, writing, talking or apparently thinking. The main purpose of these observations was to see whether the resources were used, and recorded, in the appropriate sections. Although many of the children were notably diligent in their recording of resource use, the self-report methods used in the Prismaston File seemed to underestimate rather than overestimate, the child's study behaviour, particularly at third year level. Observation showed that the children referred to maps, and the reference book, consulted friends and used rulers to measure the lengths of lines, but did not always circle the relevant 'clue-code'. It is possible that some children regarded the need to use a resource or to ask for help as a failure, as though they should know the answers without reference to resources. If this was the case they would not wish to record it.

8.42 The children's views

The class organisation at Kirby made it possible to 'interview' a few of the children about their work on the Prismaston File. A selection of very straightforward questions was asked:

1 What (which section) were you just doing?

2 What kind of work is it?

3 Did you know what to do?

4 How did you do it?

5 Did you need any help?

6 Do you like this kind of work?

7 What kind of work do you like best/least?

8 Is this new work for you? Have you done any work like this before?

9 Is it hard work? What's hard about it?

Eight children were interviewed in this way, and their responses were written down as they answered. The first two questions were to see how the children classified the tasks. Only one used conventional subjects. She responded that it was 'interesting; geography, history work' (48309). Four did not provide any classification, but described what the items required in terms of their content:

'finding out how people get to school' (transport section, Paul, 48307);

'deciding what's in the park' (town plan, Philippa, 48310);

'you have to find out how much paint they would use' (council meeting, Robert, 48325);

'it's asking you questions like what the English think the French invented' (castles, 48329);

Two children, Richard and Claire, went into detail about the 'mechanics' of the item, which showed that they were doing what was intended :

'you had to look up in a book and see if you can find 'na' and look on a certain page and see if its A, B, C or D' (castles, 48333);

'it asks you a question about them and you have to compare two together, like which have keeps' (castles, 48317).

In answer to questions 3 and 4, most of the children referred back to the items, and went into more detail about what was required. One girl explained her choice of site for the clinic (in the Council meeting section) and this developed into a discussion of the item:

'I decided here (east of the school). If it was near the river, well, I don't think that would be a good idea...(why not?...)

'You need a clinic in a safe place, and if it's beside the school then teachers have only a short way to the clinic with and infant or junior, and parents picking up their children can call with babies' (Philippa, 48310).

At this point her friend joined in:

'I decided to put the clinic here because there's the river and it would be peaceful for old people' (Tamar, 48327).

LH 'We don't know what kind of riverside it is, or if it is a calm river,'

Philippa: 'It doesn't make any difference if there are babies and children. Even if it's calm, the babies might fall in and go down because of the shock...

Tamar 'Well I thought if it's calm it will be peaceful for the old people but if it's near the school it would be too noisy for them.

In answer to question 9 , Philippa said,

'It can be sometimes.... it's deciding what place. I think it's essential to make a good decision.

Other responses to questions 3 and 4, included one child who said he didn't really know what to do, and another who said

'I asked (the teacher) for the second bit. For the white paint I used my ruler' (items cq, cr; Robert, 48325).

Questions 6, 7, 8 and 9 asked the children to say what kind of work they liked best and whether they liked the Prismaston File work. All of the responses were positive; two preferred it to their regular work and one pointed out that he liked the 'houses' section better than the 'transport'. When asked if the work was hard, most found it 'quite hard' ...e.g.

> 'Not too hard, but interesting - a bit unusual' (Paul, 48307), or
>
> 'Well it's hard in some ways. Nothing's really hard, - it's not easier than Fletcher; it's not easier than English. It's got lots of things, like houses, that you don't really do in English' (Scott, 48329)
>
> 'Quite hard. The hardest so far is 'castles' because you have to keep changing pages. (Richard, 48333)

The responses from these children seemed to illustrate that the Prismaston File was set at an appropriate difficulty level and that they were interested in the work.

8.43 The listening-drawing exercise

The listening-drawing task was carried out as a class lesson as suggested in the teacher's notes in all four classes. The session in the Woodstock third year junior class will be described as an example. The teacher read the description twice in a rather dry, formal voice. He drew a cylinder on the blackboard and elicited from the children that the body of a Prismon was the same shape as a Toblerone packet. He did not define 'hexagon', but reminded the children that they 'had done two-dimensional shapes'. One child took notes. The children then worked on their drawings in near silence.

Most drew the Prismon's head first, in great detail, and many ignored the instruction that Prismons have 'no nose'. Some took measurements, having drawn the head, to find the correct length for the body. Some tried to draw a triangular prism with a ruler, but rubbed out their attempts and apparently compromised by drawing a triangle. The details of the fingers and toes seemed to have been forgotten by the time this stage was reached. One boy (Scott, 49311) drew a very detailed Prismon. He included the cutlery, a spanner, pencil and paintbrush, which were suggested, along with both a standard and a Phillips screwdriver, and yet was inaccurate in terms of the gross features such as the number of arms and legs. Some children had finished in ten minutes, but others such as Dean (49302) were still busy after 25 minutes.

8.44 Practical feasibility: conclusions

The first two aims of these case studies were to examine the practical feasibility and the content validity of the Prismaston File. This was done by means of informal classroon observation of the children using the materials and by questioning the children in one of the third year junior classes. At third year junior level, the integration of the materials into the class routine did not present any problems. The introduction was adequate for these children to proceed with the tasks, but more time was required for this session than had been originally anticipated.

The children demonstrated a positive attitude to the Prismaston File, and their comments on how they tackled the items showed that they had responded and used the materials as intended when the items were prepared. The observations of their use of resources such as the map, the reference book and apparatus such as rulers showed that the self-reported use of the resources underestimated the degree to which the resources were actually used, especially at third year level. The tasks and use of the materials seemed to be at the appropriate level of difficulty. At third year level the evidence from the case studies validated the contents and aims of the Prismaston File as an assessment of study skills.

At first year junior level, however, a number of difficulties were observed. Firstly, the introduction was inadequate and the demands placed on their reading skills in the first place were too great. Many of the younger juniors needed strong encouragement to use the resources, and some found it difficult to coordinate the different booklets. There was also a recurrent tendency for children to ignore or reject the information they had found, read and interpreted, in favour of some other answer.

In summary, the Prismaston File would seem to have elicited study skills in the nine to ten year olds, but the conclusion is less clear for the seven to eight year olds. These observations lend some support to the interpretation of the factor analyses reported in Chapter 4, in which the results of the upper junior factor analysis seemed best interpreted in terms of resources and type of information. The analysis of the lower junior data however, seemed best interpreted in terms of a dependence on topic, and this was congruent with their inconsistent use of the resources.

The observational study was, for reasons of time and resources, a limited one and the conclusions can, at best, be tentative ones. The young children's apparent dependence on topic could have been because they were unable to assimilate the new information in the context of the Prismaston File. Alternatively, it could be argued that the younger children had received insufficient instruction in the necessary study skills to carry out the exercise satisfactorily.

8.5 The development of Prismaston pupil profiles

The third aim of the case studies was to develop a scoring system for the Prismaston File which would take into account the findings of the main study. The detailed marking schemes used there provided information about the Prismaston materials and were not presented in such a way as to provide information about individual pupils. The present aim therefore was to reduce the marking task and to provide a profile of each child's performance in the different tasks. This 'Prismaston Profile' would include 'study skills' scores from the multiple choice sections, the listening-drawing task and the graphicacy tasks, and 'study behaviour' values based on the child's recorded use of resources and help from friends or the teacher. One important principle throughout this exercise was that the scoring system should be simple and relatively quick to use. If the teacher wished to study one aspect of the profile in more depth, then s/he could choose to adopt a detailed marking scheme, for the maps, or drawings for example.

The compilation of these profiles will be described next and some examples will be provided in Chapter 9.

8.51 : Literacy and graphicacy interpretation skills: (the multiple choice sections)

The purpose of the factor analyses described in Chapter 4 was to reduce the Prismaston item scores to a number of sub-scales derived empirically from the children's performance. Four 'refined' subscales were identified, but these consisted of very few items which would not seem to do justice to the time a class would have spent on the Prismaston File. Instead, therefore, the items with loadings greater than 0.3 on each of the four factors were marked. One possible strategy for incorporating as much information as possible from the small schools study would have been to use the factor loadings as item weightings in marking the case study material. For the sake of simplicity, however, each correct item was allocated one point on the factor it represented. The factors and their abbreviated 'labels' for each version are shown in Table 8.3a. The item composition of each factor together with the resources needed for the items is shown in Tables 8.4 and 8.5. The number of unanswered items which would have contributed to the factor profile was also counted.

Table 8.3a The Prismaston File: factor scales showing number of items and expected use of resources for the upper and lower junior versions.

Upper junior factor scales

I	graphs, charts and tables	6 items
II	literal comprehension	14 items
III	maps and mathematics	8 items
IV	advanced comprehension	12 items
M	number of items in each scale which were omitted	

Lower junior factor scales

I	transport: graphs and tables	15 items
II	houses: pictures/map	11 items
III	town plan: map	9 items
IV	the past: comprehension and timeline	10 items
M	number of items in each scale which were omitted	

8.52 Use of resources and recorded help from friends or teacher

These aspects of the Prismaston File were recorded for each item in the main study and were discussed in Chapter 5. The data presented there showed that such a detailed record would not be justified for class purposes and that the total number of appropriate uses of the resources would be adequate. The number of uses expected are shown in Table 8.3b, and the items for which they would be expected to be used are indicated in Tables 8.4 and 8.5.

A primary purpose of the friend and teacher codes, however, was to indicate the child's dependency on help from others, and this would be a vital contributor to a teacher's assessment of the child's study behaviour. The teacher codes had been divided into four 'grades' (read, hint, explain, omit) in the main study but the retention of these categories was not justified by the frequencies with which they were used. For the present purpose, if any of the teacher help had been circled for an item it counted as one point toward the general 'teacher' total, even where two or three codes had been circled for an item.

Table 8.3 b Expected use of resources

Resource	Upper junior expected uses	Lower junior expected uses
maps/charts/pictures (p)	18	6
Prismmem or reference book (*)	18	8
apparatus (a)	4	2

Table 8.4 Upper junior Prismaston File : multiple choice items marking plan (showing resources for each item)

item	answer	map/chart picture (p)	reference book (*)	apparatus (a)
FACTOR I : Graphs, charts and tables				
ma	A	p	-	-
mb	D	p	-	-
tb	B	p	-	a
tc	D	p	-	a
td	B	-	-	-
te	A	-	-	-
FACTOR II : Literal comprehension				
ta	D	-	*	-
di	A	-	-	-
na	A		*	-
nb	C	-	*	-
nc	B	-	*	-
nf	B	-	*	-
ng	C	-	*	-
nh	C		*	-
ni	B	-	*	-
nj	D	p?	*	-
nl	A	-	*	-
ya	C	p	*	-
yc	A	p	*	-
yf	C	p	*	-
FACTOR III : Maps and mathematics				
hc	C	p	-	-
gd	D	p	-	-
cm	D	p	*	-
cn	D	p	-	-
co	A	p	-	
cq	B	-	-	
md	D	p	-	
xa	C	-	-	-
FACTOR IV : Advanced, inferential comprehension				
cs	A	p	-	-
tg	C	-	-	-
da	C	-	-	-
db	C	-	-	-
dc	D	-	-	-
dd	B	-	-	-
de	A	-	-	-
dj	B	-	-	-
nk	C	p	*	-
nm	A	-	*	-
yd	B	p	*	-
yg	A	p	*	-

Table 8.5 Lower junior Prismaston File : multiple choice items marking plan (showing resources for each item)

item	answer	map/chart picture (p)	reference book (*)	apparatus (a)
FACTOR I : Transport; graphs and tables				
tb	B	p	-	-
tc	A	p	-	-
td	D	p	-	-
te	D	p	-	-
tg	D	p	-	-
ce	B	p	-	-
cf	A	-	-	-
cg	D	-	-	-
ch	C	-	-	-
ci	D	p	-	-
ck	A	p	-	-
fb	A	p	-	-
fc	B	p	-	-
ff	D	p	-	-
fg	D	p	-	-
FACTOR II: Houses: pictures/map				
hx	D	p	-	-
ht	D	p	-	-
hs	B	p	-	-
hr	B	p	-	-
gx	B	p	-	-
gv	B	p	-	-
gt	D	p	-	-
gs	C	p	-	-
pl	B	-	*	-
pn	A	p	*	-
jg	A	p	-	a
FACTOR III: Town plan: map				
hv	B	p	-	-
ja	D	p	-	a
jb	C	p	-	-
cl	C	p	-	-
cm	C	p	-	-
fe	A	p	-	-
mx	C	p	-	-
mv	A	p	*	-
ms	A	p	-	-
FACTOR IV: the past: comprehension and timeline				
pa	A	p	*	-
pb	D	-	*	-
pc	C	-	-	-
pd	A	-	*	-
pe	C	p	*	-
pk	A	p	*	
jf	A	p	-	-
ta	D	-	*	-
ca	A	-	-	-
cb	A	-	-	-

8.53 The Prismon listening-drawing exercise

In addition to the reduction of the multiple choice data, the cumbersome procedure scoring of the listening-drawing exercise reported in Chapter 6 also required reduction to manageable form. Initially just the variables which had shown a large difference between the younger and older groups had been identified for a reduced scheme but these tended to be too isolated or trivial to represent an adequate view of a child's listening and drawing skills. Instead, three basic scores were drawn from the main study, which took into account the importance of speed and simplicity during classroom use. The scores were:

1 listening-accuracy

2 3D drawing

3 elaboration.

The composition of all three is shown in Table 8.6.

8.54 The graphicacy tasks

1 The bar-chart (upper junior)

The results of the bar-chart task shown in Chapter 7 indicated that most aspects of the task were easily achieved by the upper junior age group. Only three aspects differentiated between the two year groups. These were: the collection of complete data, the selection of an adequate title and plotting the correct number of columns. In the case study classes, a similar pattern was observed, and only two aspects had any discrimination value since the vast majority of the children satisfied the marking criteria on almost every aspect, including the data collection and plotting the correct number of columns. The marking scheme was reduced to record two aspects which did differentiate between the children. These

Table 8.6 : Marking plan for the listening task : 'Draw a Prismon'

1 LISTENING ACCURACY

1 mouth	1
3 eyes	1
3 ears	1
3 nostrils	1
3 arms	1
3 legs	1
6 fingers each hand	1
6 toes each foot	1
nostrils top of head	1
arms at points or edges	1
legs at points or edges	1
TOTAL ACCURACY	10

2 THREE DIMENSIONAL DRAWING

These scores are cumulative so that e.g. a combination of circles and parallel lines scores 3; a successful cylinder drawing scores 4.

HEAD	
circle, oval, curves	1
parallel lines/rectangle	1
combination of parallel and curved lines i.e. attempted 3D drawing	1
successful 3D cylinder	1
TOTAL	4

BODY	
triangle or angle	1
parallel lines/rectangle	1
combination of three parallel lines and angle or triangle - 3D attempt	1
successful triangular prism	1
TOTAL	4

3 ELABORATION

ONE mark for each DIFFERENT finger- or toe-tip (include givens) maximum possible 36

Two scores which consisted of four aspects each of labelling and layout. These are listed in Table 8.7.

2 Picture/plan of the journey-to-school (lower junior version only)

The detailed scoring scheme for the picture/plans which was developed for the main study was reduced to take note of seven primary features of the case study maps. Categories which had obtained low frequencies in the small schools sample, such as the more complex forms of road/line system (e.g. nets and loops), the intermediate forms of house-representation, and the non-verbal categories of cartographic competence were combined with higher frequency categories. Catling's (1978) stages of cognitive map representation showed a shift from an egocentric to an external frame of reference in this age-group and the maps were coded on this dimension. A map was coded as 'egocentric', if the road system began and ended at the home and school points, and as 'external', if the roads extended past these points to show the existence of routes beyond the child's journey. Both Catling's scheme and Matthews' (1984a) 'cartographic competence' scheme combine evidence from a number of dimensions such as orientation or projection, into a single figure to represent a stage or grade. This made coding difficult when the different dimensions were out-of-phase. Consequently some of these different dimensions were coded separately in the present study, each more specific than those in the Catling or Matthews' schemes and so more useful for teaching purposes. A list of the features which were coded is listed below, and a marking breakdown of each one is shown in Table 8.7.

1	frame of reference	2	cartographic competence
3	labels	4	representation of buildings
5	line/road complexity	6	points (landmarks)
7	key.		

Table 8.7 : Marking scheme for the graphicacy tasks

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1 The transport bar-chart: upper junior version only

1 Labelling (maximum 4)

1	y axis labelled correctly
1	x categories labelled clearly
1	adequate title
1	bars clearly differentiated.

2 Layout (maximum 4)

1	origin correctly placed
1	y axis numbered correctly
1	numerals at gradations
1	all columns correct height and width.

---

2 The journey from home to school: lower junior version only

1 Frame of reference

1 egocentric
2 external

2 Cartographic competence

1 pictorial
2 pictorial-plan
3 plan.

3 Labels

0 no labels
1 1 - 3 labels
2 4 or more labels.

4 Buildings

1 iconic - picture buildings: three-dimensional views,
2 mixture of pictorial and plan forms,
3 plan form or aerial view.

5 Line complexity

1 single line,
2 focal e.g. T junction or cross-roads
3 branched line or network.

6 Points

0 no landmarks
1 1 - 5 landmarks (including home and school)
2 6 or more.

7 Key

0 or 1 to show key or no key (redundant in present sample.)

Table 8.8 Example of Prismaston Profile (upper junior version)

Pupil's name (48310)	Age: 9y 5m:	Birth date: Aug. 1975	
STUDY SKILLS : INTERPRETATION		maximum	score
I LITERACY interpretation skills;			
literal comprehension		14	11
inferential comprehension		12	5
GRAPHICACY interpretation skills			
graphs, charts, maps (coordinates)		6	6
map - mathematics (scale)		8	3
II TRANSPOSING INFORMATION			
Draw-a-Prismon listening and drawing task			
listening accuracy		10	6
three-dimensional drawing		4,4	3,2
elaboration		36	4
III GRAPHICACY TASK			
Bar chart construction			
labelling		4	3
layout		4	4
STUDY BEHAVIOUR			
IV USE OF RESOURCES (self-recorded)			
reference to charts, maps etc		18	3
reference book		18	11
use of apparatus		4+	0
V HELP	collaboration with friends	0	
	consultation with teacher		7

8.6 Prismaston profiles

This scoring system gave rise to profiles containing information about the children's study skills consisting of: (I) information about study skills based on both recognition tasks in the areas of literacy, and graphicacy; (II) performance in the task of transposing information from verbal to graphic in the listening-drawing task; (III) a graphicacy task (bar-chart at upper junior; journey-to-school at lower junior level) and information about an individual's study behaviour consisting of (IV) use of resources; and (V) consultation with friends or with the teacher. Each profile contained a total of 15 scores at third year junior level, and 20 at first year junior level.

An example of an upper junior level profile is shown in Table 8.8 and further examples will be presented in Chapter 9. The profile shows the maximum score for each component and the pupil's score. Other reference points which might be provided are the class mean and standard deviation if the teacher wanted a class-based reference, but for individual diagnostic purposes, a closer examination of a section in which a low score was obtained would be necessary to indicate where further experience was needed. Alternatively, this might be done on a class basis if the majority of children obtained few marks on the same component. In other words, the teacher could set the criterion for each component on the basis of work and skills which the class or the individual had already covered.

Summary and conclusions

This chapter has been concerned with the first three aims of the cases studies. The practical feasibility and the content validity of the Prismaston File were evaluated and it was concluded that these were satisfactory at third year junior level. The third aim was to develop a shorter scoring scheme for the Prismaston File which would reflect all aspects of the exercise and take into account the findings of the main study. The result of this process was a Prismaston Profile consisting of five parts and reflecting study skills of both literacy and graphicacy and in the transposition of information, as well as study behaviour in consulting resources and other people. In the next chapter, comparisons of the Prismaston File scores in the four case study classes will be described, and the two remaining aims of the case studies will be discussed.

CHAPTER NINE

The Prismaston File and other forms of assessment: case study evidence

Introduction

This chapter will continue the evaluation of the Prismaston File. First, the concurrent validity of the Prismaston File as a measure of study skills will be determined by comparing children's performance on the Prismaston scales with their performance on the Richmond Work-study tests. Secondly, the children's records of their study behaviour in the use of resources and consultation with friends or the teacher will be considered in relation to a set of teacher judgements about each child which include behavioural, social and intellectual ratings.

In the third part of the chapter the Prismaston File will be considered as an intermediate form of assessment between the extremes of standardised testing on the one hand and teacher judgments on the other. Neither of these can provide a full picture of the child's achievement and study behaviour in ordinary conditions and the use of project-based assessment to complement these techniques will be discussed. The potential and the pitfalls of this form of assessment will become evident in the interpretation of the present results.

The emphasis throughout this chapter will be on the results in the third year classes because the Prismaston File appeared to work more satisfactorily with this age-group, and because the sample of first year children proved in the end to be rather small.

9.11 The concurrent validity of the Prismaston File

Although the Prismaston File is not a test the question of its validity as a form of assessment needs to be addressed. This would be the case for any project-based assessment. The American Psychological Association's (1966) classification of forms of validity (Cronbach, 1971), evolved for the validation of norm-referenced tests, divides validation studies into three types: content validity, concurrent validity and construct validity. The content validity of the Prismaston File was examined in Chapter 8 in terms of whether children used study skills in answering the questions. The determination of the concurrent validity of a measure is concerned with whether it produces results in agreement with those of another measure of the same skills, whilst construct validity is the attempt to identify some fundamental trait which would seem to underpin the new measure. This section is concerned with the concurrent validity of the Prismaston File; its construct validity will be considered in the next section.

The concurrent validity of the Prismaston scales (derived from the factor analysis of the multiple choice sections) was examined using the work-study tests from the Richmond Tests of Basic Skills battery (France and Fraser, 1975). The three work-study tests are: (i) Map Reading (30 minute time limit), (ii) Reading Graphs and Tables (20 minute time limit); (iii) Knowledge and Use of Reference Materials (30 minute time limit). These tests were administered in succession to both third year junior classes in their own classrooms under the test conditions set out in the test manual. In the pilot study (see Chapter 3), these tests were administered in order to assess the validity of groups of Prismaston items, but there were very few children involved. The present study involves the collection of both Prismaston and Richmond work-study scores for 50 children. The tests all use a multiple choice system with four alternatives per item. The map and graph tests have groups of items based on maps or graphs, printed in small 'boxes' alongside the questions. The questions are athematic. The 'use of references' test requires children to 'use' an index, to show an understanding of alphabetical order, to 'use' a dictionary by applying these skills to short extracts taken supposedly from a dictionary and an encyclopaedia printed beside the questions. The children's responses were marked according to the Richmond test manual and the raw scores were converted to standard age scores.

9.12 The Prismaston File and performance on the work-study tests

Significant positive correlations which range from $r = 0.33$ ($p < .05$; $N = 50$) between the Richmond map-reading test and the Prismaston graphs and charts scale to $r = 0.56$ ($p < .001$); $N = 50$) between the Richmond test of 'Interpreting graphs and charts' and the Prismaston literal comprehension scale were obtained. These correlation coefficients are shown in Table 9.1. The only coefficient which was not significant was between Prismaston Scale IV which consisted of inferential comprehension items and the Richmond 'Use of references' test. This scale had the lowest correlations with the Richmond tests and this suggests that it had no equivalent in the Richmond tests. The items on this scale required more detailed study of the materials than is required by any of the Richmond tests.

To summarise, the correlations with the Richmond tests support the concurrent validity of Prismaston scales I, II and III although the coefficients are not of the order that would be required between two uni-dimensional tests. Scale IV obtained no validatory support, however.

Table 9.1 : Correlations between the Prismaston scales and the Richmond Work-study tests (9 - 10 year olds)

Prismaston scale		Richmond Work-study tests: map reading n = 50[1]	graphs and tables n = 50	use of references n = 49
I	graphs; charts	0.33 *	0.54 ***	0.43 **
II	literal comprehension	0.48 ***	0.56 ***	0.47 ***
III	map mathematics	0.43 **	0.53 ***	0.42 **
IV	advanced comprehension	0.35 *	0.33 *	0.23 ns

Two-tail significance levels: *: p < .05; ** : p < .01; *** p < .001
[1] children who had omitted 10 or more items excluded)

9.13 Concurrent validity within the case study classes

Tables 9.2 and 9.3 show the correlations between the Prismaston scales and the Richmond Work-study tests for the Kirby third year class and the Woodstock third year class respectively. Eight of the twelve correlations in both tables are significant and positive and the overall pattern in both classes therefore supports the validity of the Prismaston File. The most obvious difference between the matrices for the two classes is that the correlations are considerably higher in most cases at Woodstock (mean r = .57; p < .05; Table 9.2) than at Kirby (mean r = .41; p < .05; Table 9.2).

The major exceptions to this are in Scales I and IV. At Woodstock, the Richmond work-study performance was associated strongly with Scale I performance but only weakly and not significantly, with Scale IV performance. At Kirby this pattern was almost reversed: there was a weak relationship between the Richmond scores and Scale I accompanied by a stronger one (except in the 'Use of References' test) with Scale IV.

Table 9.2 Inter-correlations between Prismaston scales and Richmond work-study tests within Kirby third year junior class

Class K3: 9 - 10 year olds

	I	II	III	IV	maps	graphs	refs
Prismaston scales							
I charts	-						
II compreh.	63***	-					
III maps	39*	25	-				
IV adv. comp	36*	67***	33	-			
Richmond tests							
Map-reading	22	52**	41*	53**	-		
Graphs	39*	42*	52**	35*	53**	-	
Use of refs	24	23	41*	13	48**	53**	-
	Prismaston scales				Richmond tests		

N = 32 except in Richmond 'Use of references' test: N = 31

Two tail test significance levels: * p <.05, ** p <.01, *** p <.001

(1) children who had omitted 10 or more items excluded)

Table 9.3 Inter-correlations between Prismaston scales and Richmond work-study tests within Woodstock third year junior class

Class W3 : 9 - 10 year olds

<u>Prismaston factors</u>							
I charts	-						
II compreh.	78***	-					
III map-maths	69**	52*	-				
IV adv comp	45*	63**	24	-			
<u>Richmond tests</u>							
map-reading	55*	28	74***	21	-		
graphs	81***	60**	80***	39	68**	-	
use of refs	74***	68**	56*	42	51*	67**	-
	I	II	III	IV	maps	graphs	refs
	Prismaston scales				Richmond w-s tests		

Prismaston scales N = 21; Richmond tests N = 18

Two tail test significance levels: * p<.05; ** p<.01; *** p<.001
(1) children who had omitted 10 or more items excluded)

The intercorrelations within the Richmond scores and the Prismaston scales for each class shown in Tables 9.2 and 9.3 show significant intercorrelations within the Richmond tests for both classes. The Prismaston intercorrelations show similar patterns between the two classes but the coefficients are higher at Woodstock, particularly in the case of Scale III (map-mathematics). In neither case is there a significant association between the map-mathematics scale (III) and the advanced comprehension scale (IV).

Table 9.4 shows the means, ranges and standard deviations for the Prismaston factors and the Richmond tests. The failure of the Prismaston scales to discriminate between the two classes is immediately obvious, in comparison to the Richmond work-study tests which differentiate sharply between them.

9.14 Explanations for the differences between the two classes

It may be that the failure of the Prismaston File to discriminate between the classes is inherent in the materials or, alternatively it may result from differences in the organisation of the tasks. At Kirby, the Prismaston File was carried out concurrently with other curriculum areas; the teacher remained at her desk for most of the time and help was given to children who went to ask for it. The children's records show that the distribution of help was very uneven but that they recorded consultations with friends significantly more frequently than the children at Woodstock. (see Table 8.2). At Woodstock, the teacher provided more support for The Prismaston work; the children worked on the same section at the same time. The teacher introduced certain sections to the whole class. He read the 'Castles' section from the reference book to the class and the children then worked quietly and individually whilst the teacher walked around the classroom available to give help if asked. At Kirby, on the other hand,

Table 9.4 Comparison of means of third year case study classes on Prismaston scales and Richmond work-study tests

(N items)	class	N	mean	s.d.	F	p	range
PRISMASTON FACTORS							
I (6)	K3	32	4.06	1.63			0 - 6
charts/graphs	W3	21	3.95	1.72	0.56	ns	0 - 6
II (14)	K3	32	8.48	2.77			1 - 13
comprehensn	W3	21	6.86	3.35	3.49	ns	0 - 12
III (8)	K3	32	2.47	1.70			0 - 7
map/maths	W3	21	2.95	1.94	0.92	ns	0 - 6
IV (12)	K3	32	4.97	2.24			2 - 9
adv. compreh	W3	21	5.10	3.08	0.03	ns	0 - 11
RICHMOND WORK-STUDY TESTS							
1 mapreading	K3	32	109.91	11.87			88 - 130
	W3	18	96.61	11.37	14.88	.000	82 - 118
2 graphs	K3	32	112.06	11.34			92 - 130
	W3	18	97.61	15.72	14.11	.001	82 - 118
3 references	K3	31	108.42	12.15			81 - 130+
	W3	18	101.06	11.97	4.23	.045	83 - 122

the children read the 'Castles' passage for themselves when they reached that section. It could be that the level of teacher involvement with the work did promote better performance on the Prismaston work at Woodstock; on the other hand, it detracted from the intention of the Prismaston File that children should work independently from it. At Kirby the children seemed well-motivated without this additional interest on the part of the teacher.

Another explanation for the failure to find a difference between the two classes on their Prismaston performance may be found in the whole class organisation at Woodstock. Since it was organised so that the whole class worked from the same section at the same time, more children missed whole sections there, reducing the Woodstock sample size to only 21 children who omitted less than 10 items (i.e. typically one whole section, or two 'blocks of four answers in the answer book; the actual cut-off was decided by examination of the frequencies). This may have tended to select the more capable children, or better readers from Woodstock, if, for example, the reason for the omissions was withdrawal to a remedial group. In practice there was no obvious single reason, however. At Kirby, the organisation meant that anyone who was withdrawn to another group, could continue from where they had left off during the next work period.

To conclude this section, the Prismaston File does not meet the standards which would be required if it were to be used as a test. Although its claim to measure study skills is supported by the correlations with the Richmond Tests of Work-study skills, it did not discriminate between two classes which did differ significantly on the basis of test results. It has been the theme throughout, however, that a test may provide a limited view of a child's study skills when placed in the context of normal classroom conditions. The present alternative form of assessment is dependence on teachers' judgments but these, although based on a wide range of different contexts are also subject to numerous influences, such as the teacher's own experience and expectations, the child's personality and reputation, test results and continuous unsystematic classroom assessment (Alexander, 1984). The Prismaston File represents an attempt to come between these extremes of assessment by providing a record of study skill performance and study behaviour, and the information it has provided about the children in the present study will be compared with information from teacher's judgements. Before that we shall consider the construct validity of the Prismaston File.

9.2 The construct validity of the Prismaston File

The upper junior Prismaston scales were clearly divided into two which involved reading (II and IV) and two which included the observation of graphic displays (I and III); these pairs of factors were referred to in Chapter 4 as being verbal or spatial respectively. At lower junior level no clear separation emerged but three of the factors involved the observation of graphic displays. In order to test whether performance on the Prismaston factors was underpinned by spatial ability, the Progressive Coloured Matrices (Raven, Court and Raven, 1983) were administered. The Progressive Matrices test was selected because it is basically a test of pattern recognition and many aspects of map-reading, interpreting graphs and interpreting matrix displays such as timetables and charts would seem to involve this basic ability. The test uses a multiple choice format and so the children were familiar with the answering system. Most importantly, it is untimed so that although test conditions were imposed,a time limit was not.

In addition to the Progressive Matrices scores, reading ages (Burt, 1962) were obtained from the children's records in three classes whose teachers' offered this information. The reading tests had been carried out within 6 months of the administration of the Prismaston File. Ideally a test of reading comprehension would have been used as a validation instrument, but the Burt scores were used in order to avoid making a further imposition on teacher and class time which had already been given in generous amounts. Although teacher help was permitted with reading, the Prismaston File still required a considerable amount of independent reading.

Table 9.5 Correlations between the Prismaston factor scales and the Progressive Matrices and Burt Reading Ages

Prismaston factor scales	Coloured Progressive Matrices	Burt Reading Ages
9 - 10 year olds	N = 51	N = 47
I graphs and charts	41 **	32 *
II literal comprehension	48 ***	38 **
III map-mathematics	35 *	24
IV advanced comprehension	31 *	18
Coloured Progressive Matrices	-	29*
7 - 8 year olds	N = 27	N = 13
I transport	31	48
II houses	24	16
III town plan	41*	28
IV the past	17	-07
Coloured Progressive Matrices	-	75***

The results are shown in Table 9.5. There are significant positive correlations between the Prismaston scales and the Ravens' matrices at upper junior level and this supports the role of spatial pattern recognition as a valid construct contributing to Prismaston performance. At lower junior level, however, where a greater dependence on spatial ability had been anticipated, only the 'town plan' factor correlates signicantly with the Ravens' scores. These results suggest a common feature between the Prismaston scales and the spatial ability as tested by Ravens' matrices at upper junior level, but do not support the role of spatial ability at lower junior level except in the items involving map-reading.

Reading age tested by word recognition does not appear to be a valid underlying construct at lower junior level and its role in the upper junior performance is limited. The low correlation (r = .18 n.s.) between scale IV, and Burt reading age partially undermines the validity of that scale as a measure of comprehension.

It may be that the help from teachers and friends that was permitted enabled children to demonstrate their skills of interpretation unhampered by technical difficulties in reading. Perhaps high correlations would have been obtained if the Prismaston File had been carried out in test-like conditions. At this point, we must consider the relevance of construct validity for project-based or teacher-based assessment. Firstly, the notion of an underlying ability which is present or not present in a child is an unhelpful concept in educational terms. This problem was discussed in Chapter 1 and an alternative interpretation of an ability as a skill or set of skills was adopted. In the present case, if a child's basic skills in say reading or writing are rudimentary, these need not preclude the child's exercise of other skills such as comprehension or the interpretation of graphs if the teacher can help a child to bridge the 'technical problems'. At the same time, a check must be kept on the amount of help required so that development of the basic skills is not overlooked. In the Prismaston File the children's records attempted to do this.

9.3 The Prismaston File and teachers' judgements

9.31 The Repertory Grid technique

Teacher's judgements of the children were elicited using Kelly's repertory grid technique (Kelly, 1955; Bannister and Mair, 1968) as adapted by Nash (1976) to study teacher expectations of primary pupils. The name of each child in the class was written on a small card, and the teacher was asked to place each card in one of six groups based onhis or her judgement of the child's general ability from high to low. If the teacher asked for a reference group, s/he was told to base the ratings on the class as a whole.

The next stage was to elicit constructs from the teachers by taking three of the name cards, from eight predetermined selections of the six ability groups. Two children might be drawn from group 2 (fairly high), and one from group 5 (fairly low), for example. The teacher was asked to say in what way any two of the children were similar to each other and different from the third child, in any respect. So, for example, two children might be described as 'doing as told' whilst the third 'needs nagging', or two were said to be 'independent workers' and the third to be 'dependent on the teacher'. These descriptions were considered as opposite ends of a set of bipolar constructs. When eight constructs had been elicited, one for each of the eight predetermined 'triads', the teacher was asked to select children for four more triads to provide examples of four more constructs.

The twelve constructs were then ranked by the teacher in the order in which they 'contributed to success in school'; for example, a 'successful relationship with the teacher' might be seen as contributing more to success in school than 'being sporty'. The teacher was asked to say which was the positive pole of each construct in terms of success in school and then to rank every child on each construct on a scale from one to six. A score of six represented the highest ranking at the positive end of the construct (e.g. 'very sporty') and a score of one represented the lowest (e.g. 'no interest in sports').

The comparisons between the Prismaston File and the standardised tests focused on the 9 to 10 year old groups because tests were not available for the younger classes. This means that, at the younger level, teachers' judgements are relatively more important, and have less 'objective' shaping from test results. This discussion will include evidence from the teachers of all four case study classes.

9.32 The constructs

The constructs provided by the teachers are listed in Table 9.6. Of particular interest are the differences between those provided by the teachers from the two schools. Both Kirby teachers, independently, included constructs relating to art and sport, and included more curriculum-oriented constructs. The Woodstock teachers', on the other hand, included more constructs concerned with social behaviour and attitudes to authority. Given the method for eliciting the constructs, these are likely to be salient characteristics of the respective children. This evidence will be used to investigate the relationships between the teachers' construct ratings and (i) children's self-reported study behaviour; (ii) the Prismaston scales; and (iii) the children's Richmond work-study performance. Finally, the information about individual children available from the Prismaston profiles, the test scores and the teacher's judgements will be considered.

The constructs can be categorised into three types, namely academic/intellectual (e.g. no specific learning problems; highly articulate); response to school (e.g. enthusiastic about work; successful relationship with teacher); personality factors (e.g. reliable, sociable, extravert). The last two categories may be particularly relevant to study behaviour.

Table 9.6 The teachers' constructs: ranked in the order that each 'contributes to success in school'

Kirby: 7 - 8 year olds		Kirby: 9 - 10 year olds	
1	has concentration skills	1	no learning problems
2	bright	2	tries hard
3	motivated	3	good maths ability
4	highly literate	4	needs to u'stand maths
5	confident	5	good speller
6	makes good progress	6	self-motivated
7	independent, has initiative	7	reliable
8	pride in presentation	8	independent
9	enjoys sport	9	sporty
10	extravert	10	confident in artwork
11	artistic	11	popular , sociable
12	relaxed	12	lively, energetic

Woodstock: 7 - 8 year olds		Woodstock: 9 - 10 year olds	
1	no specific learning problems	1	positive attitude to school
2	stable	2	successful relat'p with tchr
3	motivated	3	independent of teacher
4	mature, responsible	4	high general ability
5	self-confident	5	literacy-numeracy match
6	articulate; good lang. skills	6	quick to understand
7	does as told	7	quick, accurate, efficient
8	easy going	8	long concentration span
9	conforming	9	readily joins in groups
10	enthusiastic about work	10	socially motivated
11	extravert	11	lively, sense of humour
12	friendly, teacher oriented	12	accepts authority

9.33 Teachers' judgements and children's records of resource use

Table 9.7 shows the significant rank correlations between each teacher's ratings of the children on each construct in his or her class and the children's self-recorded study behaviour records. A difference between the results from the two schools is immediately obvious. In the Kirby classes, there are only two significant correlations at first year level and only one at third year level, compared with a higher than chance number of significant correlations at Woodstock. This suggests some agreement between the children's own records of their study behaviour or resource use, and the teacher's judgements at Woodstock but not at Kirby.

There may be a number of explanations for this difference. It could be that the Woodstock teachers have tighter construct systems, that is systems in which the constructs intercorrelate more highly than their Kirby counterparts, for example. This would mean that the intercorrelations between the construct ratings could have led to a larger number of correlations in Table 9.7. An alternative explanation might be that at Woodstock where tested achievement in study skills was lower than at Kirby, the more able children tended to have more positive attitudes to school, whilst the motivated children tended to achieve more. This would result in a closer association between these variables. There are, for example, strong positive correlations between reported resource use and intellectually based constructs such as 'no learning problems'; 'good

Table 9.7 Rank correlations between teachers' constructs and children's reported use of help and resources

	construct	map/chart	ref book	app'tus	friend	teacher
WOODSTOCK J1 (7-8) (n=12)						
1	no learning problems	88***	(-54)	-	-	-68*
2	stable -	-	-	70*	-	
3	motivated	70*	63*	-	-	-
4	mature, responsible	80**	76**	-	-	-58*
5	self-confident	-	-	-	58*	-
6	articulate, good lang.	83***	-59*	-	-	-68*
7	does as told	-	(-57)	-	-	-
8	easy going	-	-	-	68*	-
9	conforming	-	-	-	-	-
10	enthusiastic re work	68*	-	-	-	-
11	extravert	-	-	-	(46)	(-45)
12	friendly, tchr-oriented	74**	-	-	-	-62*
General ability placing n=20 (made positive, so high ability = group 6)		-	-	-	-	-65**
WOODSTOCK J3 (9-10) n=20						
1	+ attitude to school	(41)	-	-	-	-
2	success rel'p with tchr		-	-	-	-
3	independent of tchr	56*	59**	-	-	47*
4	high general ability	52*	(43)	-	-	-
5	literacy-numeracy match	-	-	-	-	-
6	quick to understand	52*	-	-	-	-
7	quick, accur, efficient	56**	56**	-	-	-
8	long concentration span	48*	-	-	-	-
9	readily particip groups	-	-	-	(-06)	-
10	socially motivated	-	-	-	-	-
11	lively, sense of humour	43*	-	-	-	-
12	accepts authority		-	48*	-	-
General ability placing		58**	57**	-	-	-
KIRBY J1 (8-9) n=13	no significant correlations between resources, help and teacher constructs but class teacher was not in charge of Prismaston in this class					
General ability placing		61*	63*	-	-	-
KIRBY J3 (9-10) n=27	Almost all near zero correlations between constructs and general ability placing, except: (but see text)					
4	needs to u'stand maths	-	-	-	-51**	-

language skills' in the Woodstock first year class (W1), and 'quick, accurate, efficient', 'quick to understand' and 'high general ability' at third year level (W3). These results may suggest that those children with high ratings on these constructs were also able to use the resource records more reliably, either because they understood the system better, or have a greater awareness of the processes/resources they were using. There are also significant positive correlations between ratings of maturity, motivation and independence and the use of resource records. In the third year class (W3), the positive correlation between 'independent of teacher' and use of teacher help is puzzling: were those children who achieved high scores on each measure 'just checking' rather than needing help, or were they also more diligent recorders? Would the teacher have reconsidered the ratings given in the light of this evidence had it been made available?

At first year level, the positive associations between 'use of friend' and the three personality constructs, 'stable', 'self-confident', 'easy-going' and 'extraversion' confirm the teacher's judgments as do the the negative relationships between recorded teacher help and 'mature', 'articulate' and 'no learning problems'. Thus this teacher's judgements would seem to concur with the children's own records of their help and resource use.

To summarise this section, there is some measure of agreement between one teacher's ratings of the children on various personal, social and academic constructs and the children's self-reported study behaviour at one school. As part of class-based assessment, this would support the value of children's records of their study habits at higher achievement levels. At the other school, however, there was no correspondence between these measures and so no support for the use of children's records to inform teacher's judgments could be found.

9.34 Teachers' judgements and the Prismaston scales

In this section the relationships between the teacher's judgements and the children's scores on the Prismaston scales will be considered. The correlations are shown in Table 9.8. Here again there are distinct differences between the classes. The first year groups are similar in that there was little evidence of any association between the Prismaston scales and the teacher ratings. The significant correlations that did occur were associated with Scale I (charts - transport).

In both lower junior classes, the use of constructs which describe language skills such as 'highly literate' (Kirby) and 'articulate, good language skills' (Woodstock) are associated with higher scores on Scale I. Apart from this similarity, it is noticeable that the remaining constructs associated with Scale I could be described as intellectual at Kirby and social at Woodstock. For example, at Woodstock children rated as more 'extravert' than others must have obtained higher scores on Scale I. In contrast, at Kirby, the teacher's ratings of 'extravert' were all negatively correlated with Scale I. Since these few significant values have arisen from arrays of 4 x 13 correlations, however, those which are significant at the 5 per cent level could have arisen by chance.

The patterns of correlations in the third year junior classes at each school differ too, most notably in terms of the number of significant coefficients. Positive correlations between the Prismaston scales and the contruct ratings appear in both sets in relation to both cognitive and social characteristics, but there are many more in the Woodstock data than in that from Kirby. This is particularly true of the cognitive constructs and the general ability placings for this class.

Table 9.8 Correlations between teacher construct ratings and Prismaston scales: first year junior classes (7 - 8 years)

construct	I transport	II houses	III town plan	IV the past
Kirby 1 (N = 12)				
1 has concentration skills	-05	08	05	-35
2 bright	41	07	50	23
3 motivated	58	33	26	-20
4 highly literate	57	21	47	-03
5 confident	19	-16	19	04
6 makes good progress	35	04	25	-09
7 independent, has initiative	41	22	24	-22
8 pride in presentation	25	07	24	-33
9 enjoys sport	-52	-32	-09	-18
10 extravert	-31	-56	-13	04
11 artistic	64*	12	42	15
12 relaxed	24	-49	-25	-00
General ability grouping (N = 12)	56*	06	52	19
Woodstock 1				
1 no specific learning problems	57	43	31	53
2 stable	20	07	-12	43
3 motivated	39	32	47	33
4 mature, responsible	25	47	25	27
5 self-confident	48	03	-15	36
6 articulate; good lang. skills	67*	35	17	50
7 does as told	18	36	12	28
8 easy going	44	-12	06	51
9 conforming	86***	-06	-03	45
10 enthusiastic about work	12	48	51	15
11 extravert	57	-21	06	17
12 friendly, teacher oriented	34	18	54	16
General ability grouping (N = 20)	50*	32	01	51*

Table 9.8 contd

construct	I charts	II lit comp	III map-maths	IV infer
Kirby 3 (N = 27)				
1 no learning problems	33	51**	22	33
2 tries hard	38*	47*	04	14
3 good maths ability	27	40*	32	18
4 needs to u'stand maths	39*	59***	10	31
5 good at spelling	25	34	09	25
6 self-motivated	08	27	37	18
7 reliable	48*	44*	19	16
8 independent worker	13	27	13	20
9 sporty	-06	-03	-37	-23
10 confident in artwork	25	19	-25	11
11 popular, sociable	35	46*	-04	11
12 lively, energetic	-06	07	-15	-08
General ability grouping	23	48*	28	25
Woodstock 3 (N = 20)				
1 positive attitude to sch	51*	56**	50*	52*
2 success rel'ship with tchr	26	43	28	29
3 independent of teacher	83***	51*	63**	38
4 high general ability	71***	42	53*	41
5 literacy-numeracy match	34	09	39	21
6 quick to understand	76***	52*	67**	44
7 quick, accurate, efficient	77***	49*	68**	30
8 long concentration span	74***	61**	71***	40
9 readily joins in groups	30	36	53*	15
10 socially motivated	-32	-24	-16	-38
11 lively, sense of humour	28	46*	43	41
12 accepts authority	27	36	44	29
General ability grouping	75***	57**	65**	52*

This chapter is concerned with the validation of the Prismaston measures by teacher judgements. It may be, however, that in the absence of any other evidence, project-based assessment which included records of help and resources used as well as performance measures could inform teacher's judgements. Teacher judgements are vulnerable to numerous influences and the present measures, elicited by repertory grid technique, essentially tell us more about the teachers than they do about the children. They represent the teacher's perspective, shaped by his/or her expectations of each child, which may be based on home background, conversation skills, or physical attractiveness. The teacher's view of some children will have been partially eclipsed by the demands and needs of others, whilst the view of these 'others' may have been magnified by the prevailing optimism, tolerance, patience or fatigue of the teacher. A recognition of the potentially confounding effects of some or all of these influences could lead to an over-reliance on test scores for an unbiassed view. Test scores, however, may be unrepresentative of children's real life achievements which may be affected by sociability, dependence, enthusiasm or tendency to daydream. These influences, in turn, may be reduced or exacerbated by the teacher's ablity to organise or inspire the children. Thus, the Prismaston File might be measuring some dimension which eludes both test scores and teachers' judgements. Before any conclusions can be drawn, however, the relationships between the teachers' judgements and the work-study test scores must be considered.

9.35 Teachers' judgements and the results of the work-study tests

In this comparison, positive correlations between the teacher's ratings on the intellectual/cognitive constructs and the work-study test scores were expected. This analysis is restricted to the third year classes, as achievement tests were not administered to the younger groups.

Table 9.9 Rank correlations between teachers construct ratings and children's performance on the Richmond tests of work-study skills at third year level.

construct	Richmond tests map-rdg	graphs	use of refs
KIRBY 3 9 - 10 year olds N = 27			
1 no specific problems	-	41*	44*
2 tries hard	-	-	-
3 good maths ability	-	-	45*
4 needs to u'std maths	-	43*	46*
5 good at spelling	-	-	52**
6 self-motivated	-	-	-
7 reliable	-	-	-
8 independent	-	43*	59***
9 sporty	-	-	-
10 confident in artwork	-	-	-
11 popular, sociable	-	-	-
12 lively, energetic	-	-	-
general ability groupings	42*	40*	54**
WOODSTOCK 3 9 - 10 year olds N = 17			
1 positive attitude to sch	74***	81***	56*
2 successful rel'p tchr	58*	51*	-
3 independent of tchr	74***	71***	77***
4 high general ability	74***	74***	73***
5 literacy-numeracy match	63**	-	56*
6 quick to understand	66**	72***	80***
7 quick accurate efficient	76***	73***	79***
8 long concentration	78***	83***	70***
9 readily joins in groups	-	-	-
10 socially motivated	-	-55*	-
11 lively, sense of humour	-	-	-
12 accepts authority	67**	63**	-
general ability groupings	84***	76***	76***

Table 9.9 shows the rank correlations which were obtained. There is some evidence from both classes to support the expected relationships between test scores and intellectual construct ratings but once again there is a consistent difference between the two classes: many more of the Woodstock teacher's ratings are significantly associated with the Richmond work-study scores. There is some consistency between the results shown in Tables 9.7, 9.8 and 9.9, in that the results of all three sets of correlations have more significant positive results in the Woodstock classes and in particular in the third year class.

Table 9.9 also shows that the teachers' ratings of the children on personality or social constructs were not correlated with test scores in either class. This suggests that both teachers judged the children's social and cognitive characteristics without allowing their judgements in one of these domains to affect judgements in the other.

An important point to emerge from this discussion, then, is that the teachers in this study appeared to have a reasonably consistent and accurate view of their pupils' capabilities, and they were able to rate personal and social characteristics of the children independently. This conclusion reinforces that of Mortimore et al. (1988) who also reported teacher judgements which agreed well with children's measured achievement. It contrasts, however, with the original expectation which would have rejected the value of teacher judgements.

At the same time, there were considerable differences between the teachers in the closeness of the agreements between their construct ratings and the various measures. The variation amongst the small sample of teachers in this study suggests that neither teacher judgements nor achievement measures are adequate alone. It can be argued that there is a role for project-based assessment to provide standardised materials and hence a common basis for teacher judgements on the one hand and, on the other, it permits children to show how they can use their environment, rather than prohibiting its use as in a test setting.

9.4 Prismaston profiles: the results of project-based assessment

In this chapter the evaluation of the Prismaston File has been discussed in general terms in which one set of scores has been compared with another set of scores. Very little has been said about the use of the results of individual pupils and about the value of the Prismaston File for the class teacher. In the last part of Chapter 8, however, a simplified marking scheme was produced, the results of which would form a Prismaston profile for each child. The constituents of a Prismaston profile were outlined and the profiles of a number of children will be presented here for comparison with the teacher construct ratings of the same pupils and their scores on the Richmond Work-study tests.

The potential role of project-based assessment in the classroom will then be discussed in terms of the agreements and differences at pupil level between these three measures, each of which shows how a child has performed in three different settings. An extended profile of this sort may enable the teacher to see, on the one hand both the skills and the settings in which a child may need more experience, and on the other hand, where there are discrepancies between his or her judgements and the child's performance in these settings.

Three pupils who had high, intermediate or low Richmond scores at third year level, or a high, intermediate or low teacher 'ability placing' at first year level were selected from each class. Their extended profiles which include the Prismaston profiles are shown in Table 9.10. The constituents of the Prismaston profiles will be described in turn, in terms of the agreement or disagreement with the test scores and the teacher judgements.

9.41 The Prismaston scales

The descending rank orders of the children's scores in Table 9.10 on both the test scores and the teacher ratings corroborates the conclusion that the teachers' judgements were more accurate than is usually assumed. It could, on the other hand, be interpreted as the result of self-fulfilling expectancy effects on the part of the teachers. We are concerned here, however, with the relative positions of the Prismaston results in relation to the test scores and the construct ratings. Similar descending patterns are found in the Prismaston Factor marks at third year level, from the high to the low scoring pupils which reinforces the formal validity of the Prismaston File. At first year level, the pattern is similar but less clear. In particular, whilst the high and low achievers may have corresponding profiles, the profiles of three of the intermediate children show greater variation. It is in relation to these children, that some systematic project-based assessment, which might include self-reporting, and some teacher observation, may be of most value.

9.42 The children's records of help and resources used

The use of help and resources records show patterns which are not fully congruent with the teacher ratings on the most relevant constructs. Firstly, the use of resources columns indicate that both high and low achievers (on the basis of test scores, or teacher ratings) were likely to refer to, and to record their references to a map, a picture or the reference book more frequently than the intermediate achievers. Thus, whilst both high and low achievers exhibited self-reported study behaviour, it was the high achievers who were able to find and use the information. This observation leads to the question of why the middle

Table 9.10 Pupil assessment profiles set out to permit comparison between test scores, Prismaston scores and teacher's ratings

TEST PROFILE

Upper juniors name	birthdate	BURT RA	Ravens score	Richmond tests maps	Richmond tests graph	Richmond tests refs
KIRBY Junior 3						
class mean		9:10	32.6	109.9	112.1	108.4
stdd deviation		1:09	6.9	11.9	11.3	12.2
Matthew (16)	7601	12:00	43	128	131	130
Philippa (10)	7508	10:04	33	103	127	104
Richard (33)	7508	8:05	27	103	92	81
WOODSTOCK Junior 3						
class mean		8:03	28.7	96.6	97.6	101.1
stdd deviation		1:04	4.8	11.4	15.7	12.0
Dean (02)	7501	8:10	36	118	118	122
Stuart (18)	7501	8:06	31	95	103	95
Ross (13)	7501	7:11	29	88	87	103

Lower juniors			Ravens %ile
KIRBY Junior 1			
class mean		9:02	72
stdd devn		1:08	29
Daily (30)	7610	10:11	95
Gemma (02)	7607	10:02	75
Mark (41)	7610	9:00	75
WOODSTOCK Junior 1			
class mean		-	66
stdd deviation		-	26
Mark (04)	7707	-	95
Sarah (01)	7704	-	75
Curtis (20)	7703	-	75

PRISMASTON PROFILE

Upper juniors	Prismaston factors chart graph	lit comp	map-maths	adv comp	barchart label	barchart layout	Prismon drawing L-A	head	body	elab'n	resources pic/map	ref bk	apcus	help friend	help teacher
KIRBY Junior 3 class mean	4.1	8.5	2.5	5.0			7.6	2.6	2.6	5.3	6.7	9.0	0.8	4.7	2.2
stdd deviation	1.6	2.8	1.7	2.2			1.9	1.2	1.2	4.9	3.3	5.5	1.6	6.9	3.6
Matthew	5	12	6	8	2	3	9	3	1	6	10	16	0	0	0
Philippa	6	11	3	5	3	4	8	3	2	4	3	11	1	0	7
Richard	1	3	0	4	1	3	9	3	3	3	13	12	0	1	0
WOODSTOCK Junior 3 class mean	4.0	6.9	3.0	5.1			3.9	2.8	0.8	2.2	6.3	9.7	0.1	0.7	3.9
stdd deviation	1.7	3.4	1.9	3.8			2.9	1.5	1.4	3.2	3.3	6.0	0.3	1.9	3.4
Dean	6	8	4	8	3	3	0	0	0	0	11	12	0	1	0
Stuart	3	7	2	7	4	4	3	3	0	0	4	8	0	0	3
Ross	3	5	1	5	2	3	4	4	0	8	5	3	0	8	8

(Lower juniors means)

Lower juniors	I transpt	II houses	III map	IV past	Journey-to-school 1 [illegible]	2 Matthews	3 buildings	4 roads	5 points	6 labels	L-A	head	body	elab'n	pic/map	ref bk	apcus	friend	teacher
KIRBY Junior 1 class mean	9.2	6.1	5.8	6.3							4.9	1.1	0.8	1.7	15.3	2.0	0.8	19.5	2.5
stdd devn	3.1	1.8	2.5	2.6							2.8	0.9	0.7	4.4	5.9	2.4	1.4	18.7	2.0
Daily	12	6	8	8	2	2	1	3	2	1	3	3	1	10	20	2	0	29	1
Gemma	12	5	8	8	1	2	1	1	1	2	5	1	1	0	22	3	0	19	5
Mark	2	3	3	4	0	2	0	2	0	0	6	0	3	0	17	1	0	42	6
WOODSTOCK Junior 1 class mean	6.7	3.9	4.8	5.6											10.4	0.7	0.1	10.5	5.3
stdd deviation	1.7	3.4	1.9	3.1											8.5	0.7	0.2	7.8	5.2
Mark	9	5	5	6							6	1	1	0	31	0	0	6	4
Sarah	2	6	5	2							7	1	1	0	9	1	0	10	13
Curtis	4	6	1	6							0	0	0	0	18	0	0	13	15

TEACHER'S RATINGS

ability/curriculum — attitudes to school — personal traits (rating of 6 means construct applies strongly)

KIRBY Junior 3	gen abil	no learning problems	good at maths	utds maths	good at spelling	sporty	confident in art	tries hard	self-motiv	popular sociable	reliable	independent	lively energetic
Matthew	1(high)	6	6	6	5	1	3	5	5	2	4	5	1
Philippa	4	5	3	3	4	3	4	4	4	4	5	4	4
Richard	5(low)	3	2	2	3	4	3	2	3	1	2	3	4

WOODSTOCK Junior 3	gen abil	high gen ability	lit-num match	quick to u'std	quick accur efficient	long concentn	+ attit to school	success relp with tchr	joins groups readily	socially motivated	accepts authority	independent	lively; sense of humour
Dean	1	6	4	5	5	5	5	4	3	2	4	5	3
Stuart	3	3	4	3	3	3	4	4	4	4	5	3	5
Ross	4	3	4	3	3	3	4	4	3	4	3	3	4

KIRBY Junior 1	gen abil	good concentratn	bright	highly literate	good progress	artistic	motivated	pride in presentn	enjoys sport	confident	independent	extrovert	relaxed
Daily	1	6	6	6	6	5	6	6	3	6	6	4	5
Gemma	3	2	3	4	2	3	2	1	1	3	1	3	6
Mark	4	6	4	3	4	3	1	2	6	6	2	6	6

WOODSTOCK Junior 1	gen abil	no acad probs	articulate good lang	motivated	does as told	conforming	enthusiastic re work	friendly tchr-oriented	stable	mature responsible	self-confident	easy going	extrovert
Mark	1	6	6	6	6	6	5	5	2	6	2	3	2
Sarah	4	3	3	5	6	1	6	3	5	5	3	4	2
Curtis	5	6	6	6	3	5	6	6	3	6	6	3	5

children did not record and/or consult the references so frequently. An examination of these extended profiles for a whole class would be needed to determine whether these traits are typical of intermediate achievers. The correlations between the Prismaston factors and the resource use records at both upper and lower junior levels reflect a positive association between successful interpretative study skills and study behaviour, but do not provide sufficiently detailed information for diagnostic use.

If we now consider the teacher construct ratings, and if it is reasonable to assume that a construct such as 'independent' implies an independence of the help of teacher or friends and a tendency to 'find out for one's self', then the teachers' judgements are not consistently supported at the individual level (see the profiles of Philippa (Kirby 3) and Sarah (Woodstock 1) for example).

9.43 The Prismaston graphicacy tasks

The graphicacy tasks included the 'draw-a-Prismon' listening task and the production of a map or a barchart. These tasks differ significantly from the test scores and the Prismaston scales in that they are based on children's productions rather than their recognition of correct responses. The scores on these tasks do not follow the high-middle-low achievement pattern when these few individual cases are studied. We shall consider the 'draw-a-Prismon' task first.

Whilst the children from the three classes showed large inter-class differences, none of these trios followed the achievement order. The Kirby third year trio far outstripped the other three trios on listening-accuracy, but their scores did not follow their achievement order. Similarly, whilst the Kirby children obtained higher scores on the

Prismon measures of three-dimensional drawing and elaboration/creative fluency, these showed no significant correlation with either the tested achievement or the Prismaston 'interpretation' scores.

The pattern of correlations between the Prismon drawing scores and the scales is shown in Table 9.11 for the combined classes at each age level. The results partially confirm the lack of relationship between the interpretative tasks represented by the factor scales and the productive task represented by the draw-a-Prismon task. The relationships between the elaboration scores on the drawing task and the scales is interesting in that there are significant positive correlations at first year level, but the equivalent correlations are close to zero at upper junior level.

The other two graphicacy tasks were the bar-chart construction at third year level and the journey-to-school cognitive map at first year level. The simplified scoring system led to the use of two composite scores on the bar-chart task for this age group. As in the case of the listening-drawing task, there was no correlation either at individual or class level, between the bar-chart 'lay-out' or 'labelling', scores and achievement or interpretation scores.

The journey from home to school

The analyses of the children's maps which had been planned as part of these case studies were not carried out because all of the Woodstock children drew pictures rather than maps, leaving only 13 maps in all drawn by the Kirby first year pupils. The map profiles in Table 9.10 which included the map show some correspondence with the teacher's ability groupings.

9.44 A role for the Prismaston File in class-based assessment?: Conclusions

The extended profiles show that there is a consistency between the

Table 9.11 Correlations between the Prismaston study skills factors and scores on the listening-drawing task

UPPER JUNIOR PRISMASTON FILE (N = 53)

Draw - a - Prismon	I graphs	II compreh	III map-maths	IV adv comp
listening-accuracy	21	40 **	12	22
head (cylinder)	29 *	40 **	24	28 *
body (triangular prism)	23	27 *	-07	17
elaboration (fingertips)	14	05	-03	-08

LOWER JUNIOR PRISMASTON FILE (N = 33)

Draw - a - Prismon	I transport	II houses	III town plan	IV past
listening-accuracy	13	35 *	20	00
head (cylinder)	35 *	45 **	17	-15
body (triangular prism)	02	-04	27	-14
elaboration (fingertips)	42 *	53 **	47 **	-20

tests, the teacher judgements and the Prismaston scales for the high and low achievers but this is less clear for the intermediate children. In addition there is a slight amount of evidence to suggest that performance on certain 'active' components such as record-keeping and resource use, or the listening-drawing task, did not match the achievement scores.

It might be suggested that the children's records of their resource use may challenge teacher judgements of 'independence' and confidence, such that these judgements might need to be accompanied by observation, or self-report measures. This would be particularly helpful in the case of children in the intermediate achievement band.

Thus project-based assessment may have an important role to play in amplifying present methods of assessment particularly if some analysis of children's activities and products are included. Much of the Prismaston File was in multiple choice form because a large sample was involved and results were to be produced quite quickly. When working with one class, however, it would be possible to incorporate more 'productive' tasks. There is a suggestion in the present results that a simple but systematic breakdown of the components of these products, combined with children's records of their own work, and/or some observation of them at work may provide a more informative picture of children's capabilities, particularly for middle level achievers, than test results or teacher judgements alone.

9.5 Conclusions

The last two chapters have reported case studies of four classes or groups of children working from the Prismaston File in order to assess its validity. In Chapter 8, aspects of content validity were examined 'in situ'. It was concluded that The Prismaston File was successful in encouraging children to use the resources, thus exhibiting 'study behaviour', but that 9 to 10 year olds were more successful at assimilating the information gained than 7 and 8 year olds. The present chapter has been concerned with examining the concurrent and construct validities and what might be called 'ecological' validity of the Prismaston File i.e. its usefulness for class-based assessment.

Significant positive correlations between the Richmond tests of work-study skills and the Prismaston scales indicated acceptable concurrent validity for the assessment of 'interpretative' study skills, i.e. recognising correct interpretations of information obtained from a variety of sources. Examination of the results in separate classes, however, revealed differences which were explained in terms of the level of interest shown by the teacher and the class organisation.

Spatial ability, tested by Ravens' Progressive matrices was shown to be an underlying construct at upper junior level but was significantly associated with only one factor, the map-reading factor, at lower junior level. There was no evidence to support reading age as a basic determinant of Prismaston performance at lower junior level, and there were significant correlations between reading age and Prismaston scores in only two upper junior factor scales. The usefulness of construct validity based on basic abilities in a teaching context was discussed.

In the last part of the chapter the results of the Prismaston File were compared with teacher judgements. Each teacher rated the children in his/her class on the basis of twelve constructs which the teacher had supplied. S/he then rated all the children on these constructs and the construct ratings were compared with the children's records of their study behaviour. Once again, there were a number of associations between the teachers' constructs and the records of study behaviour at one of the schools, whereas there were none at the other. The difference may result from differences in the internal consistency, or tightness, of the teacher's construct systems, but here also, the level of teacher involvement and accessibility in class may affect the accuracy of these judgements.

When teachers' construct ratings were compared with children's achievement scores on both the Prismaston File and the Richmond tests, two general observations were made. First, at third year level, one teacher's ratings were more closely associated with the tested study skills scores than the other, but, second, that the evidence generally supported the accuracy of the teachers' judgements in relation to test results.

Finally, the Prismaston File was evaluated in terms of its potential classroom usefulness. After an examination of pupil profiles based on three forms of assessment, it was suggested that whilst the Prismaston 'interpretation of information' scales accurately reflected both tested and teacher-judged achievement levels, project-based assessment, which involves children's self-reported study behaviour can also inform teachers' judgements of pupils' social and personal characteristics. It can also challenge teachers' assumptions about children's <u>productive</u> study skills as distinct from those which are <u>responsive</u>, especially in the case of middle level achievers. This is a hopeful finding which merits further consideration.

In the final chapter, the implications of the present study will be discussed in relation to recent developments in the teaching of study skills and current proposals for a national system of assessment.

CHAPTER TEN

The contribution of study skills to project-based assessment

This thesis has described an attempt to develop a form of assessment which is more closely identified with primary classroom practice than are tests, while at the same time providing more tangible evidence of children's independent study skills and behaviour than teacher judgements alone. The work began in 1984 when, for most primary teachers, a national or 'core' curriculum was just an idea, and the notion of nationwide assessment of attainment at seven was inconceivable.

In this chapter, the main conclusions of the trials of the Prismaston File will be summarised and the contribution of the present study to research in study skills and assessment will be discussed. In view of the very rapid changes in thinking about the curriculum and the role of assessment since the start of this study, the chapter will begin with a brief description of the Prismaston File and the educational background against which it was written.

10.1 Primary education and project-based assessment in 1984

In 1984, for many primary teachers, 'assessment' and 'tests' were essentially synonymous. In spite of some disillusion with standardised tests, and some awareness of their limitations (Steadman and Goldstein, 1983), there had been a considerable increase in the amount of testing as a response to demands for accountability and concern about 'standards' following 'The Great Debate' (Gipps et al., 1983).

There was an awareness, too, that the primary curriculum was still dominated by 'the three Rs' in spite of the potential liberalisation of the primary curriculum in the wake of Plowden and the establishment of comprehensive schools (DES, 1978). Added to this, research on record-keeping in the primary school (Clift et al., 1981) had documented the failure of teachers' records to provide useful information about children's competences and progress through the primary phase.

Against this backcloth, the aims of the present study were to find a way to assess children's independent study skills which did not rely on test data, and which required the application of 'basic skills' or 'the three Rs' to contexts in the rest of the curriculum. Another requirement was that this assessment should not take too much time, for the prevailing attitude was that assessment, still narrowly conceived in formal terms, interfered with teaching.

The assessment had to be capable of administration by all the teachers in the PRISMS small schools with minimum prior instruction; to be suitable for use in three- and four-year span vertically-grouped classes; to be available in less than five months from its inception, and to be compact enough to be posted to the schools and back. The result was 'The Prismaston File', a mini-project which required children to glean, use, or present information in both verbal and graphical modes. It incorporated the following innovations:

1 it covered a variety of study skills and content areas within an integrating theme, thus approximating to primary 'project' work;

2 it included both multiple-choice 'interpretative' items and productive/expressive tasks and used both verbal and graphical response modes;

3 it required children to use their study skills - to look up information in a reference book, or on a map, or on a chart, or to consult with friends;

4 it encouraged children to keep a record of their own use of these resources;

5 it was intended to fit any classroom organisation and to be carried out in everyday classroom work conditions - the children's familiar study context - with distractions and resources nearby;

6 it allowed the children to seek help from the teacher and provided a simple guide for the teacher to 'grade' the type of help given.

The first four of these features are chiefly concerned with the assessment of study skills, but all six are concerned with developments in assessment itself. We shall look first at the conclusions of the present study in relation to research on study skills, and then at the possible implications for primary assessment in general.

10.2 The Prismaston File and the assessment of study skills

The study skills research reported in Chapter Two, was based largely on the results of self-report questionnaires or diary studies: it focussed exclusively on the post primary age-range, and it was prescriptive of study skills, rather than seeking to identify them through observational, exploratory or experimental means. It was also more concerned with 'study behaviour' and 'library skills' than with cognitive aspects of study skill. Meanwhile, the research on cognitive style reported in the same chapter was largely experimental and artificial and was divorced from purposeful, context-based study. Publications on the teaching of 'information skills' at primary level (e.g. Irving, 1985) tended to focus on specific study behaviours such as 'using alphabetical order' however, which were essentially decontextualised. The removal of the study process from genuine study tasks to 'study skills courses' at secondary level may account for the lack of success of these courses. At primary level there is a danger of 'study skills exercises' being practised without application to genuine study contexts, just as children can demonstrate skills such as measuring length, or using capital letters and full stops with ease when these are practised out of context, but do not necessarily apply them when asked to make a model or write a story. Nisbet and Shucksmith (1986) pointed out that children capable of using various study strategies such as skimming and scanning in specific exercises, did not necessarily apply these skills in their everyday study tasks.

In the present study which demanded reference to various sources, a series of tasks was linked by an integrating theme to provide some context validity. The whole exercise was used as the basis for:

1 a factor analytic study of performance in obtaining and interpreting information from a variety of sources;
2 a study of the relative importance of skills, resources and context in performance at different ages;
3 the investigation of a direct link between performance and self-recorded study behaviour;
4 the development of an assessment profile to include performance in study tasks and a record of study behaviour.

These points were presented and discussed in detail in Chapters 4, 5 and 8, and will be summarised here.

10.21 The identification of study skills at junior level

The factor analyses of the upper and lower junior data revealed four factors at each level which accounted for 25 per cent of the total variance, but were stable enough to warrant further study. The factors indicated a division at both upper and lower junior levels between items requiring the interpretation of spatial/graphical material and those dependent on verbal written information. These two modes were interpreted in terms of aspects of literacy and graphicacy. At upper junior level, a slightly correlated factor solution was adopted which resulted in a clear separation of the factors into two which demanded the observation and interpretation of graphical information and two which demanded reading and comprehension skills. At lower junior level the separation was less clear. An orthogonal solution was adopted which resulted in the extraction of four factors. Although the four factors were made up of both graphicacy and literacy based items, three showed a bias towards graphic resources, namely charts and matrices, pictures and the map, and one showed a preponderance items dependent on verbal resources. This separation within graphicacy suggests that study skills models should emphasise these separate aspects particularly in a curriculum with an over-emphasis on literacy-based tasks.

10.22 Study skills versus study contexts

The exercise of a skill, such as comparison of two graphic displays, may be influenced by the context in which it is practised. The context could be the source of information itself such as a map, chart or picture or the topic content of the information required such as traffic flow or housing. In the Prismaston File at upper junior level, the factors were based on the resources, or sources of information used; items involving the use of coordinates and charts appeared on one factor; those involving the interpretation of written information on another. At lower junior level, although the factors showed some consistency in terms of their resources, they were best described in terms of the topic content of the items. Items about transport, the town plan, about 'houses' and about 'the past' loaded on separate factors.

These results suggest that context may be more closely associated with performance than skills alone, and that the topic content is more influential than either skills or resources in the younger age-group. The conclusion is that study skills must be considered in relation to the context in which they are used. It is suggested further that there may be a shift within this context-dependency from topic to resource as children get older. Further research, using the same materials for each age-group would be needed to test this.

10.23 Relationship between study behaviour and performance

The Prismaston File provided a direct link between the performance measure of the children's study skills and their self reported study behaviour. In Chapter 5, positive correlations were reported between recorded use of the graphical resources, and the reference book and total score, at both upper and lower junior levels. At the upper junior level there was an inverse relationship between consulting friends and success on the Prismaston items, whilst at lower junior level the relationship was direct.

The informal observations reported in Chapter 8 revealed that although the younger children consulted the reference book, and located and interpreted the relevant parts, they did not always use the information gained to alter their initial hunches as to the correct response. In terms of the Tonjes and Zintz (1981) model of study skills presented in Chapter 2, these children were successful in locating the information, extracting its meaning and intrepreting it, but were unable to apply it. In a recent study, Fyfe and Mitchell (1988) devised a system to encourage study skills by asking the children to devise key questions to enable them to find out about a particular topic. They found that the children had great difficulty in thinking of questions to which they did not already know the answer. In the present case, it is suggested that the younger children were looking, not for information, but for confirmation of what they already knew.

Taken together, the observations made above suggest two potential developmental aspects of study skills. Firstly, the data suggest that a shift from topic- to resource-dominated performance may occur during the primary years, and, secondly, that some younger children, having adopted appropriate study behaviour, do not always assimilate the information gained. These observations require further specific research to be of value in teaching.

10.3 Direct and indirect assessment : the listening, drawing and mapping tasks

The first observation above was based solely on the results of multiple-choice items printed in a booklet. Thus the children's demonstration of their study skills and study behaviour was filtered through their reading skills and through the pencil-and-paper medium employed. In this sense this assessment task could be called indirect, whereas a direct assessment of a child's skill in map-reading, for example, would be to ask the child to find the way, or locate the 'treasure' using a real map in the real world. (Not surprisingly, children can demonstrate 'map-using' skills that far outstrip their 'map-reading' skills, see e.g. Walker, 1980, and Boardman, 1986).

It was not possible to include direct tasks of map-using, or to make observations of children in the small schools actually using the reference materials in The Prismaston File but three direct tasks were included which were less dependent on reading and which used a graphic response mode. These 'production' tasks were an attempt to assess listening and mapping skills more directly, without the reading demand and in a manner much more typical of classroom topic work. The tasks were (i) a listening task in which the children were required to listen to the teacher read a description of a creature and then to draw the creature; (ii) the collection of data and the construction of a bar-chart by the upper juniors to show how ten children had travelled to school; and (iii) a cognitive mapping task in which the lower juniors were asked to draw map of their journey from home to school. The major conclusions from these three graphicacy tasks are summarised below.

10.31 <u>The Draw-a-Prismon listening task</u>

The results showed that the older children had better listening skills, or were better at converting verbal information to pictorial form, <u>when</u> allowance was made for the greater length and difficulty of the upper junior description. On the other hand the older group included fewer details, used more 'humanoid' features and produced fewer 'divergent' responses than the younger children. These unexpected findings may have been the result of strategies adopted by the children to recall the long description. Perhaps they had concentrated on the main points of the description and 'dropped', or substituted human features for the minor ones, or alternatively, perhaps the task had more appeal for the younger group.

10.32 The Bar-chart transport survey task

The results of this task failed to differentiate significantly between the 10 and 11 year old children's performance. Both age groups fulfilled most of the criteria required which suggested that this task was too easy for this age-group and might have been better placed in the lower junior version. The most notable failing in both third and fourth year junior groups was the selection and use of an adequate title for the charts.

10.33 The home-to-school journey task

This task was included at lower junior level and led to the overall conclusion that the cognitive maps drawn by eight to ten year olds have more advanced features than would have been predicted on the basis of previous research evidence. This was particularly true of the children's cartographic competence in mapping roads. The difficulty experienced in assigning maps to the various levels proposed by Catling (1978) and Matthews (1984) because of the mixture of advanced and immature features on the same maps, suggested that a general stage theory is too crude: it would be better for teachers to consider aspects such as roads, buildings and frame of reference separately. It was speculated that regular opportunities to draw maps in purposeful contexts could lead to considerable gains in mapping skills.

10.34 The relationship between interpretative and productive study tasks

Study skills, by definition, are concerned with the ability to obtain and interpret information from a source rather than with the production or reproduction of information; for example with map-reading rather than map-drawing. The inclusion of 'productive' tasks in a study skills assessment package might seem odd. These tasks were included, not only as an attempted validation of the Prismaston File as project work, but also to investigate the relationship, if any, between direct and indirect tasks.

This was carried out using the case study data. The listening-drawing task scores were correlated with the factor scales scores and a difference emerged between the two age groups. At upper junior level, the basic comprehension (verbal) factor was associated with the accuracy scores, but no associations were found between the elaboration (creativity) scores and the study skills factors. At lower junior level, however, the reverse was found: the strongest correlations were between the elaboration/creativity scores and the study skills factors, whilst the accuracy scores were associated with the 'houses - pictures' factor, which involved items requiring careful examination of pictures. It may be that these results reflect another age-related shift from a tendency to code information graphically at lower junior level, to the attempt to code it verbally at upper junior level. The dip in the accuracy results of the third year juniors in the main study might be explained in terms of a change in coding style.

10.4 Assessment at primary level

Before going on to consider the present study in relation to current developments in primary assessment, it is necessary to describe briefly the rapid changes in this area since 1984, with particular reference to the national assessment proposals. This section will take up the history of assessment at primary level, where Chapter 1 left off. At the beginning of the present chapter, there was a reminder of the context of primary education in the days prior to the imposition of The National Curriculum and the proposals for national assessment at 7, 11, 14 and 16. These two major changes have exerted a catalytic effect on the pace of thinking about assessment at primary level.

As outlined in Chapter 1, assessment at secondary level had been undergoing a revision as dissatisfaction with the academic bias of the formal examination system had led to the study of alternative forms of assessment which would better represent a child's school career, and reflect more than mere academic ability. Murphy (1988) provided an up-to-date review of developments in the use of 'profiling' or 'Records of Achievement', and the implementation of graded tests, whilst Black and Dockrell (1984) provided a detailed account of the use of criterion-referenced, classroom based assessment in Scottish secondary schools.

These initiatives were recognised in the 'Black Report' (Task Group on Testing and Assessment (TGAT) 1987) which contained the recommendations of the Task Group on Assessment and Testing (TGAT) for the proposed national assessments set up by the Secretary of State for Education, Kenneth Baker, in 1987. The report emphasised that assessment should be criterion-referenced and formative; that results would need to be moderated by teachers to facilitate common understanding and to ensure some comparative value. The report differentiated between the three modes of assessment, namely:

- the presentation mode - the method of delivery of the questions (oral, written pictorial, video...)
- the operation mode - the expected method of working (mental

only, written, practical, oral);

- the response mode - pupils may answer in various ways (e.g. ... multiple choice questions, ... open-ended writing,... practical outcome..)' (para 47, TGAT Report, 1987).

One aspect of this expanded range of possibilities is that the discontinuity between teachers' own assessment of normal classroom work and their use of externally provided tests need not be a sharp one. ..... (so that)..'the pupils would not necessarily be aware of any departure from normal classroom work' (para 49)

It was proposed that the standardised national assessments should consist of activities and tasks which would be administered and eventually, selected by teachers to 'suit the run of the work', and that teachers' assessments of the children should be taken into account.

'We therefore recommend that the national assessment system is based on a combination of moderated teachers' ratings and standardised assesment tasks. (para 63)

The call for a variety of forms of assessment and the importance of teachers' ratings were reiterated throughout the document. At the reporting age of seven, for example:

'..the results of the tests and the recorded continuous assessments made by the teacher should be considered together when deciding what level a child has reached' (para. 151).

The report went on to say that:

'Between each of the reporting stages, continuous assessment is a normal feature of classroom practices and this may be supplemented by diagnostic tests. As we have already noted, there is a demand for a wider range and variety of means of assessment to be developed for use in busy classrooms at the discretion of the teacher' (para 154).

For pupils aged 11, the national assessment would include

'information about overall school performance...incorporated in a published report, related to a statement of the school's context' (para 157).

The advance here was the recognition of the need to report on a school's context, but it is not until secondary stage that non-academic aspects of performance are considered formally. Records of achievement would:

'.. provide a means of recording achievement through the secondary years..., including that related to personal and social development' (para 162).

The Black Report provided formal recognition of the need for a greater variety of forms of assessment, of the role of teachers in the assessment of children's progress and of the significance of non-academic aspects of school life. It endorsed progressive models of learning and represented a major move forward in proposing assessment tasks in place of tests. Recently, writers such as Murphy (1988) and Broadfoot (1979) have acknowledged the influence of methods of assessment on the curriculum. It is ironic therefore that if teachers were to 'teach to the task' rather than 'teach to the test' this might go some way to repairing the damage to the primary curriculum brought about by the eleven-plus and the use of standardised tests. The Hilton Young Report (1920) had proposed the introduction of only two tests for selection purposes in order that the primary curriculum should not be unduly constrained or narrowed by too many assessment demands. The present proposals appear to place a very heavy burden of assessment on schools to the extent that some heads have seen the need for parental assistance in carrying out the assessments (Hughes et al., 1990). If the assessment tasks that are produced do fulfil the recommendations of the Black Report; if they use a variety of response modes; if they encourage cooperation and discussion; if they stimulate cross-curricular links; if in effect they succeed in demanding a deep approach to study across the curriculum, then their introduction might achieve what Plowden and the removal of the eleven-plus failed to do. The same mechanism of 'teaching to the test' which wrought damage to the primary curriculum might be exploited to remedy it.

If the Black Report's recommendations are to be achieved at primary level, however, they will involve considerable resources for in-service training in assessment and for the necessary moderation procedures. Unfortunately, but perhaps inevitably, the report has now been seen as too ambitious and complex, or just too expensive, to implement. The use of short tests (Nuttall, reported in the T.E.S., 1989) to allow teachers time to get on with teaching the National Curriculum, and the relegation of teachers' assessments in favour of standardised task results (SEAC 1989) have been called for.

10.41 The present study and the National Assessment proposals

The present study represents a prototypical attempt to implement some of the ideas which were later endorsed in the Black Report. It included a variety of presentation and response modes including listening, drawing, using resources and recording 'references'; it provided a simple system whereby the teacher could record the help given to a child; it provided a profile of scores in different areas, which could be used formatively, rather than an overall total score;

it fitted into normal classroom organisation so that the children did not experience an extraordinary assessment situation. Although limited by the various constraints listed in Chapter 3, the project was capable of 'expansion' and integration into other curriculum areas and more direct activities, and some teachers reported activities involving the invention of a Prismoan language, Prismoan poetry, two- and three- dimensional artwork and technology in the form of 'intruder alarm circuits' for use when Prismaston work was in progress. Musical activities would also be feasible. Thus, in spite of being an external assessment, the method could nevertheless be enmeshed with what the Black Report called 'the run of the work'.

The Prismaston File obviously could not fulfil the requirements of a full-scale standardised assessment task, but, as suggested in Chapter 8, it has illustrated the possibility that teachers could prepare 'project-based' assessment materials to be used alongside their teaching on any particular topic. Already, teachers are mapping National Curriculum programmes of study and specific attainment targets onto any topic work they undertake. Thus, already class topics are becoming vehicles for on-going teacher-based assessment. The Statements of Attainment form the bases of specific assessment criteria, and so provide a theoretical progression towards each attainment target.

The analysis of curriculum areas into small progressive steps has not been widely practised at primary level except in mathematics and reading. School guidelines were not necessarily produced for all curriculum areas and systematic assessment was rare in areas other than language and mathematics. The PRISMS project, for example, found that mathematics was by far the most frequently assessed area of the curriculum, in that having answers marked right or wrong is one manifestation of assessment in the classroom; 'marking' was never observed in some curriculum areas (Galton et al., 1987).

The present study suggests that teachers could develop their own project-based assessments to inform their subsequent teaching and, as originally intended, to assist in the moderation of the Standardised Assessment Tasks. It has also revealed the need for careful scrutiny of a number of factors which can be grouped under three headings: (i) implications for the progressive model; (ii) the role of instruction; (iii) the need for a variety of forms of assessment.

10.5 Implications of the present study for teacher-based assessment

10.51 The progressive model of assessment

The national assessment system is based on a model that assumes a step by step progression within each attainment target. The first TGAT supplementary report (TGAT 1988) acknowledged that the steps may not yet be accurately age-related and that normative data is not available in most curriculum areas for most ages. Some changes to the attainment level specifications are anticipated:

> 'Initially, the norms now expected for particular ages will be used in helping to identify criteria appropriate for the system of ten levels; but once devised, the system will rest on the levels and criteria alone, through which different poupils may progress at different paces......
>
> ....The way in which the reported attainment of pupils collectively relates to age will be established as a matter of fact, and can be expected to change over time. (p. 3, TGAT 1988)

In other words, the attainment steps have not yet been substantiated by reference to actual performance. Nevertheless, the proposed structure must be of assistance in the general planning of teaching whether the steps turn out to be in a different order, or some steps rise more steeply than others. The working parties have at least proposed a theoretical progression which awaits validation or modification when put into practice. For assessment purposes, however, accuracy in the order and relative difficulty of the steps between the statements of attainment within each attainment target will be of vital importance.

In the present study four features of the children's study skills were noted, which should be taken into account within this model. These are summarised in the next four sections.

10.52 The effect of topic or context on performance

The factor analyses revealed that the topic of a task or item was consistently related to performance at lower junior levels. At upper junior level a shift in emphasis from the topic to the skills associated with particular resources was detected.

It is therefore important that individual assessments of certain process skills are made on more than one occasion, with different topic content. Since only three or four standard assessmenttasks are proposed for the assessments at age eleven, moderation based on teachers' assessments may be of great importance here. Systematic teacher-based assessments could ensure that each child is assessed in relation to various attainment targets within a variety of topic areas.

10.52 Progression in study behaviour

Informal observation in the case studies revealed that many of the older children used and recorded their use of resources appropriately (Chapter 5) but that some of the younger children were unable to assimilate the information they had located. The records kept by the children of their social interaction also revealed a difference between the older and younger groups; in the younger group consultation with friends was associated with higher scores overall, but the reverse was true in the older group.

The Black Report recommended that teachers should collect observational information to support their assessments of children. The present findings suggest that behaviour and achievement need to be assessed in conjunction to provide an accurate record.

10.53 The assumption that progress will be forward and linear

Although the working parties have adopted a developmental model there is no undisputed developmental progression in most curriculum areas. Whilst crude levels or stages of competence may be discernible across a wide age-range, these may amount to three or four 'plateaux' as opposed to the ten steps set up by TGAT. The present study provides some evidence that the shifts from one level to another may involve both regression and progression.

In Chapter 7, for example, the coding difficulties experienced in the cognitive mapping task were best explained by a theory which suggested that children do not necessarily progress smoothly from one level of mapping to another, but rather that different elements of the whole process may leapfrog forward and then drop back so that advanced and early forms can appear together (Feldman, 1980).

This uneven progress can be monitored only by repeated assessments over a long period. Once again, only regular teacher-based assessments can achieve this.

10.54 The effects of structured teaching

Little is established about progressive patterns of development and even less about the effects of regular structured teaching or even just the commitment of 'reasonable amounts of time', for children to practise skills and gain understanding in whatever area. Activities which involved map-drawing, for example, were rarely observed by the PRISMS observers but will presumably increase in importance when the national geography curriculum is announced. The present research suggests that the effects of opportunities to practise these skills combined with some teaching can be considerable. Herman and Siegel's (1978) study cited in Chapter 7, raised the performance of what would be 'Key Stage 1' children to that of 'Key Stage 2' children in just three trials. The effects of regular map-drawing activities will therefore need to be monitored closely so that the statements of attainment keep pace with children's progress. In the present study, visual inspection of (a) class groups of maps, and (b) the distribution of scores suggested some strong class effects. The task group on testing and assessment was aware of these problems and stipulated that the levels of attainments should be kept under review (see e.g. National Curriculum in Science Orders, DES 1989).

The TGAT report stated that

'The combination of teachers ratings and standardised assessment tasks can engender confidence in the interpretation

> of achievement. The combination will facilitate fair sampling of the national curriculum, coverage of different circumstances of assessment on different occasions, and a range of evidence as the basis of report. (para 63, TGAT 1987)

It is a pity that this unique opportunity for the use of teacher-based assessment to test the progressive models presented in each area, and to moderate the national assessment of the individuals in their care, seems unlikely to survive. Recent proposals from the School Examinations and Assessment Council (SEAC) suggest a limited future for the recommendations of the Black Report. These will be discussed at the conclusion of this chapter.

10.6 The role and monitoring of instruction

In the previous section, the surprising effects of a limited amount of experience on performance were noted in one activity. Now whilst the National Curriculum might influence the content of what teachers teach, it does not prescribe methods of presentation, nor teacher involvement and style. In the case studies reported in Chapter 9, however, it was argued that the level of involvement of the teachers, in terms of the evenness of distribution of the help given to the children had made a difference to class performance. If assessment is to become a natural part of teaching, as envisaged by the TGAT report, then teachers need some way to monitor the amounts of help given to the children. It is suggested that the simple system used in the present study, which reminds teachers to suggest (or invite) strategies for locating or analysing information, rather than providing the answer or method, may be of some use.

Such records of teacher help can be of value in two ways in the assessment of children's performance against the attainment targets, in project work, or in any curriculum area. First, the case studies presented in Chapters 8 and 9, showed that, in some cases, children who were regarded by their teachers as independent in fact consulted the teacher on a larger number of occasions than children rated more teacher-dependent. Children's records of the occasions on which they had had help for a particular task would form evidence to support teacher's judgements of children for personal and social records. Second, if a Vygotskian view of intellectual development is adopted, as a result of the eventual intertwining of assessment and teaching, this system may represent a means of measuring the help or instruction needed by a child to acquire a new concept. The measurement of the 'zone of proximal development', described by Vygotsky as the ability of the child to benefit from instruction, may need to become an integral part of the assessment of performance (see Wood, 1988; Day, 1983). Teachers could collect this information through project-based assessment.

10.7 The need for a variety of different forms of assessment

The Prismaston File included indirect, interpretative items as well as more direct study activities. In Chapters 8 and 9 these two forms of assessment task were linked with teachers' judgements to provide extended profiles for individual children.
Inspection of a small sample of these profiles and of the correlations between the indirect and direct tasks, did not show any consistent link between children's performance in the indirect, multiple choice tasks and in the direct tasks.

At primary level, assessment has been polarised between a narrow range of intellectual skills, which may have been tested, and teacher's judgements of children's attitudes and social behaviour. Some criterion-referenced assessment of such activities as drawing, mapping, carrying out investigations or using references might do something to 'erode the hard-and-fast academic and pastoral divide' in assessment (Broadfoot et al., 1988). The role accorded to teacher-based assessment by the TGAT Report could provide the opportunity for this. What is needed is a re-evaluation of real-life practical tasks and this may be provided by some of the recent developments in the psychology of intelligence.

10.8 Study skills or intelligence?

When the teachers seconded to the PRISMS project were engaged in the content analysis exercise for the Prismaston File, one of them asked the question above. Her tone was derogatory, and representative of the contemptuous respect in which many primary teachers hold the narrow concept of tested intelligence. The question however, was not unreasonable. Butcher (1968) cited studies which claimed that intelligence was the 'crucial variable' associated with measures of athletics, science, leadership, the arts, psychological defense mechanisms, persuasibility, risk-taking and sex-role identification, amongst other things. The study skills tasks which Jasman devised for the ORACLE study, were introduced as follows:

> 'It seems clear that unless study skills are operationally defined, and hence directly related to the tasks students perform, they can easily become synonymous with the 'primary mental abilities' described by Thurstone (1938), or with Guilford's more recent model of the intellect (1967); any

attempts at assessment will relate more to the concept of intelligence than to the practicalities of classroom endeavour. (Galton and Simon, 1980, p. 102).

The idea that intelligence was the crucial variable in many school-based tasks has perhaps delayed or prevented the development of detailed analyses of the demands of many school activities.

Psychological approaches to the study of intelligence have altered, however, in recent years. Howe (1989) summarises a wide range of research studies which challenge the traditional view that intelligence is a unitary entity with the alternative view that intellectual abilities are specific, independent and autonomous. Howe concludes that the existence of intelligence...'like that of a number of concepts that seemed real to previous generations of scientists, including 'phlogiston'....may soon be seen as having been illusory' (Howe, 1989, p. 358).

Sternberg and Wagner (1986), for example, show that some psychologists have reversed the tradition of attempting to isolate 'pure' or 'culture-free' test items and have begun to study behaviour in context, following observations that many people who perform badly on the decontextualised items in IQ tests, demonstrate the same skills or capabilities with ease in their daily lives. Sternberg and Wagner's (1986) collection of papers which exemplify this approach, includes a paper which describes Gardner's theory of multiple intelligences (Walters and Gardner, 1986; Gardner, 1983). Gardner proposes seven intelligences: musical; bodily-kinaesthetic; logico-mathematical; linguistic; spatial; interpersonal; and intrapersonal. The theory is derived from studies of everyday problems and the capacities of normal children, and special populations e.g. autistic children, idiots savants, and people with 'jagged cognitive profiles'. Walters and Gardner (1986) present a concise description as well as a critique of the derivation and organisation of this theory. A model such as this could provide the urgently needed theoretical foundation for the assessment of activities which are not removed from their context and filtered through the 'reading-writing' process. Of interest here, however, is Gardner's analysis of educational assesment in terms of the theory of multiple intelligences.

Gardner (1988) contrasts the modern American 'examination hall' form of assessment with the continuous assessment and training of the apprentice whose skills are shaped over time by close observation of, and guidance from a master craftsman. He suggests that educational assessment needs to move away from the first image and closer to the second. To implement this view, the teaching profession needs to accept (a) an explicit formative teaching role and (b) a means to measure or monitor the type or level of instruction provided. Gardner goes on to describe the emergence of a 'first-order' symbol system in a child's early years, such that

> 'by the age of five or six, most children have acquired a first draft knowledge of how to create and understand stories, works of music, drawings and simple scientific explanations...'

but, '...in literate cultures, however, there is a second level of symbol use, wherein children must learn to use the invented symbol (or notational) systems of their culture, such as writing and numbers. With few exceptions, this assignment is restricted to school settings, which are relatively decontextualised.' (Gardner 1988, p.15).

The paper goes on to point out the difficulties incurred for children in meshing their newly acquired 'second order' symbolic knowledge with the earlier forms of 'practical' and 'first order symbolic' knowledge. Gardner argues that formal tests presuppose second-level literacy, and that they engage only the linguistic and logico-mathematical intelligences. Alternative methods of assessing the practical and first order systems need to be devised.

This new approach to intelligence highlights the unique opportunity to undo the harm done by the past exclusive emphasis which was placed on a limited form of intelligence in the past, and to value the skills and abilities of all individuals in a wider range of modes, contexts and activities. The current assessment proposals would seem to pave the way for this revolution in thinking about assessment.

The present study has attempted to show that project-based assessment materials could be prepared by teachers, interspersed with topic work and used to provide valuable information about children's skills in a wider range of contexts than is the current norm. Viewed from the broader perspectives on intelligence represented by Vygotsky's 'zone of proximal development', and Gardner's theory of multiple intelligences, The Prismaston File, or its equivalent, may be described as 'just intelligences'.

10.9 The fate of assessment at primary level

In August 1989, the Schools Examinations and Assessment Council (SEAC) recommended to the Secretary of State that teachers' assessments of achievement should be subjugated to the Standard Assessment Tasks.

More recently, in November 1989, SEAC has invited submissions for the development of assessment procedures and materials which would provide 'additional valid and reliable evidence of the achievement of individual pupils' (SEAC, 1989, p. 2). to be used in the evaluation of the Key Stage One Standard Assessment Tasks. The evaluation is to be carried out by means of a series of 'in-depth' probes to assess the achievement levels of 1200 children. At the same time, the in-depth probes must be devised by the time the first SATs are being used and be administered after the SATs have been completed; must neither interfere with nor increase the work of teachers; and must involve children in a minimum of additional assessment procedures. The results of the evaluation procedures must be capable of providing evidence of achievement in a range of tasks, for the exploration of the validity and reliability of the attainment level scores and of combining SAT and teacher-based assessments into a single score. The document also suggests that the use of the 'materials and procedures' to be devised for this validation exercise might be considered for use by teachers as diagnostic aids.

The fulfilment of these requirements would seem to undermine the potential gains of the originally proposed system of SATs and teacher-based assessment. Firstly, the validation of the expensive and extensively researched SATs will be based on a set of 'materials and procedures' which will developed in less than 18 months, by staff already in place and at a fraction of the cost. Secondly, the time restrictions on the administration of the 'probes' implicitly rejects the long-term collection of evidence which teacher-based assesment could provide. At its worst, the SEAC invitation could be interpreted as a request for a set of short tests. Tests may be useful to reveal how individuals perform under one set of stressful conditions but the assumption that these performances should be the criterion against which other assessments are validated denies is unfounded. It fails to recognise what may be valid performances under a different set of conditions.

Finally, if a new set of materials are to be devised, they themselves will require validation. What criteria will be used for this? Would other tests be available? The ideal would be the validation of the new procedures against teacher-based assessments or classroom observation of children's performance in every day curriculum activities, and yet both of these forms of assessment have been precluded. If the new procedures depend on written responses which do not permit teacher help the result may be an unrepresentative assessment of the skills and understandings of many young children. The inadequacies of this form of assessment led, in the past, to the abandonment of this kind of formal assessment at 7 but it would seem that the present requirements area temptation to reintroduce this.

Fourthly, SEAC's invitation implies that the information gained in multi-modal SATs can be collected in a fraction of the time, and probably through a narrower range of media. The results of present study and recent work developed from it have implications here, indicating that performance in one response mode does not necessarily predict similar performance in another. The Primary Science Teaching Action Research (STAR) Project directed by Galton and Harlen, involved the development and use of project-based materials, entitled 'The Walled Garden', for criterion-referenced assessment of children's science process skills in the written mode, and a practical and oral one-to-one assessment task based on the same skills and theme and administered some months later (see Schilling et al., 1990). Although the results of the written assessment correlated positively with teachers' judgements of general achievement levels, zero or negative (non-significant) correlations existed between the results of the practical and written measures. A further investigation using these materials is now being analysed which has eliminated the time gap. Information about the relationships and predictive value of skills performance on across two response modes is as yet unavailable. Nevertheless, SEAC are prepared to assume that short-term, minimally disruptive assessment procedures and materials can be used to validate the results of extended, context-based, practical, cross-curricular tasks. The economic temptation to substitute the former for the latter will be great.

Conclusion

This gloomy forecast indicates a serious threat to what was a potentially broad-based and constructive assessment system. A brighter alternative view can be presented, however. The establishment of the National Curriculum has already accrued benefits such as increased communication between teachers and an increased awareness of the need for formative, context-based and criterion-referenced assessment. During the 1990s, therefore, there is likely to be further growth of interest in assessment, particularly at primary level. The National Curriculum assessments are certain to be examined and cross-checked both by spontaneous teacher moderation and through formal research. Project-based assessment incorporating similar principles to The Prismaston File is likely to acquire increased importance as it can provide a basis for the integration of teaching, pupil observation and formative assessment, and the development of 'The Walled Garden' materials (Schilling et al., 1990) provides one example of this.

There is, therefore, every reason to be confident that project-based assessment will be seen to have a vital role to play in the difficult task of monitoring the performance of pupils.

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Curriculum categories for number work	INF	JUN
01 DIGITS (the problem has at most one digit in any term)	7.4	2.0
02 DIGITS (the problem has two digits in some terms)	7.3	7.8
03 DIGITS	0.3	5.4
04 DIGITS	0.00*	1.8
05 to 09 DIGITS	0.04	0.6
10 COUNT (the problem involves counting)	12.6	7.9
11 PLACEV (the problem involves place-values)	4.1	9.5
12 ADD (addition must be performed)	5.3	6.6
13 SUBTR (subtraction must be performed)	3.2	4.6
14 MULT (multiplication must be performed)	1.0	5.1
15 DIVIDE (the problem involves division, fractions or decimals)	0.3	5.5
16 CARRY (the problem involves carrying between columns)	1.6	6.6
17 TABLES (there is explicit use of tables or number-bonds)	0.4	1.9

Curriculum categories for practical maths		
18 LENGTH (either sums about lengths, or measuring lengths)	1.9	2.7
19 WEIGH (either weighing or sums about weight)	0.6	0.8
20 TIME (either measuring time or sums about time)	1.4	1.7
21 AREA (either measurement or sums about area)	0.1	0.7
22 VOLUME (either measuring or sums about volumes)	0.5	0.5
23 ANGLES (angles are involved in the problem)	0.1	1.0
24 SYMMET (the problem uses symmetry, e.g. in art)	0.4	0.6
25 SHAPE (shapes must be recognised or measured)	3.9	3.7
26 MONEY (recognising, counting, using or sums about money)	0.8	2.6
100 TEMP (temperature)	0.04	0.03

* 0.00 Item observed on less than 0.005% of observations

Curriculum categories for mathematical concepts		INF	JUN
27 SETS	(classification into sets, or unions and intersections)	3.1	1.4
28 SCALE	(ratios of fractions, e.g. on maps)	0.00	0.6
29 LOGIC	(logical puzzles, writing computer programs)	0.04	0.5
30 MATRIX	(using two-dimensional tables of data)	0.1	1.2
31 GRAPHS	(graphs, bar-charts, pie-charts, etc.)	1.1	2.0
32 NTWORK	(networks, e.g. flow-charts, road maps)	0.02	0.2

Curriculum categories for relate

(The relation which the pupil has to take into account between the terms he is dealing with)

33 MATCH	(e.g. find the difference between two pictures, find the word whose meaning matches the definition)	7.0	2.7
34 ORDER	(place a series of things in order)	2.1	2.1
35 COMPAR	(compare according to a criterion, e.g. find the strongest adjective or the largest number in a set)	1.9	2.7
36 PREDIC	(make a prediction, e.g. pick the right word in a cloze procedure, estimate numerical result before calculation)	0.4	2.2
36 MEANNG	(meanings of words or concepts, e.g. cloze procedure)	4.3	6.8

	INF	JUN
Curriculum categories for stage		
(The stage the pupil has reached in his task. Most tasks have only a 'doing' stage; this is not coded)		
39 WAIT (waiting, e.g. for paint to dry; or task not yet given)	4.0	3.4
40 INSTR (receiving instructions on how to do task)	5.0	6.4
41 PLAN (the pupil has to plan in advance of doing the task)	0.2	0.8
42 ROUTIN (tidying up or getting things out as the given task)	8.9	7.4
43 ASSESS (assessing own progress on task; or weighing evidence)	0.3	1.3
44 REPORT (reporting results, either written or verbal)	0.7	2.5
45 FEEDBK (receiving feedback about performance or ideas)	1.1	2.6
Curriculum categories for medium		
(The ways in which the pupil takes in information for the task or expresses the results from the task. Maths tasks using only numbers are not coded here.)		
46 READ (the task involves reading)	16.7	21.6
47 LISTEN (the task involves listening, to speech or music)	30.6	29.1
48 OBSERV (acquiring information by looking, excluding reading)	17.1	13.2
49 WRITE (presenting results of task by writing)	17.6	22.8
50 VOCAL (vocal presentation, i.e. talking or singing)	17.4	13.1
51 DRAW (drawing; this includes paint or crayons)	19.8	15.6
52 ACTOUT (results embodied in movement; e.g. dance, play music)	10.6	4.8
53 MATERL (results embodied in material; e.g. clay, LEGO)	13.9	11.8
110 HARDWR (pupil operates equipment, e.g. computer, tape recorder)	0.04	0.03

		INF	JUN
Curriculum categories for action			
(the action the pupil takes to convert the information he has to the required presentation)			
54	SELECT (select an answer or item from several given or known)	15.9	15.2
55	CLASFY (classify words, concepts or things by some criterion)	2.2	1.6
56	REORGN (reorganise given material, e.g. rewrite story in own words)	2.9	4.0
57	CONSTR (construct from pre-fabricated parts, e.g. SRA cards)	4.0	1.5
58	ANALYS (analyse information, bring together for conclusions)	0.5	1.9
59	QUESTN (the pupil must formulate questions)	0.3	0.4
60	ANSWER (the pupil must answer questions, excluding maths)	5.1	8.2
61	DISCUS (pupils discuss problem, or extended question-answer session)	6.5	7.8
Curriculum categories for criterion			
(Criteria to which the pupil's performance should conform)			
62	CREATE (the pupil is required to create for himself)	16.0	16.5
63	MAP (the pupil is required to transform information from one medium to another, e.g. reading aloud or following instructions to make something)	18.7	18.0
64	COPY (the pupil is supposed to copy as accurately as possible in the same medium, e.g. handwriting from examples)	19.0	16.6
65	LEARN (the pupil is required to learn, e.g. spellings)	2.7	2.2
66	TEST (the pupil is being tested, perhaps informally)	0.2	1.5
67	PLAY (the absence of other criteria)	7.7	0.9

			INF	JUN
Curriculum categories for resources				
68	TCHR	(information from the teacher is essential for the task)	25.5	26.2
69	PUPIL	(information from other pupils is essential)	7.9	7.2
70	BRDOHP	(information displayed on board or overhead projector)	4.1	8.4
71	CHART	(information on prepared chart, map or pictures)	2.3	2.0
72	TEXTBK	(non-fiction reading book)	0.8	4.6
73	REFBK	(reference book, e.g. encyclopaedia, dictionary)	1.7	4.9
74	READBK	(reading book)	6.6	7.7
75	WORKCD	(work-card: includes work-schemes even if in book form)	21.3	22.7
76	PUBLSH	(published resources are being used)	16.8	25.0
77	ENVIRN	(the environment is used as a resource, e.g. draw teacher)	1.5	3.2
78	UNSUPR	(unsupervised task, but behaviour may be supervised)	0.6	1.6
Curriculum categories for equipment				
79	TAPE	(pupils or teacher using tape-recording made in class)	0.7	1.1
80	RADREC	(radio or record-player or equivalent tape- recording)	4.0	2.3
81	TVFILM	(television, cine-film or equivalent video-tape)	4.7	3.7
82	CALCUL	(task requires teacher or pupil to use calculator)	0.02	0.7
83	COMPUT	(computer; either lesson about, or actual use)	0.4	1.9
84	APARAT	(apparatus; gym, maths, science, etc.)	21.3	14.8
Curriculum categories for games (also puzzles or role-play)				
85	PHYSCL	(P.E., football etc.)	2.5	2.3
86	EDUCNL	(educational games or puzzles, e.g. crosswords)	1.9	1.3
87	COMPTV	(competition, e.g. chess, spelling competition, football)	1.3	2.1
88	COOPTV	(co-operation, e.g. role-play, football)	3.6	3.2

		INF	JUN
Curriculum categories for topic			
89 HIST	(work with historical elements)	2.1	7.1
90 GEOG	(work with geographical elements)	0.7	3.6
91 BIOLGY	(work with elements of biological study)	3.0	3.5
92 PHYSCS	(work with elements of physical science)	0.4	4.6
93 ENVIRS	(work having aspects of environmental studies)	3.9	4.6
94 ART	(art and craft, including cooking, woodwork)	14.6	15.3
95 DRAMA	(dramatic work; plays, puppet-plays)	3.2	2.4
96 MUSIC	(playing, listening, singing or moving to music)	7.0	5.3
97 RELIG	(religious studies of any kind)	2.6	4.6
98 MOVEMT	(movement; gymnastics, dance)	5.7	3.3
99 SCLMRL	(social and moral education; must go into general concepts)	8.4	4.3
Curriculum categories for language work			
101 LETTER	(work concentrates on letters, e.g. handwriting)	5.4	2.7
102 PARTWD	(work uses partwords, e.g. phonics with letter-pairs)	3.0	1.7
103 WHOLWD	(work concentrates on whole words, e.g. CLOZE)	13.4	11.7
104 SYMBOL	(work uses symbols other than numbers, e.g. map-work)	1.4	2.0
105 SENTNC	(work concentrates on sentences, e.g. creative writing by infants, or cloze sentences - this is WHOLWD also)	11.0	10.4
106 PASSAG	(work with extended passage, e.g. creative writing, reading aloud by juniors, following long instructions)	12.1	23.2
107 POEM	(involves metre or rhyme, e.g. song, story in verse)	2.9	3.6
108 STORY	(the teacher reads or tells a story or poem)	7.0	4.4
109 FOREGN	(foreign language, including ESL)	not observed	

APPENDIX A2

Copies of The Prismaston File pilot study materials, including:

Teachers Notes

Map of Prismaston: lower junior version (original on loose yellow sheet)

'Datacheck 1' : lower junior question book (original on yellow paper)

'Prismmem' : short reference book (original on pink paper)

Map of Prismaston: upper junior version (original on loose green sheet)

'Datacheck II' : upper junior question book (original on green paper)

'Agent's Code-book II' : upper junior answer book : instructions and sample pages (original green). The lower junior version was similar in format and was printed on yellow paper.

Pilot version of the 'draw a Prismon' listening task

THE PRISMASTON FILE TEACHERS' NOTES

The Prismaston File is designed to allow children to use their analytic, critical and work study skills in solving the problems posed by four secret agents from the world of Prismos.

The Prismaston File has six parts although each child will use only three. The parts are:

1. Teachers' notes
2. Prismmem : a reference book (pink)
3. Datacheck I : 1st. year junior (yellow)
4. Codebook I : 1st. year junior (yellow)
5. Datacheck II : 3rd. year junior (green)
6. Codebook II : 3rd. year junior (green)

The Prismmem

This is a short reference book containing information specifically written for the problems in the Prismaston File. Its contents are:

1. Map symbols and an explanation of the scale of the map for both distance and area.
2. A time-line showing historical events from 1000 A.D. to the present.
3. A dictionary of the words necessary to complete the problems which may not appear in class dictionaries, although the use of other reference books is encouraged.
4. A description of the development of castles.
5. Some historical notes to explain the time-line. These include some irrelevant information such as wuold be encoutered in any other reference book.
6. An index.

Prismmems are available for children to use by sharing one between four. They should be kept on a shelf or in a central place instead of being given out so that the child has to actively seek the information required.

The Prismaston File Datachecks I and II

These are essentially question books.
Datacheck I is for 1st year juniors (age about eight) and is accompanied by a map without a grid reference system.
Datacheck II is for 3rd. year juniors and is accompanied by a map headed PRISMASTON : Town Plan .
The Prismaston File is designed to be self explanatory but teachers are asked to go through the introductory pages with the whole class. After that children may need to be reminded to READ all the information so that they can make their minds up as to which agent is right.

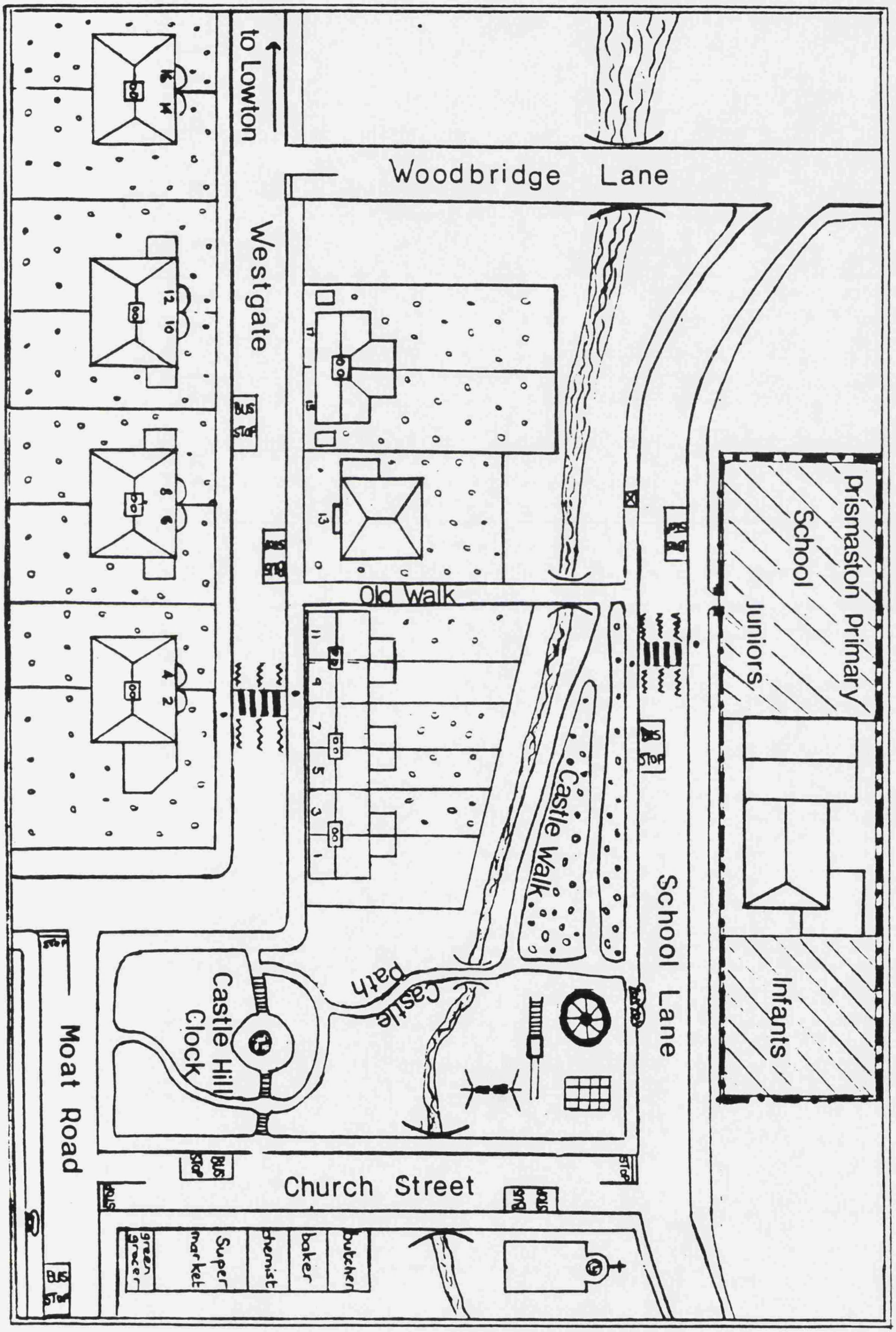
Each Datacheck is in sections which need not be undertaken in the order they appear, althouough some sections do follow on thematically from the preceding one. The time required to complete each section is given in the back of the appropriate Code-book. This should enable children to "fit it in" between other assignments over a period of about two weeks. Alternatively it could be undertaken as a whole class activity if this fits the usual routine better.

Code-books I and II

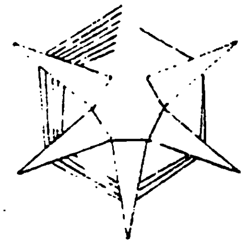
These are basically answer books, compiled in code to preserve secrecy! The child is asked to decide which agent, A,B,C or D had the right idea. The child is also asked to record the time s/he began and ended the section, as well as recording by ticking the appropriate letters which, if any, resources were used.Thus:

1. mem : Prismmem or another reference book
2. dis : discussion with a friend or co-agent
3. the teacher :
   - r : read : ask the child to re-read the question or read it for a child who has difficulty reading.
   - d : define : define a term or suggest that the child looks it up in a reference book.
   - h : hint : give a hint if r and d fail
   - e : explain the process needed but...
   - m : advise the child to miss out the item if the explanation must be too involved.

Lower junior version

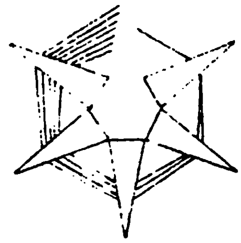


Lower junior version 1

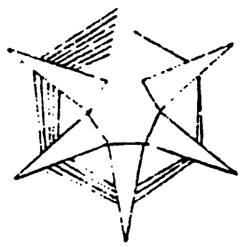


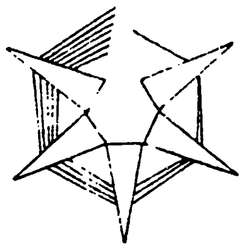
THE PRISMASTON FILE

Data-check



This book is about 4 children who live in a small place code-named Prismaston. They are about the same age as you, and their names are Nicola, Paul, Mark and Sarah.





Hello!

We are from the friendly world of PRISMOS.
We are making a book about worlds close to PRISMOS and we have had 4 secret agents called Anen, Bakk, Ckek and Dxox, but known as A, B, C and D, working in Prismaston, watching the 4 children. A, B, C and D have told us a great deal about them but we need checks on some of their information. A, B, C and D each have a different theory about some of the facts. YOUR assignment is to decide WHO is right —— Anen, Bakk, Cken or Dxox, by checking the evidence in this book.

Please help us.

Become a secret agent! Use your powers of detection!

Our alphabet is not qite the same as yors. We are very sorry if we have made sume spelling mistakces.

This is the Prismoan alphabet.

a b c d e g i k l m n o p q r s t v x

Use our alphabet to make up a Prismoan name for yourself. It must have 4 letters. One letter must be used twice. Write it on the front of your Prismaston Data Collection Code-book.

Now have a good look at your code-book.

Make sure you can use our secret codes.

* * * * * * * * * * * * * * * *

A, B, C and D were not sure of these things.

a1: How many more letters are there in your alphabet than in the Prismoan alphabet?

A: 6 B: 4 C: 0 D: 7

a2: Which of these groups of letters is in <u>both</u> alphabets?

A: efg B: qrs C: tuv D: vwx

Look closely at the plan of Prismaston in the centre of the book. Anen and Dxox made the plan from an observo-copter hovering above Prismaston.

We have put some words on the plan to point out roads and buildings.

A, B, C and D tried to find out where Paul, Nicola, Sarah and Mark live.

They need you to tell them if they have got the plan right.

Please sort them out!

Housing

We know that:

Nicola's house is 5, Westgate.

Sarah lives at 2, Westgate.

Mark's address is 13, Westgate.

Paul lives nextdoor to Sarah,

but ...

h1 What is Paul's address?

A: 3, Westgate

B: 1, Westgate

C: 5, Westgate

D: 4, Westgate

h2 The people who live at 15, Westgate, are nextdoor neighbours to ....

A: Nicola

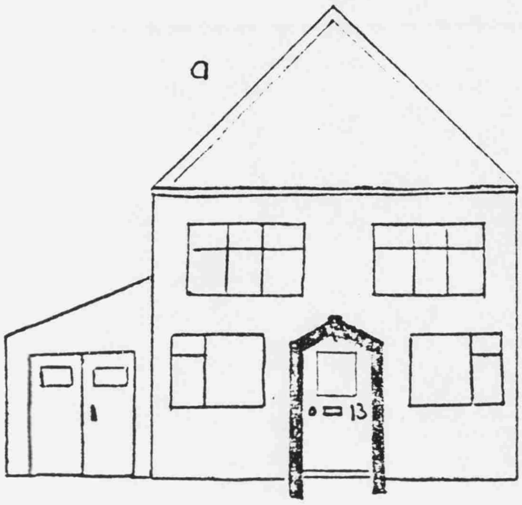
B: Mark

C: Paul

D: Sarah

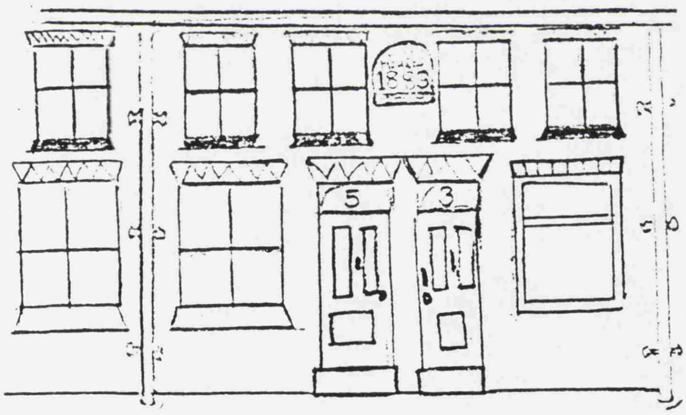
Look at the pictures of the children's houses on the next page.

These houses are all on Westgate.



This is Mark's house.

a detached house

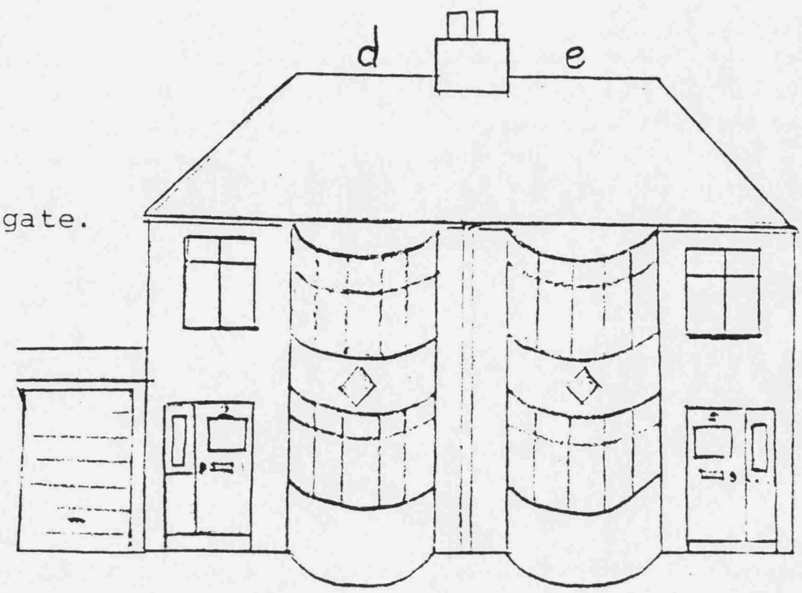


Nicola lives at number 5.

terraced houses

Sarah lives at 2 Westgate.

Paul lives nextdoor.



semi-detached houses

A, B, C and D drew these pictures but we are not sure which are the right sky-views. You must imagine how these houses would look from the sky.

Find these sky-views on the town plan.

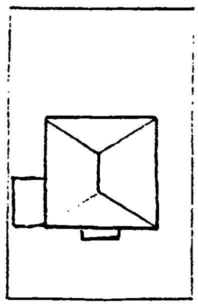
h3 Which house does this sky-view belong to?

A: Nicola's house

B: Mark's house

C: Sarah's house

D: Paul's house



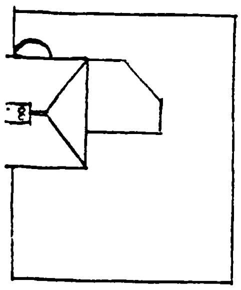
h4 Which house do you think has this sky-view?

A: Paul's house

B: Sarah's house

C: Nicola's house

D: Mark's house



h5 What kind of house does Paul live in?

A: terraced

B: detached

C: bungalow

D: semi-detached

h6 Nicola lives in a row of terraced houses.

Which house is Nicola's house?

A: house e B: house b

C: house c D: house a

h7 Who lives in a detached house?

A: Sarah B: Nicola

C: Paul D: Mark

h8 Which pair of children live in the same sort of house?

A: Mark and Sarah B: Paul and Mark

D: Paul and Sarah D: Nicola and Mark

h9 If you walked along Westgate, starting at Castle Hill Clock, which order would you pass the children's houses?

A: Mark's - Sarah's - Paul's - Nicola's

B: Nicola's - Sarah's - Paul's - Mark's

C: Nicola's - Paul's - Sarah's - Mark's

D: Paul's - Mark's - Nicola's - Sarah's

ARCHITECTURE

Look in the Prismmem book to see what we mean by 'architecture'.

Bakk is a builder and he is very interested in the way your houses look. They are not at all like ours. Our houses are made of 3-sided and 6-sided shapes. (You call them triangles and hexagons, we think.)

A1 Look at the pictures again. Whose house has a triangular roof when drawn from the front?

A: Nicola's B: Mark's

C: Sarah's D: Paul's

A2 One of the houses seems to have had a new window put in. Which one is it?

A: 2, Westgate B: 3, Westgate

C: 5, Westgate D: 13, Westgate

A3 Look carefully at Mark's house. It has no ....

A: door B: windows C: garage D: chimneys

Over 20 years ago, most houses were heated by coal or wood fires. They were built with chimneys to let the smoke out. Nowadays, many houses do not have fires and so they do not need chimneys.

A4 What can we be sure about when we look at Mark's house?

A: It has electric heating.

B: It has gas heating.

C: It does not have coal fires.

D: It is very cold inside.

The Town

Look carefully at the plan of Prismaston.

m1 There is no .... on the plan.

A: church

B: school

C: play park

D: library

m1 In the play park, there is no ....

A: see-saw

B: slide

C: climbing frame

D: round-a-bout

m3 Which order would you pass these things if you walked along Castle Path towards School Lane?

A: bridge - clock - gardens- round-a-bout

B: gardens - clock - round-a-bout - bridge

C: round-a-bout - gardens - bridge - clock

D: clock - bridge - gardens - round-a-bout

m4 Which order would you pass these things if you were on the bus going along Church Street from Moat Road to School Lane?

A: shops - stream - swings - church

B: church - stream - swings - shops

C: church - swings - stream - shops

D: swings - shops - church - stream

The Past

Nicola's house was built in 1883.

p1 We know when it was built because.........

A: it has a date stone which says 1883

B: it is very old

C: it is made of brick

D: it is a terraced house

Nicola's house has stood for more than 100 years.

p2 100 years (one hundred years) is called

A: a decade

B: a centurion

C: a millenium

D: a century

If Nicola's house is about one hundred years old, then it must be........

p3 A: about your mother's age

B: about your age

C: much older than your great grandmother is, or would be

D: about your grandmother's age

Nicola's house has no room for a car or a garage.

p4 Why do you think most people did not have a car in those days?

A: because cars were only just being invented then

B: because they did not have garages

C: because they did not go out very often

D: because it was always fine enough to walk

When do you think Sarah's house was built?

p5 A: earlier than Nicola's

B: at the same time as Nicola's

C: later than Nicola's, when lots of people owned cars

D: last year

*

Look at the plan of Prismaston again.

Find Castle Hill Clock.

p6 What do you think there might have been on the hill a long time ago?

A: a church B: a house

C: a clock D: a castle

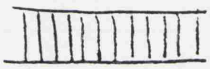
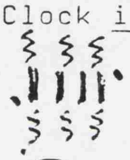
p7 Which of these road names might mean that there was once a

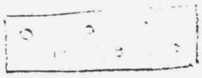
* castle in Prismaston?

A: Moat Road B: Westgate

C: School Lane D: Church Street

p8 Which plan-sign shows that Castle Hill Clock <u>is</u> on a small hill?

* A:  B: 

C:  D: 

p9 The hill could have been a motte, so there could have been

a castle here as early as the ....

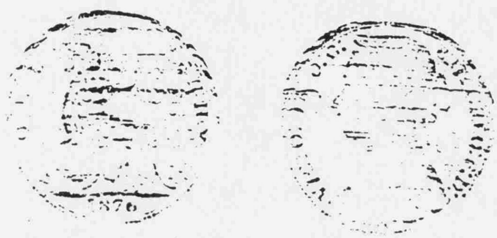
A: 5th century B: 11th century

C: 20th century D: 14th century

p10 Nicola once found this coin on Castle Hill. She thought it was Roman. When do you think it could have been minted ?

* A: in Roman times B: in Victorian times

C: in Norman times D: last week



p11 What kind of coin is it?

A: bunpenny B: veiled head penny

C: newpenny D: farthing

Journeys

Paul, Sarah, Mark and Nicola walk to school on dry days.

Lock at the plan of Prismaston.

Which way is the shortest way for them to go?

j1 A: along Woodbridge Lane

B: along Castle Path

C: along Church Street

D: along Old Walk

j2 Sometimes they walk to school along Castle Walk. The path goes near to all these things except one. Which one?

A: a clock B: a stream

C: a shop D: a playground

j4 Which of these would be the longest distance from Mark's house to school? Mark's house is 13, Westgate.

A: Westgate --- Moat Road --- Church Street --- School Lane

B: Old Walk --- cross School Lane at the crossing

C: Westgate --- Castle Path --- School Lane

D: Westgate --- Woodbridge Lane --- School Lane

j4 Which is the shortest way for Nicola to walk to the Play Area near Church Street?

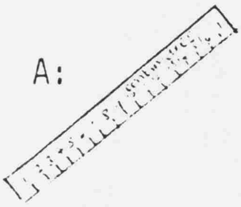
A: Westgate --- Castle Path

B: Westgate --- Moat Road --- Church Street

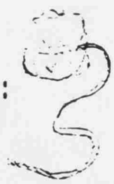
C: Westgate --- Old Walk --- School Lane

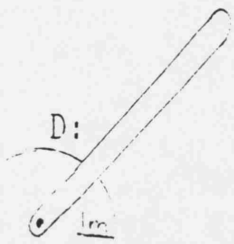
D: Westgate --- Castle Path --- Castle Walk

j5 Which of these would you use to measure the actual length of Old Walk?

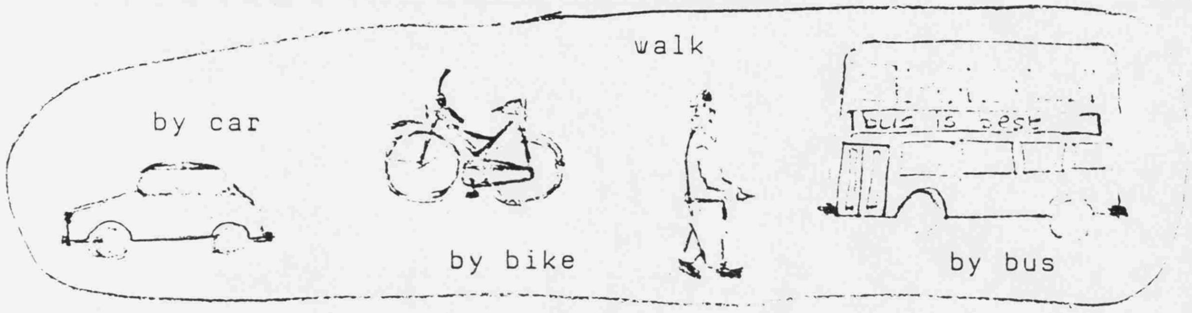
A: 

B: 

C: 

D: 

Here is a group of ways to come to school.

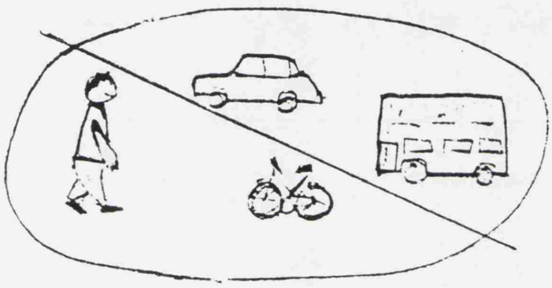


It can be divided or split in different ways.

A, B, C and D saw some children doing this at Prismaston school but they forgot to write down the answers!

Can you tell the right answers?

s1



This split means

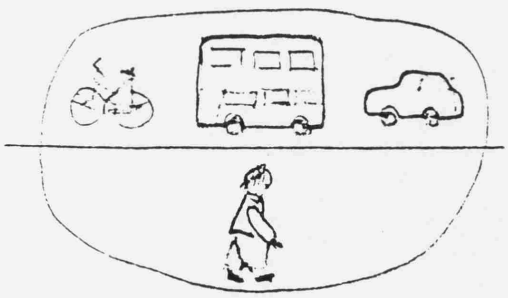
A: (has wheels/has no wheels)

B: (engine/no engine)

C: (stairs/no stairs)

D: (pedals/no pedals)

s2



A: (has wheels/has no wheels)

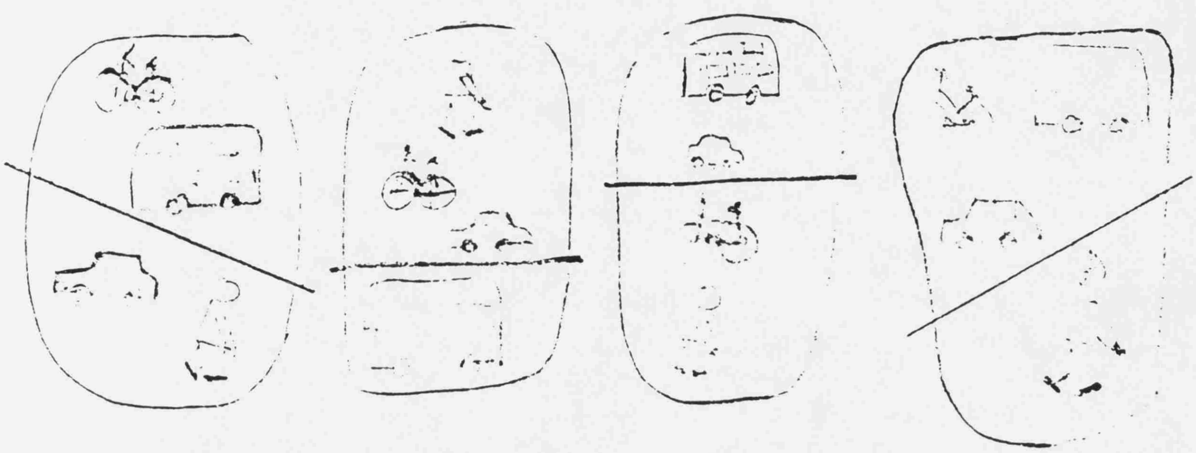
B: (engine/no engine)

C: (stairs/no stairs)

D: (have bells/do not have bells

s3 Which group is split : (made of metal/not made of metal)?

A: B: C: D:



Transport

We'd like to know more about transport in Prismaston.

t1 What is transport?

A: games like tennis, football, cricket ...

B: a place where boats are kept

C: a big lorry

D: the way people travel about from place to place; by bus or car or aeroplane ...

Nicola, Sarah, Paul and Mark are all in Class 3 at Prismaston Primary School. A, B, C and D went to the school one day to see what happens inside. There were some charts on the wall about how the children come to school. They copied the charts. Can you find them and look at them?

We need you to explain them to us.

Look at the chart called '<u>How we get to school on fine days</u>'.

t2 Can you tell how many children come by car?

A: 6 B: 7 C: 3 D: 20

t3 Only 3 children came ......

A: by bicycle B: on foot C: by car D: by bus

t4 How many children came altogether?

A: 18 B: 7 C: 24 D: 20

Now look at the chart called '<u>How we come to school on wet days</u>'.

t5 How many children come by bike when it is wet?

A: 2 B: 20 C: 8 D: 0

t6 How many more children walk on fine days than on wet days?

A: 4 B: 3 C: 5 D: 20

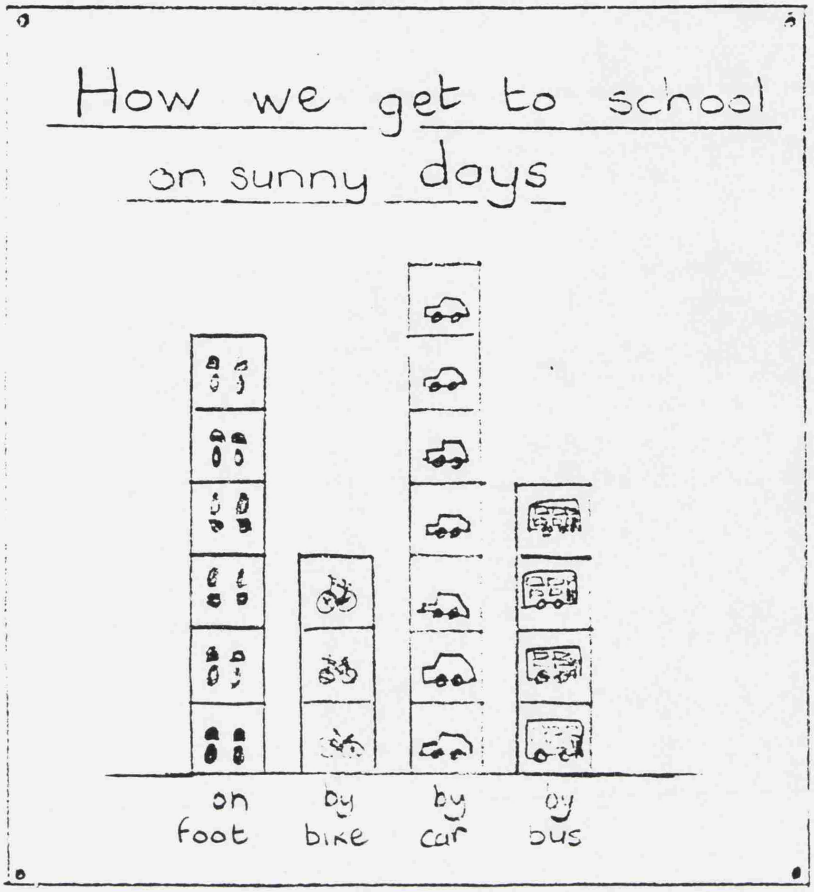
t7 Which idea CANNOT be checked by looking at the chart?

A: on fine days more children walk than on wet days

B: on wet days nobody rides a bike to school

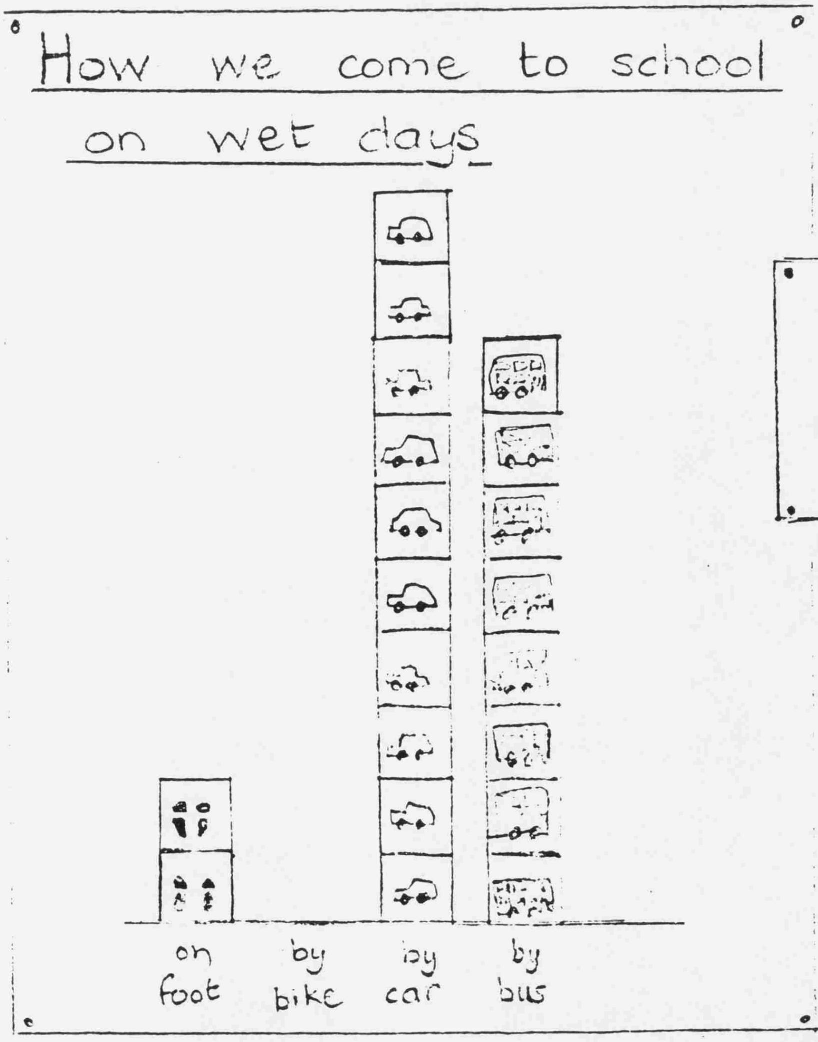
C: on wet days more children come by car than on fine days

D: the bus is full on wet days



Transport Survey

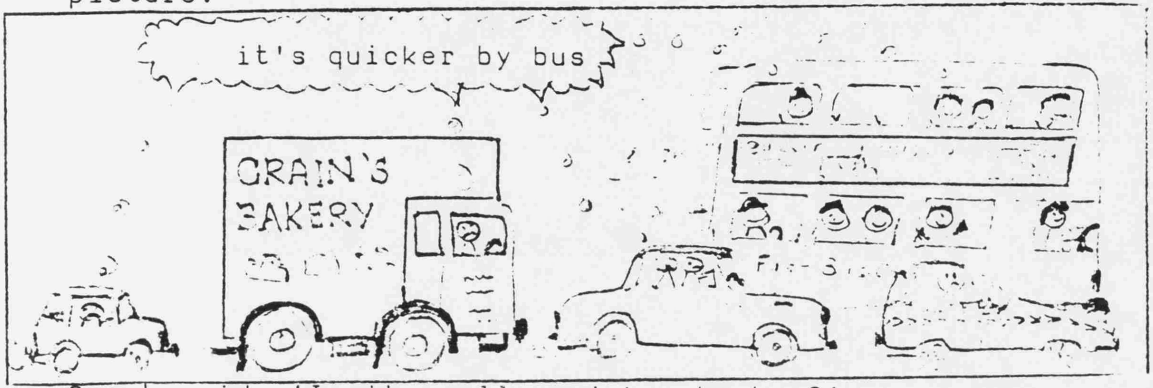
	6	2
	3	0
	7	10
	4	8
total	20	20



Have you all stuck your squares on this chart?

'It's quicker by bus'

One day Mark brought a picture to school. His mum is a bus driver and she got the picture at the bus station. Here is the picture.



Sarah said, 'Is it really quicker by bus?'

'Quicker than what?' asked Nicola.

'Quicker than walking, of course,' said Paul, 'but I think bikes are best.'

'Look at the picture! It means buses get there quicker than cars,' explained Mark, sounding a bit cross.

'I know,' said Mrs. Tryit, their teacher, 'instead of arguing, why not find out for yourselves?'

'How?' said all four children at once.

'Try it!' said Mrs. Tryit and left them to think about it.

* * * * * * * * * * * * * *

1 Who brought the picture to school? A: Mark B: Sarah C: Paul D: Nicola

2 Whose mum drives buses? A: Mark's mum B: Nicola's mum C: Sarah's mum D: Paul's mum

3 Look at the people on the bus.
Do you think they look ...? A: tired B: cross C: sad D: happy

4 Which word does <u>not</u> describe the car drivers?
A: grumpy B: frustrated C: amused D: angry

5 In the picture, what is meant to be moving fastest?
A: the front car B: the bus C: the back car D: the van

Who likes bikes best? A: Paul B: Sarah C: Nicola D: Mark

How many people speak in the story?

A: 6 B: 4 C: 1 D: 5

Who felt a little bit angry

A: Nicola B: Paul C: Mark D: Sarah

What do <u>you</u> think the picture means?

A: Bus~~s~~es are quicker than walking

B: Cars are quicker than buses

C: Buses are quicker than bikes

D: Buses are quicker than cars in town

* * * * * * * * * * * *

The children did try it. They had a race to school.

Mark went by bus along Moat Road and Church Street.

Nicola walked along Old Walk.

Paul went by bike along Woodbridge Lane.

Sarah went by car along Woodbridge Lane. Her Dad was the driver.

They all set off from Westgate bus stop at half past eight.

Here are the results:

Child	Mark	Nicola	Paul	Sarah
went by	bus	walking	bike	car
set off at	8.30	8.30	8.30	8.30
got to school by	8.50	8.45	8.40	8.45

Who took the longest time?

A: Mark B: Nicola C: Paul D: Sarah

The children found that going to school was quickest by ...

A: bus B: walking C: bike D: car

What would be a better title for the story?

'It's quicker ....

A: ... by bus.'
B: ... on foot.'
C: ... by bike.'
D: ... by car.'

Think about <u>your</u> journey to school.

How did you come to school today?

a: walking b: car c: bus d: bike e: taxi f: none of these

Which of these do you pass on your way to school?

Mark all the ones you pass.... in the code-book, of course!

a: a church
b: a petrol station
c: a shop
d: a big house
e: a little house
f: a field
g: water, a river, stream, canal, lake
h: a tree
i: a very big building like a factory
j: a hill or a mountain

If you pass something unusual or special, like a windmill or a statue, or something you always like to see, write what it is in the space in the code-book. It could be a lovely garden or a road sign.

What kind of house do you live in?

a: terrace b: semi-detached c: detached d: cottage

e: bungalow f: flat g: farmhouse

You can tick more than one.

In the code-book, there is an empty space. It is for you to draw a picture. Call your picture 'My journey to school'.

Draw..... your house

your school

yourself and how you get to school

3 of the things you pass on your way

Draw the best picture you can. You can use pencil, felt-tips, crayons or what ever you usually use.

If there is something unusual on your journey, don't forget to draw it.

Money

On Prismos we do not use money.

Anen, Bakk, Ckek and Dxox could not understand this list.

Mark was reading it at the bus stop.

	FAST BUS COMPANY	Lowton		
	Fares until further notice			
Bus	**From**	**To**	**Full**	**Half**
12	Lowton Bus Station	Westgate	18p	9p
	Lowton High School	School Lane	15p	8p
	Westgate	Church Street	6p	3p
	Westgate	School Lane	12p	6p
14	Moat Road	Westgate	7p	4p
	Westgate	Lowton High School	18p	9p
	Moat Road	Lowton Bus	22p	11p
	Children under 5 travel free. 5 to 13 years and OAP's pay half fare. Others pay full fare. No dogs.			

A, B, C and D made some guesses but can you say which is right?

How much did Mark have to pay to get to Prismaston Primary School?

A: 15p B: 8p

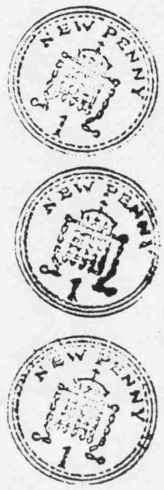
C: 6p D: 12p

f2 Which coins would he need for the exact fare?

A

B

C



D

Mark's sister Joanne is 14. She goes to Lowton High School.

She catches the number 14 to Lowton.

f3 What is her fare to Lowton High School?

A: 9p B: 18p C: 7p D: 20p

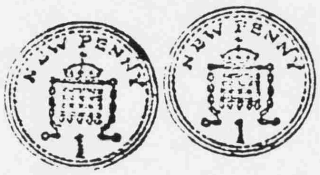
f4 She has 

How much change should she get?

A: 

B: 

C: 

D: 

There is a fold in one corner of the fares list.

f5 What letter is missing from the last word?

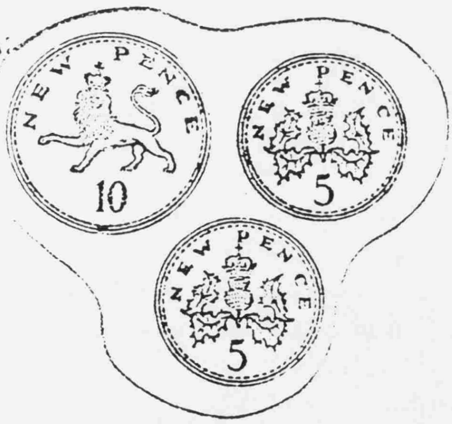
A: O B: u C: i D: ru

f6 What is the word on the fold on the line above the bottom line.

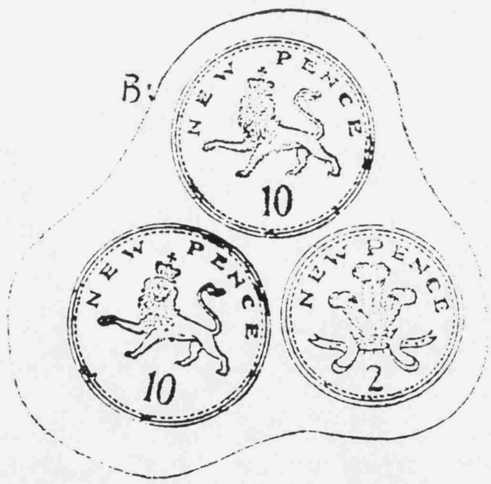
A: loaf B: halve C: harf D: half

f7 What would it cost Mark to travel from Moat Road to Lowton Bus Station?

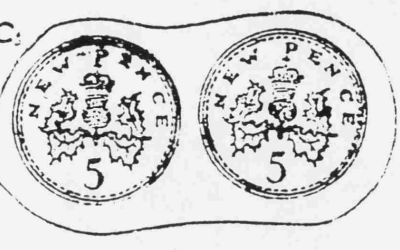
A:



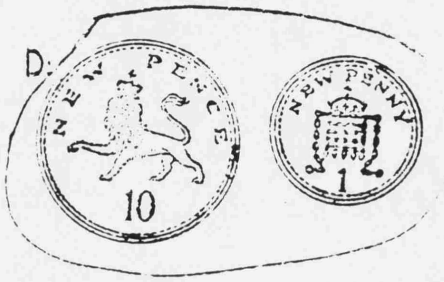
B:



C:



D:



Would you like to know something about <u>us</u>? Listen very carefully to your teacher who is going to read a description of what the people of Prismos are like.

* *   * *

We are called Prismons.

* *   * *

Wait until your teacher has read about us twice.

* *   * *

We have many Prismons studying your world (We hope you have not seen any of them!)

To find out if you have seen a Prismon without knowing what it was, we want you to make a drawing or plan for a model Prismon.

In the Code-book there is a list of earth-stuff that you could use for your model.

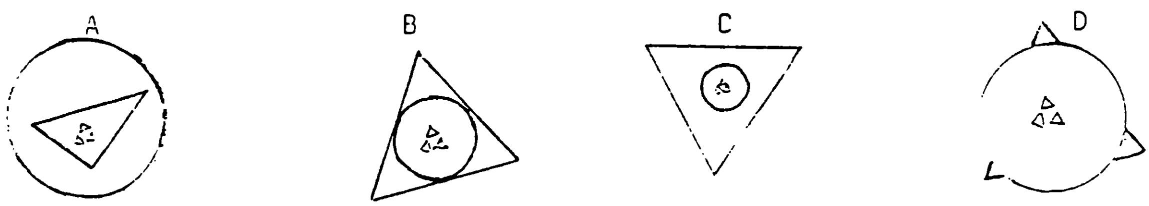
Anen, Bakk, Ckek and Dxox tried to make little models of you.

L1: Which one do you think seems the best?

Some of the earth-stuff they used is:

	A:	B:	C:	D:
hair	string	wool	wood shavings	nothing
eyes	marbles	buttons	fruit gums	sequins
arms	matchsticks	plasticene	newspaper	sticks
clothes	paper	cloth	foil	cotton wool

L2: Which of these CANNOT be a sky-view of a Prisbi?



The reference book for both upper and lower junior versions

Prismmem

PRISMMEM * PRISMMEM * PRISMMEM * PRISMMEM * PRISMMEM * PRISMMEM

This book contains some of the background information needed for the Prismaston Datachecks. Please use any other earth reference books that you need as well.

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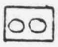
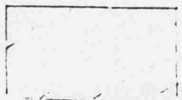
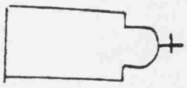
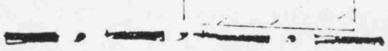
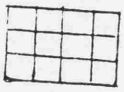
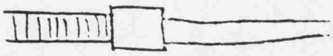
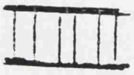
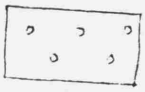
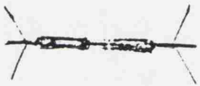
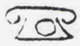
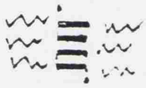
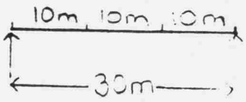
PRISMMEM * PRISMMEM * PRISMMEM * PRISMMEM * PRISMMEM * PRISMMEM

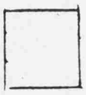
PLAN SIGNS

bridge		round-a-bout	
chimney		school playground	
church		school wall	
climbing frame		slide	
clock		steps	
gardens		swings	
post-box		telephone box	
river		zebra crossing	

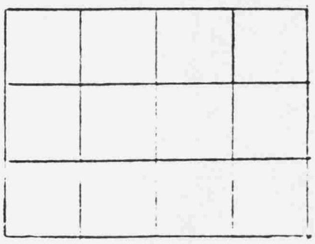
Scale : on the town plan :1 centimetre stands for 10 metres.

In other words, this length —— on the paper means 10 metres on the ground.



A square this size:  stands for 100 square metres (100m^2).

so this area



stands for 1,200 m^2.

THE PRISMASTON TIME-LINE

Although there was a settlement at Prismaston in Saxon times, this time-line begins in 1000 A.D.

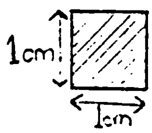
In England	A.D.	In Prismaston
	1000	
Norman invasion 1066		Norman soldiers build motte and bailey castle
	1100	
		Work begun on castle: stone walls built and moat made 1130 - 1160
	1200	
	1300	First church building
Black death 1349		100 deaths
	1400	
	1500	
King Henry VIII 1509 - 1547		Church spire struck by lightning 1552
Queen Elizabeth I 1553 - 1603		
Gunpowder Plot 1605	1600	
Great Plague 1665		
	1700	New Church building begun 1725
Inventions: Hargreaves' Spinning Jenny 1764 Watt's steam engine 1765		
Stephenson's Rocket First steam trains	1800	
Queen Victoria 1837 - 1901		Prismaston School opened
first motor cars	1900	new houses on Moat Street
World War I		Castle Hill Clock
World War II		
Queen Elizabeth II 1952 -		The Queen's visit: 1958
		Prismon landing 1983
	2000	

1 centimetre stands for 50 years

THE PRISMMEM DICTIONARY

This dictionary will tell you the meanings of the difficult words in the Prismaston File. If the word you are looking for is not here, look in one of your class dictionaries.

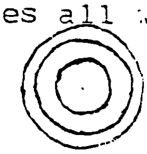
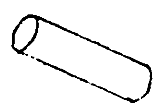
aA

agenda	a list of matters to discuss
agent	someone whose job is to arrange things for another person : a spy
amused	feeling of wanting to smile or laugh at something : being happily interested
archaeological	(say arkiolojical) something to do with archaeology : archaeological evidence tells us about life hundreds or thousands of years ago
archaeology	(say arkioloji) the study of ancient objects which have been hidden or buried for hundreds of years
architecture	(say'arkitektyor') design of buildings
area 	the size of a surface: the area of the square is 1 square centimetre or $1cm^2$.
assignment	task or job you are given to do
athletics	running, jumping, throwing, often in a race or competition

bB

bailey	part of a castle: in the motte and bailey type, this was where the kitchen, stables and chapel were.
bungalow	a house without an upstairs: all the rooms are on the ground floor
bunpenny	an old penny showing Queen Victoria with her hair in a bun: (see veiled head penny)

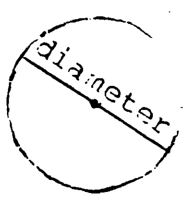
cC

centimetre	a length that is exactly one hundredth of a metre: this line is 1 centimetre or 1cm long
centipede	a small, crawling animal with many tiny legs
centurion	an important Roman soldier : Roman army officer in charge of 100 soldiers
century	100 years : 100 runs by one batsman in cricket From 1900 to 1999 is the 20th. century. From 1000 to 1099 is the 11th. century. From 1100 to 1199 is the 12th. century. From 1300 to 1399 is the 14th. century.
circulation	the way blood goes round the body
code	a set of letters, figures or signs used to send messages secretly or quickly
code-name	a secret made-up name to hide the real name of a person or place
concentric	rings of different sizes all with the same centre: these circles are concentric: 
conclusion	the end of a story or discussion: the final decision
council	the group of people elected to be in charge of a town or county
councillor	a person elected to be a member of a council
cottage	a small, old house
cylinder	the shape of a tin of beans: a long shape with the same sized circle from top to bottom, like a stick of rock: a 3-D shape like this 

dD

decade	ten years: 1970 to 1980 is a decade

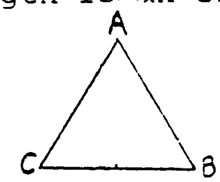
decimal	number system based on ten: a way of writng fractions by using a dot called a decimal point: so 12·5 means $12\frac{1}{2}$: 3·75 means $3\frac{3}{4}$
detached	separated from other things: a detached house is not joined to any other houses
detection	finding out by looking for clues
detective	someone who looks for clues to solve a problem or a mystery
diameter	a straight line across a circle which goes through the centre of the circle from one side to the other
discussion	a serious conversation about something



eE

equilateral	equal sides: a triangle with sides of the same length is an equilateral triangle

AB=BC=CA



exhaust	waste gas and steam from an engine
expensive	costing a lot of money

fF

farthing	a small coin (about the size of a 1p) which was worth a quarter of an old penny
frustrated	unhappy and angry because you cannot do what you intended to do
fumes	smoke or gas

gG

hexagon	a shape with six sides: a regular hexagon has its sides of equal length

iI

ignore	to take no notice of someone or something
international	between many different countries: involving people from many countries
invade	to enter a country and to fight to control it
invasion	when a n army fights its way into another country
issue	an important matter: a problem

jJ

journey	the way from one place to another: the distance between two places

kK

keep	1:to have something and not let it go: or 2:the strongest part of a castle: the large tower in a motte and bailey castle

lL

litre	(say'leeter') a certain amount of a liquid: petrol for cars is measured in litres or gallons

mM

metre	(say 'meeter') a certain length which many countries use as a measure of other lengths 1,000 metres = 1 kilometre or 1,000m = 1km
millenium	a thousand years : 1,000 years
minimum	the smallest amount or number
minted	made by stamping out of metal: the date on a coin tells when it was made or minted
moat	the deep ring of water around a castle of the 12th. century and later
motte	the mound of earth or hill which was made for the keep of a motte and bailey castle in the 11th. century

nN

oO

opposite	as different as can be: big is the opposite of little: sitting opposite means facing

pP

palisade	a high fence of pointed wooden poles
pollution	an impurity: the air is polluted by smoke, fumes and noise
prism	a solid with the same cross-section (slice) throughout its length

qQ

rR

ridiculous	so silly it should be laughed at

s S

scheme	plan
semi-detached	a semi-detached house is joined to one other house
site	place to build a building: a place to put something
sky-view	the way something looks from above
solar system	the sun and the planets
summary	a short account of a story or of some information
survey	a careful look over a wide area: asking lots of people the same question to find out about something

t T

terraced	houses joined together in a row
territory	an area of land which belongs to a person or group: the piece of land that an animal marks out as its own
transport	the way people and things are moved from one place to another; by horse, by ship and so on
treasurer	person who is in charge of the money
triangle	a three-sided shape
trundle wheel	a wheel to push along the ground to measure the distance between two places

u U

unidentified	cannot be named or labelled : something which has not been seen before

v V

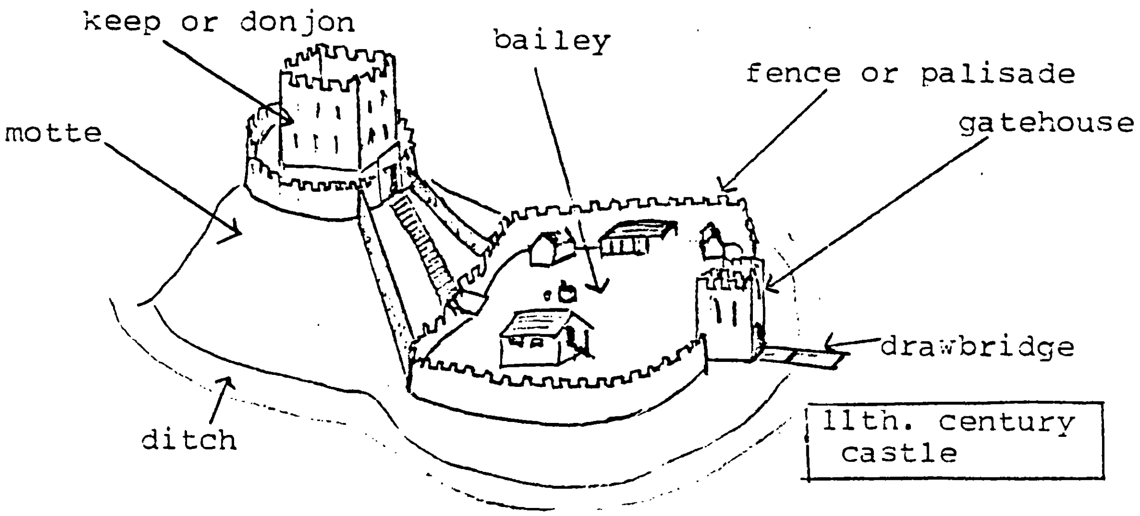
veiled head penny	old penny showing Queen Victoria with a veil covering her hair: these pennies were minted in the later part of her reign

wW : xX : yY : zZ

CASTLES

When William the Conqueror invaded England in1066, his army of French soldiers had to build castles in a hurry, to protect themselves from the English.

The first castles they built were usually 'earthworks'. They dug a deep ditch around a high mound of earth called a 'motte'. Beside the motte was a low, flat area called a 'bailey'.This drawing shows what a Motte and Bailey castle may have looked like.



11th. century castle

Archaeological evidence tells us that the buildings were made of wood. Many of them were replaced by stone buildings during the 12th. century because attackers often set fire to the timber. Sometimes the wood was plastered and painted to make it look like stone!

The castles of the 12th. century were built with round towers in the high walls. The square keeps were often replaced by round ones.Stone towers could be built higher than wooden ones so there was no need for a motte.

HISTORY IN ENGLAND : NOTES TO EXPLAIN TIME-LINE

PLAGUE

The Black Death 1349

In 1348 and 1349, there was a serious outbreak of disease in England.The disease or plague was called Bubonic plague. The 1348-9 outbreak was the worst ever known in this country. It claimed the lives of nearly half the population and in some areas it wiped out whole villages.

The Great Plague 1665

In 1665, there was another outbreak of Bubonic plague but this time is was confined to London and to a small village in Derbyshire called Eyam. This outbreak killed over 60,000 people in London out of the 450,000 people living there.

INVENTIONS

Hargreaves' Spinning Jenny 1764

James Hargreaves was a Lancastrian who invented a cotton spinning machine, called a spinning jenny. With this machine one person could spin ten or more bobbins of fine twisted cotton thread. Before this invention, one person could spin only one bobbin at a time using a spinning wheel.

Watt's Steam Engine 1765

Although many people think that James Watt invented the steam engine, this is not quite true. James Watt(1736-1819) was a Scotsman who made great improvements to the first kind of steam engine which was invented by Newcomen in 1763. One of Newcomen's engines was taken to Watt's works to be repaired and this led Watt to design a condenser(to convert steam to water) and a steam jacket for the boiler cylinder.

Stephenson's Rocket 1829

George Stephenson (1780-1848) was an engineer who worked at a colliery near Newcastle on Tyne. In 1814 he invented a steam locomotive to pull coal trucks to the docks from the mine. He became a railway engineer and in 1829, his train, 'The Rocket', won a competition for the fastest steam train. After that his design was used for years. The Rocket went at 15 miles per hour!

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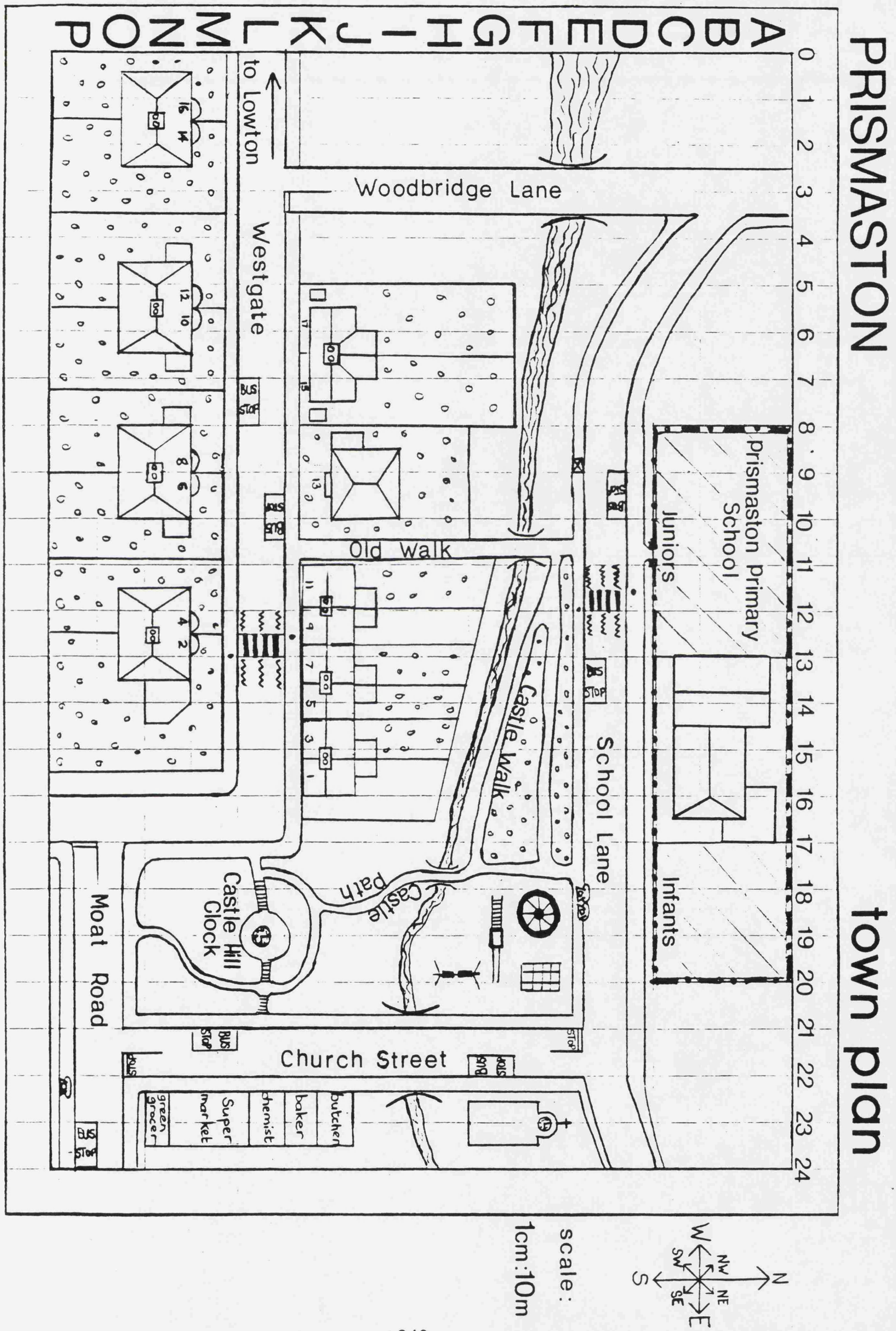
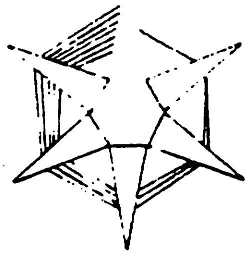
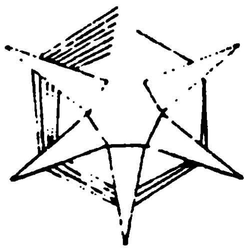

PRISMASTON town plan
A B C D E F G H I J K L M N O P
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Woodbridge Lane
to Lowton
Westgate
Old Walk
Prismaston Primary School
Juniors
Infants
School Lane
Castle Walk
Castle Path
Castle Hill Clock
Moat Road
Church Street
BUS STOP
butcher
baker
chemist
Super market
green grocer
16 14 12 10 8 6 4 2
17 15 13 11 9 7 5 3 1
N NE E SE S SW W NW
scale:
1cm:10m

Upper junior
version

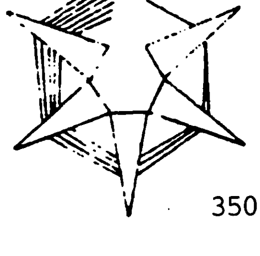


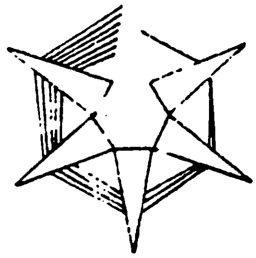
THE PRISMASTON FILE

Data-check



This book is about 4 children who live in a small place code-named Prismaston. They are about the same age as you, and their names are Nicola, Paul, Mark and Sarah.





Hello!

We are from the friendly world of PRISMOS.
We are making a book about worlds close to PRISMOS and we have had 4 secret agents called Anen, Bakk, Ckek and Dxox, but known as A, B, C and D, working in Prismaston, watching the 4 children. A, B, C and D have told us a great deal about them but we need checks on some of their information. A, B, C and D each have a different theory about some of the facts. YOUR assignment is to decide WHO is right —— Anen, Bakk, Cken or Dxox, by checking the evidence in this book.

Please help us.

Become a secret agent! Use your powers of detection!

Our alphabet is not qite the same as yors. We are very sorry if we have made sume spelling mistakces.

This is the Prismoan alphabet.

a b c d e g i k l m n o p q r s t v x

A, B, C and D were not sure of these things.

Use our alphabet to make up a Prismoan name for yourself. It must have 4 letters. One letter must be used twice. Write it on the front of your Prismaston Data Collection Code-book.

Now have a good look at your code-book.

Make sure you can use our secret codes.

a1: How many more letters are there in your alphabet?

A: 6 B: 4 C: 0 D: 7

a2: Which of these groups is in <u>both</u> alphabets?

A: efg B: qrs C: tuv D: vwx

Look closely at the plan of Prismaston in the centre of the book. Anen and Dxox made the plan from an observo-copter hovering above Prismaston.

We have put some words on the plan to point out roads and buildings.

A, B, C and D tried to find out where Paul, Nicola, Sarah and Mark live.

They need you to tell them if they have got the plan right.

Please sort them out!

HOUSES

We know that ;

Nicola's house is 5, Westgate;

Sarah lives at 2, Westgate;

Mark's address is 13, Westgate;

Paul lives nextdoor to Sarah......but..

ha What is Paul's address?

A: 3,Westgate B: 1, Westgate

C: 5, Westgate D: 4, Westgate

hb The people who live at 15, Westgate are nextdoor neighbours to

A: Sarah B: Mark

C: Paul D: Nicola

Look at the compass points on the map. On Prismos, we have six points of the compass. Anen, Bakk, Ckek and Dxox were not sure how to use your compass.

hc Sarah's house is to the .... of Paul's

A: West B: South C: North D: East

hd Mark's house is .... of Paul's.

A: South B: South-east

C: East D: North-west

SKY-VIEWS

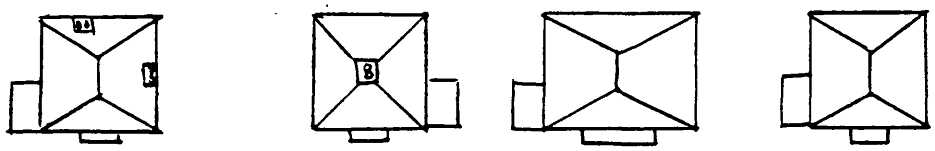
Anen, Bakk, Ckek and Dxox drew pictures of the children's houses. Their drawings are on the next page.

On the plan, you can see how the houses look from the sky.

You can see 'sky-views' of the houses.

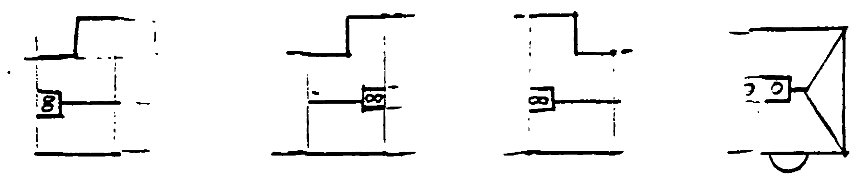
he Which is the correct sky-view for Mark's house?

A B C D



hf Which sky-view goes with Nicola's house?

A B. C D



Ckek is a builder in his spare time, and he was interested in the names you use for your houses. Would you check these names?

hg What kind of house does Paul live in?

A: terraced B: detached

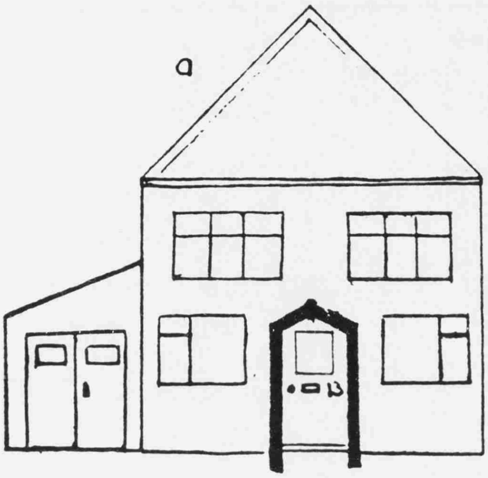
C: bungalow D: semi-detached

hh What kind of house is 17, Westgate?

A: terraced B: detached

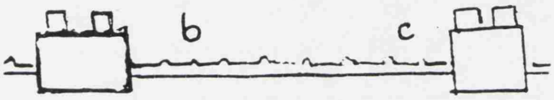
C: semi-detached D: cannot decide

These houses are all on Westgate.



This is Mark's house.

a detached house

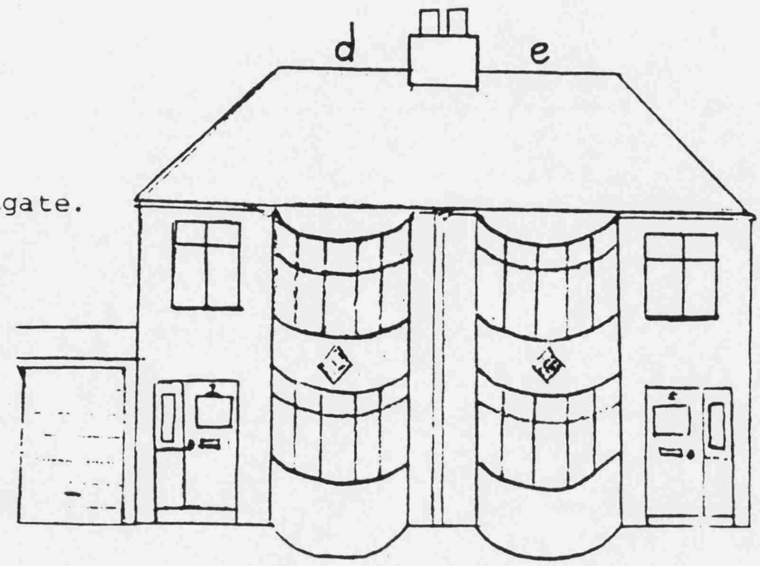


Nicola lives at number 5.

terraced houses

Sarah lives at 2 Westgate.

Paul lives nextdoor.



semi-detached houses

TERRITORIES

Anen and his friends were puzzled by the sizes of your territories. (We think you call them yards or gardens)

They all seem to be different sizes. Some houses have enormous gardens and others have quite small ones.

On Prismos, every family has the same sized territory.

Look at the territories along Westgate, for example.

One of these houses has a much bigger territory than the others.

g1 Which one is it? (Territory is house AND garden space)

A: 17, Westgate B: 8, Westgate

C: 3, Westgate D: 13, Westgate

Some of them do have the same sized space, but not many!

g2 Which house has the same sized territory as 6, Westgate?

A: 8, Westgate B: 13, Westgate

C: 7, Westgate D: 4, Westgate

Your houses seem to be different sizes too.

g3 Who lives in the house with the biggest floor space?

A: Nicola B: Paul C: Mark D: Sarah

Your territories are different shapes as well.

g4 Whose territory is NOT a rectangle?

A: Mark's B: Paul's C: Sarah's D: Nicola's

THE TOWN PLAN

Look carefully at the plan of Prismaston. You may need to look at the list of plan signs as well.

m1 In the play park, there is no .... A: see-saw

B: slide

C: climbing frame

D: round-a-bout

m2 There is no .... on the town plan.

A: library B: church C: school D: play park

Bakk and Ckek went to a Prismaston Council Meeting.

Here is the list of items for discussion.

PRISMASTON COUNCIL MEETING

Agenda

1. Minutes of last meeting.
2. Site of new clinic.
3. Site for large carpark to ease traffic along Church Street.
4. New school wall.
5. Road markings on Church Street.
6. Reports of Unidentified Flying Objects over Prismaston; discussion to be led by Councillor Moon.

Bakk and Ckek were really looking forward to item 6!

Had the observo-copter been spotted????

Prismaston Council Meeting.

ITEM 2 : Site of new clinic with small car

Aspace of $800m^2$ will be needed. Clinic must be central for old people and people bringing babies.

(One square on the plan means $100m^2$ on the ground.)

Our agents thought it should be close to the shopping centre. They argued about where it should be built.

m.1 Who do you think was right?

A: West of Woodbridge Lane and South of the river.

B: West of Woodbridge Lane and North of the river.

C: Next to the Junior playground.

D: East of the Infant playground.

ITEM 3 : Site of large car park to keep cars away from shopping area and to get more people to use the bus service.

Car park needs $1000m^2$ minimum space.

m2 Which of our agents thought of the best site?

A: East of Woodbridge Road; south of the river.

B: West of Woodbridge Road; north of the river.

C: North side of School Lane; west of the school.

D: West of Woodbridge Lane; south of the river.

ITEM 4 : New school wall

cm3 If each 1cm on the plan means 10m on the ground, how long will the new wall be? (The gateway is 5m wide.)

A: 295m B: 300m C: 120m D: 250m

ITEM 5 : Road markings for Church Street.

Double white lines to be painted down the middle of the road and double yellow lines down each side.

cm4 How far would the lines stretch if they were laid end to end? Who was right, Anen, Bakk, CKek or Dxox?

A: 1000m B: 6Km C: 5000m D: 10m

A single line uses one litres of paint per 0:5 Km.

cm5 How much white paint will be needed?

A: 0:5 litres B: 1 litre

C: 2 litres D: 3 litres

cm6 How much paint will be needed altogether?

A: 6 litres B: 2 litres

C: 3 litres D: 12 litres

ITEM 6 : U.F.O.s flying over Prismaston.

The mayor refused to discuss this issue. He said that it would be a ridiculous waste of council time. Anyway, he was certain that there no such things as U.F.O.s or life anywhere else in the solar system.

The next Council Meeting will be on the first Friday in May.

cm7 What date will that be?

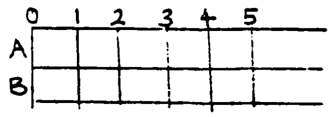
A: May 1st. B: May 3rd.

C: May 4th. D: May 5th.

April					
Sunday		5	12	19	26
Monday		6	13	20	27
Tuesday		7	14	21	28
Wednesday	1	8	15	22	29
Thursday	2	9	16	23	30
Friday	3	10	17	24	
Saturday	4	11	18	25	

THE MAP

On Prismos we have a special system for finding things on maps. We draw a "grid" of squares all over the map. We number the columns across the top of the map starting with number 0 for the first column from the left and carrying on 1,2,3,4....etc. The rows of squares are labelled A,B,C,D, and so on starting with the top row. Like this:



So the top left corner of the map is square A0; the next square across the top if A1 and so on. We always put the letter before the figure.

Try to find square E8. It has a post-box in it.

Let's see if you can use our system. We are very proud of it.

The round-a-bout is in...

A: F18 B: 18F C: E18 D: 19G

The Westgate zebra crossing is in...

A: 12L B: D11 C: K12 D: L12

Good. Now you know our system.

We think Ckek made some mistakes on the map.

School Lane telephone boxes <u>should</u> be on the corner of School Lane and Church Street in...

A: E21 B: F20 C: E20 D: 21F

Sometimes we use decimals to pinpoint objects on the map. For example, if something is half way across column 3, row B, we would put B3.5, or, since the post-box in E8 is at the end of the column, it is at E8.9.

The telephone box on Moat Road is at...

A: P22 B: O22 C: P22.8 D: P22.3

The Belisha Beacon outside 9, Westgate is at...

A: K12.8 B: L12.7 C: M13.2 D: K12.2

Transport

We would like to know more about your transport system.

t1 What do you mean by 'transport'?

A: international athletics

B: a large, busy harbour

C: a container lorry

D: the way people and materials are moved about from one place to another e.g. by ship, by car, by rail ... etc.

Nicola, Sarah, Paul and Mark are all in the same class at Prismaston Primary School. Agents A, B, C and D went into the school one day to see what happens inside. (There are no schools on Prismos.) There were some charts on the classroom wall.

Can you help us understand them? There are copies in this file.

Look at the chart called 'How we get to school on fine days'.

t2 How many children came by car?

A: 6 B: 7 C: 3 D: 20

t3 How many children came altogether?

A: 18 B: 7 C: 24 D: 20

Here is a summary table of the transport survey.

What numbers should go in the spaces instead of x and y?

t4 x= ... A: 2 B: 3

C: 6 D: 4

t5 y= ... A: 4 B: 7

C: 3 D: 5

on foot	6
by bike	x
by car	7
by bus	y
total	20

Look back at the diagrams of Wet Weather Transport at Prismaston School. Mark asked 12 of his friends how they travelled on wet days. 5 came all the way to school by car, 3 came all the way by bus.

t6 How many came by car and bus?

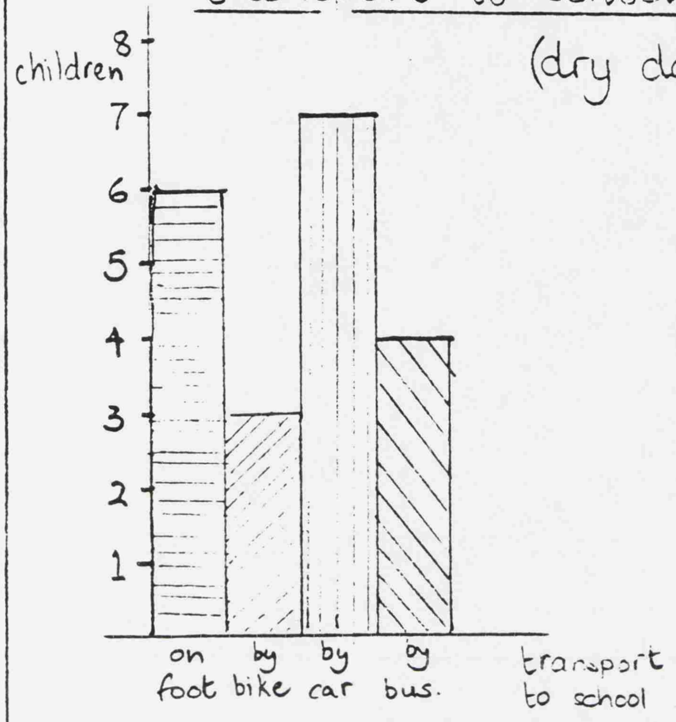
A: 12 B: 3 C: 4 D: 9

t7 So z= ......

A: 9 B: 7 C: 4 D: 12

level II

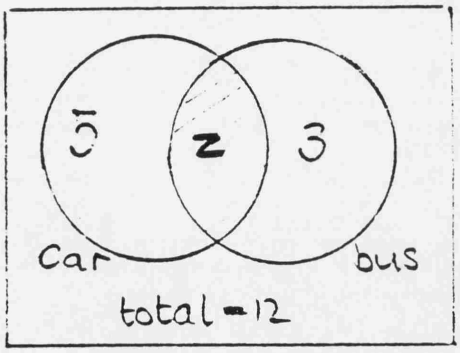
A bar chart to show our transport to school (dry days)



Transport Survey

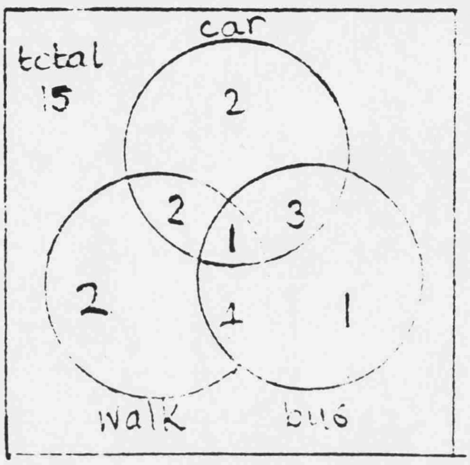
Wet Weather Transport

Mark's group asked 12 children "How do you travel to school when it rains?" The shaded section, z, shows how many came part way by car and part way by bus



Sarah's group asked 15 children Their Venn Diagram has 3 sets.

8 came in cars
9 came by bus
9 walked
} at least part of the journey



We would like to know whether the transport to school is the same at your school as at Prismaston.

Please do your own transport survey on 10 children (some girls, some boys and yourself).

There is a space for you to make a bar chart of your results in the code-book. It is on squared paper to help you.

We know what has to be done to make a chart but not the right order.

Can you sort this out for us, please ?

xt1: What is the right order for these stages ?

i) Write down the people's answers.

ii) Decide what question to ask.

iii) Make a list of the 10 children you decide to ask - (remember yourself).

iv) Ask each person on your list the question.

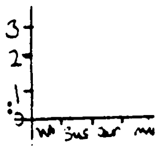
Possible orders:

A:	B:	C:	D:
i	iii	ii	iv
ii	ii	iii	iii
iii	i	iv	ii
iv	iv	i	i

xt2: What is the right order for these stages ?

i) Make a summary table of how many walked, how many cycled etc.

ii) Rule out the bars on the chart.

iii) Put the right labels on the axes (the 2 lines: 

)

iv) Shade or colour the bars in different colours.

Possible orders:

A:	B:	C:	D:
iii	iv	i	i
ii	iii	iii	ii
iv	ii	ii	iii
i	i	iv	iv

xt3: Which is the best question to ask ?

A: How do you come to school ?

B: How did you come to school to-day ?

C: Did you come by car ?

D: Did you walk to school ?

xt4

Make your chart. Use the spaces in the code-book.

Look at it carefully. Have you done everything ?

xt5: Choose the best title.

A: A chart to show who came by what.

B: A chart to show how 10 children travelled to school to-day.

C: A chart of how many people came to school.

D: A chart of transport.

Write the title you have chosen underneath your chart.

Now look at the Prismaston "wet weather transport" charts.

You are going to make one now.

Look at your list of how your friends come to school

Fill in the spaces in the code-book, with the answers to these questions.

xt6: How many girls did you ask ?

xt7: How many children said they walk to your school ?

xt8: How many girls said they walk to your school ?

xt9 : Can you put your results into the right sections of the diagram in the code-book ?

THE TRANSPORT DISCUSSION

a: Cars cause pollution.

b: Bicycles are dangerous and often in accidents.

c: It's too expensive on the bus.

d: Walking is too slow for long distances.

e: In the car you can stay warm and dry.

g: Bikes are unhealthy because you breathe in exhaust fumes.

i: Bus fares would come down if more people used buses.

k: The council could build cycle tracks to prevent accidents.

l: Walking gives you time to think about the day ahead.

m: Walking isn't much fun when it's raining.

n: Buses get stuck in the traffic.

o: Old people need the buses or they can't go far.

p: Cycling gets your circulation going so it is healthy.

q: When you are walking you have time to notice things.

r: you can park bikes anywhere. They take you door to door.

s: It's often difficult to park a car.

t: You can walk through fields or parks and breathe fresh air.

v: You can't walk 20 miles there and back in a day.

x: You need the car to carry heavy shopping.

aa: It all depends on where you're going and why you're going.

bb: Bikes are quiet.

cc: Petrol is expensive.

dd: It's cheaper by car if all the family is going.

THE TRANSPORT DISCUSSION

Whilst they were doing the transport charts, Paul, Mark, Sarah and Nicola began to argue about the best form of transport.

We have a transport problem on Prismos so Anen and its friends listened to the children. They couldn't follow all the arguments so they just wrote down what the children said.

The list of arguments is in this book. Can you see it?

They used the Prismon alphabet to 'number' the points.

Please would you help us understand the discussion.

Here are the points A, B, C and D couldn't agree on.

d1 Which of these arguments is <u>for</u> walking?

A: a B: d C: q D: n

d2 Which of these arguments is <u>against</u> cars?

A: n B: e C: cc D: dd

d3 If you were arguing <u>against</u> bikes, which points would you make?

A: c and i B: b and m

C: p and r D: b and g

d4 If you were in favour of bikes, which argument would beat point 'b'?

A: e B: k C: x D: p

d5 Which point would be the best conclusion to the argument?

A: aa B: bb C: cc D:dd

At the Council meeting, the councillors used the same points.

as the children.

They divided them into groups called 'issues'. (Ckek thought the councillors had suddenly caught colds! They kept talking about, "This issue...", and "That issue....", but Ckek never takes things seriously. He can't spell either!)

The issues were things like.... Health; Cost; Safety; etc.

d6 Which of these supports the Health issue?

A: k B: g C: s D: p

Councillor Phil Terit was worried about air and noise pollution.

d7 Which group of arguments would he use?

A: c,i,cc,dd B: d,l,q,v

C: a,g,t,bb D: b,g,p,t

Councillor Emma Chisthat is treasurer to the Council.

She likes arguments about money.

d8 Which group of arguments would she use?

A: c,i,cc,dd B: d,l,q,v

C: a,g,t,bb D: b,g,p,t

Cllr. Chisthat told the council that thegovernment would grant £8,725 towards a new traffic scheme. The scheme would cost £20,000.

d9 How much would the council have to spend?

A: £12,275 B: £ 11,275 C: £28,725 D: £1,225

CASTLES

Look in the Prismmem.

Find the section on castles and READ it very carefully.

LOOK closely at the drawings, too.

****** ****** ****** ****** ****** ****** ******

The problem is this; on Prismos we have no such thing as a castle. All our buildings are designed to welcome others but castles seem to do just the opposite! Anen, Bakk, Ckek and Dxox were fascinated by them. It seems that each new kind of castle is even less welcoming than the last!

Could you help Anen, Bakk, Ckek and Dxox to understand more about castles?

C1 Who invaded England in 1066?

A: William the Conqueror

B: King Harold

C: the English

D: the Vikings

C2 Who built the castles?

A: the English

B: the attackers

C: the French Soldiers

D: William the Conqueror

C3 What were the first castles made of?

A: stone

B: earth and timber

C: plaster

D: bricks and mortar

C4 Which of these ideas is correct?

A: There is a palisade in the ditch round the castle.

B: The palisade goes round the gatehouse.

C: The palisade only goes round the bailey.

D: The keep and the bailey are surrounded by a palisade.

C5 How do you think the English people felt about the French invaders?

A: They were very pleased to see them.

B: They hated them enough to fight against them.

C; They quite liked them.

D: They ignored them.

C6 How many basic designs of castle are described in the Prismmem?

A: one B: thirteen

C: three D: eleven

C7 Which reason is used in the Prismmem to explain the making of moats around 12th. century castles?

A: The soldiers needed rowing practice.

B: The moat provided drinking water for the soldiers.

C: The moats prevented attackers tunnelling into the castle.

D: The moat kept disease away from the castle.

C8 One of the rings of defence around the keep of a concentric castle is the...........

A: ditch B: moat

C: gate-house D: stables

C9 The motte and bailey castle and the 12th. century castle are alike in all these ways EXCEPT one. Which one?

A: Both have a drawbridge.

B: Both have a bailey.

C: Both have a gate-house.

D: Both have a moat.

C10 The 12th. century castle and the concentric castle are alike in all these ways EXCEPT one. Which one?

A: Both have a drawbridge.

B: Both have towers in the walls.

C: Both have a central keep.

D: Both have a moat.

C11 Which kind of castle could be built in the shortest time?

A: the motte and bailey castle

B: cannot decide which castle

C: the 12th. century castle

D: the concentric castle

C12 After the 14th. century, hardly any new castles were built because ....

Which idea CANNOT fill the space?

A: there was peace; nobody had battles anymore.

B: it could take 8,9 or even 40 years to build a castle.

C: castles were too expensive to build.

D: the battles began to be fought away from the castle, out in the fields.

HISTORY IN PRISMASTON

We are very interested in what you call 'history'. On Prismos, very little has changed in the last thousand years. In your world there seem to have been many changes. Anen, Bakk, Ckek and Dxox have been studying Prismaston's history. Would you see if their Prismaston TIME-LINE (in the Prismmem) makes sense?

H1 Which of these buildings was built at an earlier date than the others?

A: first church

B: Prismaston School

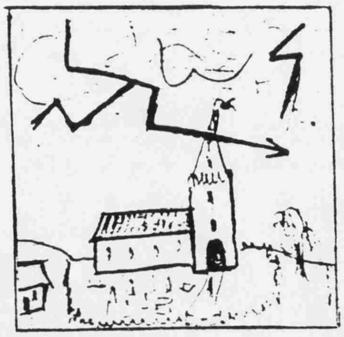
C: motte and bailey castle

D: new church

H2 When did this happen?

A: 1066 B: 1310

C: 1725 D: 1552



H3 A,B,C and D for got to write down exactly when the school was built.

Look carefully at the time-line to see if you can tell.

Here are their guesses. Who was right?

A: 1870 B: 1820 C: 1900 D: 1890

H4 Which is the right order in time for these events?

Put the earliest first, the latest, last.

i Queen's visit

ii Prismon landing

iii 100 deaths

A: i - ii - iii

B: iii - i - ii

C: ii - iii-- i

D: iii - ii - i

H5 What is the most likely explanation of the 100 deaths in 1349?

A: a train crash

B: an earthquake

C: the Black Death

D: The Great Plague

H6 Nicola found this coin on Castle Hill. One figure was worn out so she could only make out 1 76.
Our agents think they know the missing figure.
Who is right?

A: 1876

B: 1976

C: 1776

D: 1676

Extracts from the upper junior answer book - lower junior version used same format

11

PRISMASTON DATA COLLECTION

AGENT'S CODE-BOOK

Agent's name: ....

Agent's Prismoan name: | | | | |

School name: ....

School code: | | |

Class: ....

We need your code so that you cannot be traced by unfriendly beings.

S E C R E T S E C R E T S E C R E T S E C R E T S E C R E T

HOW TO USE YOUR CODE-BOOK

Almost everything in this book will be in code.

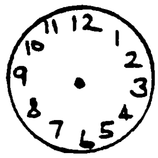
We try to avoid using words as much as possible.

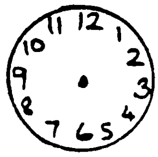
TIME-BOXES

At the beginning and end of each section there is a 'time-box'.

Whenever you begin and end a section, check the time and fill in the time-box.

Fill it in like this:

at the beginning............ [:] or 

at the end.................. [:] or 

CLUE-CODES

At the side of each page are some codes called 'clue-codes'.

They are like this.... mem dis r d h e m

If you need extra information about any of the ideas, you or your teacher can tick a clue-code.

<u>YOU</u> tick mem if you used the Prismmem book.

<u>YOU</u> tick dis if you discussed the idea with a friend,

(It's often useful to discuss sticky problems!)

YOUR TEACHER will tick r d h e m if he or she can help.

GOOD LUCK with the assignment! ****************

We know you can help in our quest! ****************

Our four agents were coded A, B, C and D. You know their real names but do not use them in this file.

YOUR TASK is to decide which agent, A, B, C or D, had the best theory for each bit of information.

****

If you think agent D's theory was best, put a ring around code-letter D........like this..... A B C D

For example, try this:

e1 What age are Paul, Sarah, Mark and Nicola?
(Look on the front of the PRISMASTON FILE.)

A: 7 years old B: 8 years old
C: 10 years old D: 11 years old

Put your answer on the next page.

(Don't forget the time-boxes!)

Did you need to tick a clue-code? ....

Try another to make sure:

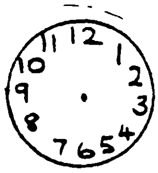
e2 Look on the Prismaston Town Plan.
How many shops are there on Church Street?
A: 4 B: 5 C: 6 D: 0

Some of you could use dis but keep your voices low and only discuss with ONE other agent.

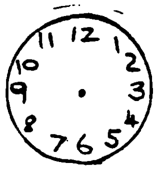
(We think agent B was right.)

.... time-box! ....

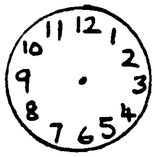
Examples

begin [:] or 

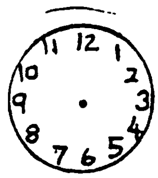
check number	which agent is right?				clue-codes						
e1	A	B	C	D	mem	dis	r	d	h	e	m
e2	A	B	C	D	mem	dis	r	d	h	e	m

end [:] or 

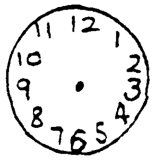
Alphabet

begin [:] or 

a1	A	B	C	D	mem	dis	r	d	h	e	m
a2	A	B	C	D	mem	dis	r	d	h	e	m

end [:] or 

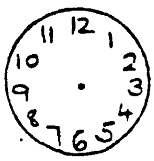
HOUSES

begin [:] or 

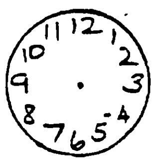
check	whose theory is correct?				clue-codes		
ha	A	B	C	D	mem	dis	r d h e m
hb	A	B	C	D	mem	dis	r d h e m
hc	A	B	C	D	mem	dis	r d h e m
hd	A	B	C	D	mem	dis	r d h e m

Sky-views

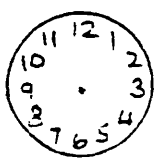
he	A	B	C	D	mem	dis	r d h e m
hf	A	B	C	D	mem	dis	r d h e m
hg	A	B	C	D	mem	dis	r d h e m
hh	A	B	C	D	mem	dis	r d h e m

end [:] or 

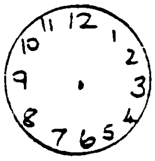
TERRITORIES

begin [:] or 

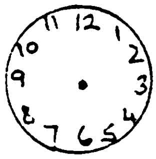
check	whose theory is correct?				clue-codes		
g1	A	B	C	D	mem	dis	r d h e m
g2	A	B	C	D	mem	dis	r d h e m
g3	A	B	C	D	mem	dis	r d h e m
g4	A	B	C	D	mem	dis	r d h e m

end [:] or 

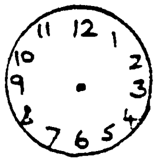
TRANSPORT

begin [:] or 

check	whose theory is correct?				clue-codes		
t1	A	B	C	D	mem	dis	r d h e m
t2	A	B	C	D	mem	dis	r d h e m
t3	A	B	C	D	mem	dis	r d h e m
t4	A	B	C	D	mem	dis	r d h e m
t5	A	B	C	D	mem	dis	r d h e m
t6	A	B	C	D	mem	dis	r d h e m
t7	A	B	C	D	mem	dis	r d h e m

end [:] or 

YOUR TRANSPORT SURVEY

begin [:] or 

check	whose theory is correct?				clue-codes		
xt1	A	B	C	D	mem	dis	r d h e m
xt2	A	B	C	D	mem	dis	r d h e m
xt3	A	B	C	D	mem	dis	r d h e m

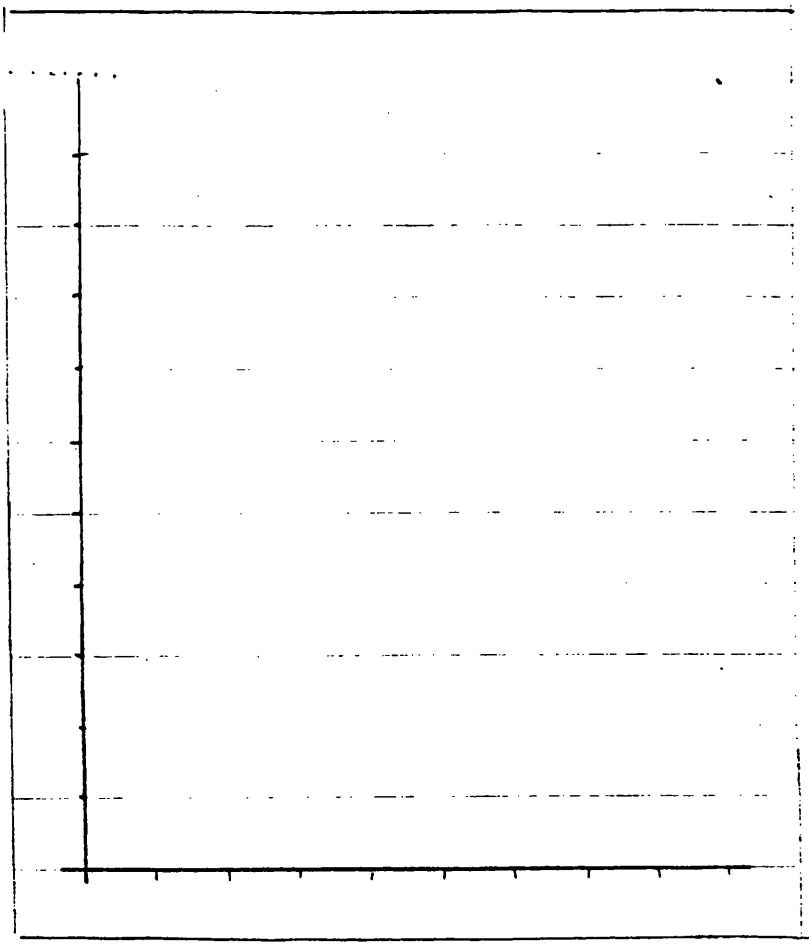
xt4 Now make your chart on the next page.

xt4: YOUR TRANSPORT SURVEY

Make your list here.

Prismoan name	came by	boy or girl

Make your chart here.



xt5: Title : ....

Summary Table

how many	came by
1 0	Total

xt6 : ....

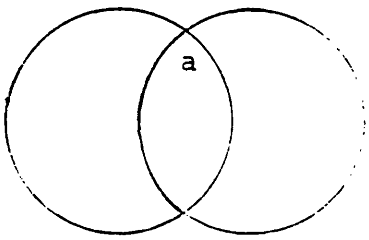
xt7 : ....

xt8 : ....

xt9 : a = ...

Fill in the spaces a,b and c.

(b).........

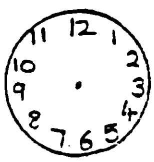


........(c)

Clue-codes

dis r d h e m

end [:] or



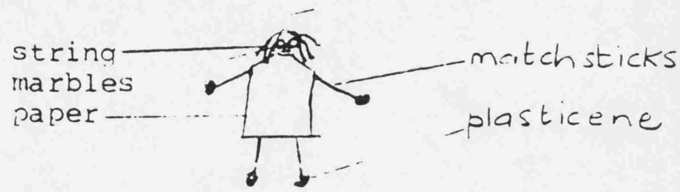
What do you think a Prismon is like?

Make a drawing of your idea of a Prismon on this page.

Pretend you are going to make a model Prismon. What would you use for the different parts?

This list of earth-stuff might help you. Join the body-part to the stuff you use by ruling a line between them.

This is what Agent A did for its model human:



earth-stuff

Draw your Prismon here

silver foil
cotton wool
raffia
cotton
fur material
plasticene
cloth
wire
toilet roll
kitchen paper roll
match-box
cornflakes box
large Toblerone
small Toblerone
smarties tube
cocoa tin
cocktail sticks
sequins
buttons
string

Write any other earth-stuff you need on the other side, like A did.

TASK TIME GUIDE

You do not have to follow the exact order of data-checks that is in the book.

This Time Guide is to tell you how much time you might need to do each topic. You might manage to do them in a shorter time! One topic, "What does a Prismon look like?" will have to be done when your teacher decides. Obviously, we could not let everybody have a copy of that information and so we are trusting your teacher to look after it!

Please would you put a tick and the date (short form: 23:5:84) to help you keep a record of your data-checking.

TOPIC	TIME	TICK	DATE
Alphabet	5mins.		
Houses	20mins.		
Territorries	20mins.		
Town Plan	5mins.		
Council Meeting	30mins.		
The Map	20mins.		
Transport	20mins.		
Your Transport Survey	45mins.		
The Transport Discussion	30mins.		
History in Prismaston	15mins.		
Castles	30mins.		
What does a Prismon look like?	45mins.		

*   *   *   *   *   *   *   *   *

Did you find time for all the data-checks? Well done and thanks a prillion for your invaluable and learned help!

If you didn't do them all, thanks all the same. Every bit helps!

Upper junior version of description for listening task used in pilot study

VERSION B: 1

SOME INFORMATION ABOUT US

What does a Prismon look like?

(This information is strictly secret. That is why we cannot let everyone have a copy. Like good detectives, you must listen for every detail.)

The people of Prismos are called Prismons. Although we have been watching your world for hundreds of years, we hope that you have never seen one of us. We practise keeping very still and humans usually ignore us. They think we're bits of old equipment that they've forgotten how to use. Sometimes people try to tidy us up by throwing us in the bin, but more often than not, we are tidied into a 'Science Resource Cupboard' along with the batteries, clocks and magnets. These, by the way, play havoc with our digestive systems. Dxox had tummy-ache for a week after a spell in a Science Resource Cupboard!

Anyway, you want to know what we look like, don't you? We aremuch smaller than you. A baby Prismon, called a Prisbi, is exactly one prismetre long, that is exactly six centimetres in length. Full-grown Prismons are exactly three prismetres tall. I expect you can work out how many centimetres that would be.....

Now for the details, so pay attention.
We are all based on threes and sixes whereas you humans are based on twos and fives. For example, you have two eyes, two ears and two hands each with five fingers. WE have three eyes, three ears and three hands each with six fingers. That is,when we're fully grown but we're born with just a head and a body.(We don't have necks.) We also have three legs, three feet and six useful toes on each foot....unlike your funny little things!

Our heads are the same shape as a cylinder but they can be long and thin or short and fat. The tops of our heads are flat circles with three little triangles in the middle where our nostrils pop out on stalks when it's not raining or when something smells particularly good!

We do not have hair as it can be such a nuisance. We have three eyes which can slide all the way round the tops of our heads if we want to look around. We have three ears evenly spaced round our heads and fitted with earlids for when we want a bit of peace. I always keep my ears shut at school dinners.

We have just one mouth. It's hexagon shaped and large on a chatterbox but quite small on a quiet Prismon.

What about our bodies?

They are the same shape as a triangular prism or in other words, a certain kind of chocolate packet, but shorter of course. The triangular surfaces are at the top and the bottom. This makes us rather difficult to draw, but most people manage something like it.

Our three arms and three legs grow from the points of the triangles. Our arms can be long, short, straight or curly but each one has a hand with six fingers on it.

Our legs are straight and each one sticks out slightly at an angle so that we don't fall over! We have six toes on each foot, too .

We <u>can</u> grow rather special fingertips and toe-tips. Some of us have paintbrush tips, or screw-drivers or even pencils but most of our fingers and toes are long, thin and pointed.

What are we made of?

That's a secret, I'm afraid. In fact it's <u>the</u> secret of our success. You see we can change not only our colour but also our texture. It all depends on the background. We can be soft and cuddly, hard and grainy or shiny and metallic, especially when hiding in science cupboards!

I wonder if you'll begin to notice us now. We'll have to keep extra-specially still!

APPENDIX A3

Lower Junior Pilot Study: Distribution of responses for each item (expressed in percentages: N = 78)

	Response selected					
Item	A	B	C	D	2 or more answers	omitted
E2	1.3	65.4*	3.8	3.8	12.8	12.8
A1	1.3	6.4	0.0	84.6*	6.4	1.3
A2	0.0	83.3*	2.6	1.3	11.5	1.3
H1	19.2	10.3	0.0	69.2*	1.3	0.0
H2	0.0	93.6*	0.0	6.4	0.0	0.0
H3	0.0	92.3*	2.6	5.1	0.0	0.0
H4	5.1	76.9*	9.0	7.7	1.3	0.0
H5	1.3	35.9	0.0	62.8*	0.0	0.0
H6	5.1	61.5*	7.7	17.9	7.7	0.0
H7	9.0	11.5	2.6	70.5*	6.4	0.0
H8	2.6	2.6	6.4	82.1*	6.4	0.0
H9	9.0	53.8*	17.9	14.1	5.1	0.0
G1	11.5	71.8*	3.8	5.1	3.8	3.8
G2	2.6	34.6*	42.3	11.5	5.1	3.8
G3	7.7	1.3	7.7	74.4*	5.1	3.8
G4	9.0	5.1	59.0*	16.7	6.4	3.8
M1	3.8	5.1	3.8	82.1*	3.8	1.3
M2	79.5*	6.4	7.7	1.3	3.8	1.3
M3	10.3	3.8	16.7	57.7*	10.3	1.3
M4	62.8*	9.0	5.1	14.1	7.7	1.3
P1	66.7*	10.3	5.1	14.1	0.0	3.8
P2	7.7	5.1	10.3	73.1*	0.0	3.8
P3	7.7	5.1	62.8	19.2	1.3	3.8
P4	65.4*	16.7	3.8	9.0	1.3	3.8
P5	19.2	9.0	30.8*	33.3	3.8	3.8
P6	6.4	2.6	15.4	70.5*	1.3	3.8
P7	60.3	2.6	5.1	23.1	5.1	3.8
P8	14.1	7.7	3.8	66.7	3.8	3.8
P9	7.7	43.6*	19.2	20.5	5.1	3.8
P10	24.4	65.4*	1.3	1.3	3.8	3.8
P11	32.1*	14.1	6.4	41.0	2.6	3.8

* denotes correct response

APPENDIX A3

Lower Junior Pilot Study: Distribution of responses (continued)

Item	A	B	C	D	2 or more answers	omitted
	Response selected					
J1	14.1	9.0	0.0	73.1*	0.0	3.8
J2	20.5	9.0	55.1*	10.3	1.3	3.8
J3	65.4*	12.8	7.7	9.0	1.3	3.8
J4	60.3*	5.1	15.4	12.8	2.6	3.8
J5	9.0	7.7	15.4	61.5*	2.6	3.8
S1	24.4	61.5*	5.1	3.8	1.3	3.8
S2	61.5*	20.5	7.7	3.8	2.6	3.8
S3	2.6	5.1	10.3	74.4*	3.8	3.8
T1	5.1	7.7	6.4	74.4*	0.0	6.4
T2	11.5	55.1*	16.7	9.0	1.3	6.4
T3	53.8*	11.5	12.8	14.1	1.3	6.4
T4	11.5	19.2	5.1	55.1*	2.6	6.4
T5	2.6	3.8	12.8	67.9*	6.4	6.4
T6	52.6*	10.3	9.0	14.1	7.7	6.4
T7	9.0	24.4	7.7	42.3*	10.3	6.4
C1	82.1*	5.1	3.8	2.6	0.0	6.4
C2	79.5*	9.0	3.8	1.3	0.0	6.4
C3	6.4	6.4	5.1	75.6*	0.0	6.4
C4	21.8	14.1	41.0*	16.7	0.0	6.4
C5	16.7	65.4*	2.6	1.3	7.7	6.4
C6	55.1*	14.1	9.0	7.7	7.7	6.4
C7	7.7	33.3	17.9	26.9*	7.7	6.4
C8	16.7	9.0	46.2*	10.3	11.5	6.4
C9	32.1	11.5	5.1	33.3*	11.5	6.4
C10	57.7*	7.7	11.5	6.4	10.3	6.4
C11	30.8	1.3	42.3*	7.7	11.5	6.4
C12	24.4	2.6	35.9*	15.4	15.4	6.4
F1	24.4	3.8	39.7*	15.4	6.4	10.3
F2	39.7*	28.2	5.1	9.0	7.7	10.3
F3	3.8	59.0*	6.4	14.1	6.4	10.3
F4	9.0	7.7	2.6	59.0*	11.5	10.3
F5	52.6*	10.3	6.4	6.4	14.1	10.3
F6	9.0	10.3	7.7	51.3*	10.3	11.5
F7	11.5	28.2	3.8	34.6*	10.3	11.5

* denotes correct response

APPENDIX A3

Upper Junior Pilot Study: Distribution of responses for each item (expressed in percentages: N = 40)

	Response selected					
Item	A	B	C	D	2 or more answers	omitted
E1	2.5	12.5	62.5*	0.0	0.0	22.5
E2	2.5	65.0*	0.0	7.5	2.5	22.5
A1	2.5	2.5	2.5	87.5*	5.0	0.0
A2	5.0	90.0*	0.0	0.0	5.0	0.0
HA	15.0	15.0	2.5	67.5*	0.0	0.0
HB	2.5	87.5*	2.5	7.5	0.0	0.0
HC	45.0	5.0	5.0	45.0*	0.0	0.0
HD	7.5	32.5	15.0	45.0*	0.0	0.0
HE	2.5	12.5	40.0	42.5*	2.5	0.0
HF	12.5	15.0	57.5*	12.5	2.5	0.0
HG	5.0	17.5	20.0	52.5*	5.0	0.0
HH	7.5	12.5	62.5*	12.5	5.0	0.0
G1	22.5	30.0	5.0	35.0*	5.0	2.5
G2	75.0*	7.5	2.5	7.5	5.0	0.0
G3	10.0	5.0	50.0	27.5*	5.0	2.5
G4	22.5	7.5	35.0	27.5*	5.0	2.5
M1	95.0*	2.5	0.0	2.5	0.0	0.0
M2	92.5*	2.5	0.0	2.5	2.5	0.0
CM1	32.5	5.0	12.5	47.5*	0.0	2.5
CM2	17.5	35.0	10.0	30.0*	5.0	0.0
CM3	20.0*	15.0	32.5	22.5	7.5	2.5
CM4	32.5	40.0*	2.5	15.0	7.5	2.5
CM5	32.5	17.5*	5.0	30.0	12.5	2.5
CM6	20.0	20.0	2.5	42.5*	12.5	2.5
CM7	37.5*	37.5	10.0	2.5	10.0	2.5
MR1	77.5*	10.0	5.0	2.5	5.0	0.0
MR2	20.0	10.0	10.0	57.5*	2.5	0.0
MR3	32.5	7.5	50.0*	2.5	7.5	0.0
MR4	62.5	15.0	10.0	5.0*	5.0	2.5
MR5	45.0	30.0*	5.0	12.5	5.0	2.5

* denotes correct response

APPENDIX A3

Upper Junior Pilot Study: Distribution of responses (continued)

	Response selected					
Item	A	B	C	D	2 or more answers	omitted
T1	5.0	2.5	10.0	77.5*	0.0	5.0
T2	0.0	90.0*	2.5	2.5	0.0	5.0
T3	2.5	7.5	17.5	67.5*	0.0	5.0
T4	22.5	47.5*	15.0	10.0	0.0	5.0
T5	47.5*	10.0	10.0	27.5	0.0	5.0
T6	40.0	22.5	25.0*	5.0	2.5	5.0
T7	17.5	20.0	30.0*	25.0	2.5	5.0
XT1	17.5	30.0	25.0*	10.0	7.5	10.0
XT2	17.5	5.0	45.0*	15.0	7.5	10.0
XT3	20.0	37.5*	7.5	17.5	7.5	10.0
D1	10.0	15.0	40.0*	22.5	0.0	12.5
D2	25.0	7.5	52.5*	2.5	0.0	12.5
D3	7.5	22.5	12.5	45.0*	0.0	12.5
D4	5.0	25.0*	15.0	40.0	2.5	12.5
D5	47.5*	17.5	10.0	12.5	0.0	12.5
D6	10.0	15.0	12.5	47.5*	0.0	15.0
D7	27.5	15.0	42.5*	0.0	0.0	15.0
D8	50.0*	10.0	5.0	20.0	0.0	15.0
D9	20.0*	20.0	30.0	15.0	0.0	15.0
C1	75.0*	0.0	0.0	5.0	0.0	20.0
C2	10.0	67.5*	0.0	2.5	0.0	20.0
C3	25.0	52.5*	2.5	0.0	0.0	20.0
C4	27.5	2.5	17.5	30.0*	2.5	20.0
C5	0.0	70.0*	0.0	5.0	2.5	22.5
C6	7.5	2.5	52.5*	12.5	5.0	20.0
C7	2.5	0.0	67.5*	7.5	0.0	22.5
C8	12.5	30.0*	27.5	7.5	0.0	22.5
C9	7.5	5.0	10.0	55.0*	0.0	22.5
C10	0.0	25.0	47.5*	5.0	0.0	22.5
C11	20.0*	15.0	12.5	27.5	2.5	22.5
C12	42.5*	7.5	10.0	17.5	0.0	22.5
H1	17.5	5.0	50.0*	5.0	2.5	20.0
H2	47.5	5.0	10.0	15.0*	2.5	20.0
H3	22.5*	32.5	7.5	15.0	2.5	20.0
H4	22.5	45.0*	2.5	2.5	7.5	20.0
H5	10.0	0.0	50.0*	12.5	7.5	20.0
H6	12.5*	2.5	2.5	55.0	7.5	20.0

* denotes correct response

APPENDIX B1

THE PRISMASTON FILE:

materials for the project-based assessment of study skills

Appendix B1 is in two parts:

i information for teachers is contained in this volume:

Contents:

1) The Prismaston File: Teachers' Notes;

2) Description of a Prismon: 1st and 2nd year version;

3) Description of a Prismon: 3rd and 4th year version;

ii Supplementary volume containing materials for pupils;

The Prismaston File: materials for the project-based assessment of study skills

Contents:

1 'The Prismaston File datacheck 1' :
question book for 1st. and 2nd. year junior children;

2 'Prismaston Data Collection 1 Agent's Code-book':
answer book for 1st. and 2nd. year junior children;

3 'The Prismaston File datacheck 2':
question book for 3rd. and 4th. year junior children;

4 'Prismaston Data Collection 2 Agent's Code-book' : answer book for 3rd. and 4th. year children;

5 'Prismmem' : a reference book containing map symbols, historical notes, a time-line and a dictionary.

APPENDIX B1 Notes to accompany Prismaston materials

THE PRISMASTON FILE

Teachers' Notes

The instructions for use of the Prismaston File are contained in the first six pages of the pupils' "datacheck" booklets. The introductory session should consist of teacher and class working through these instructions. The first session will, therefore be hard work, requiring prolonged concentration particularly from first years. It is hoped that the "game" of "Secret Agent Training" course will sustain many children through the instructions but it is hoped that teachers will add questions.... what is evidence?; what are facts?; etc. and will pay special attention to children likely to get lost! If the class teacher can play up the part of Prismons' accomplice and agents' trainer, so much the better!

After the introductory section, when the children are invited to begin datachecking for themselves, there is a short section called "Alphabets". Although some children will easily answer these questions, they are intended as a practice at using the answer codes for both pupils and teacher. If time allows it should be the last part of the introductory session which will take about one hour.

The instructions are intended to be worked through as a class lesson, but the teachers who piloted the File tried also introducing it to smaller groups, particularly with the younger children. One teacher grouped the children together on the carpet with their books, and sent them to their tables to try the examples, regrouping them afterwards to show them the Clue-codes and the Prismmem. This class was in an open plan area ill-suited to class teaching.

Although the instructions seem complicated at first, and the first sessions a bit difficult if all the children are doing their Prismaston work together, they quickly become independent, particularly if the notion that teachers' ideas are not required is stressed! This was found to be very effective in encouraging children to READ the information for themselves rather than being too reliant on the teacher.

The following notes are additional to the instructions and cover comments and tips from the teachers who tried out the File for us.

Target Completion Date: although a fortnight is suggested, there is no rigid time limit; some children will finish the books very quickly, others will need longer than a fortngiht, or extra sessions within that time. Three weeks should be ample for all the children. We hope that most children WILL complete the whole thing, however.

These notes are long and prescriptive for the sake of completeness. The Prismaston File is, however, intended to be flexible and teachers are asked to run the project in a way typical of the usual class routine.

Extra Notes to Accompany The Prismaston File

1 The first five boxes on the code-book are for the pupil's code number which is on the computer list of test results. Your classroom observer may have already given you a list of names and numbers but you can obtain the number from him or her if you need them.

2 Do the drawing of a Prismon after the children have had the File for about one week. The drawing for the Agents Picture Gallery need not be part of the same session.

3 Although a theme runs through the File, there is no need to stick to the order of the sections. The answer books, or "code-books", make it easy to see which sections have not been done.

4 A few children thought that they had to tick a clue-code for every item. This is obviously unnecessary, but please make sure that no-one is doing this. On the other hand, some children forgot to tick clue-codes; reminders to tick 'p' if they use picture clues will be useful.

5 It is suggested that some one to one discussion between agents may be useful occasionally. The amount of consultation between agents that is permitted will vary from class to class. The children must be reminded not to broadcast their ideas but to speak them very quietly! It is hoped, however, that "The Transport Discussion" in the 3rd. and 4th. year version will be discussed and that it may spark some debate in the class.

6 Time-boxes: please encourage those who can to express the time digitally as this is obviously more accurate than drawing clock hands can be. We are sorry that the clocks have turned out to be rather small.

The time-boxes in the middle of sections are to cater for stoppages such as play-times, overnight etc. and to allow short sessions to be timed. If a child stops at an item which is not immediately before a clock, this does not matter, he or she should simply fill in the next time-box. If they have to stop in a section without extra time-boxes, they could perhaps write the time at the side.

7 Encourage the children to use the Prismmem (and to tick *) if necessary. Remind them of its contents and that they are welcome to use other reference books to find definitions etc.

8 Remind the class to READ the "story" sections so as not to miss information. (Some children tend to skip from datacheck to datacheck and soon need help.) Please check up on the children's progress through the File every few days.

Finally, thank you for undertaking the project. We hope that your class will find The Prismaston File both enjoyable and informative.

LINDA M. HARGREAVES

Description of a Prismon 1st. & 2nd. year version

(For teachers' eyes only!) This description is to be read to the class about a week after the introductory session. It should be read in the way you would read a story to the class; it is a LISTENING EXERCISE. It should be read twice.

SOMETHING ABOUT US : What does a Prismon look like?

This information is strictly secret . That is why we cannot let everyone have a copy. As good agents do, so you must listen for every detail.

To begin with, we're much smaller than you. Fullgrown Prismons as we're called , are only a bit bigger than your handspan. Baby Prismons, called Prisbis are a third of that size.

We're all based on threes and sixes whereas you are based on twos and fives. For example, you have two eyes, two ears, two arms, two legs and your fingers and toes are in bunches of five. Prismons have three eyes, three ears, three legs and so on, and we have SIX fingers on each hand and SIX toes on each foot. AND we have useful toes, not like your funny little things.

We have two main parts. A head, which is the shape of a cylinder (toilet roll shape) and a body which is the shape of a triangular prism.......or, in other words, the same shape as a certain kind of chocolate packet, but shorter. Our heads and bodies can be fat or thin. A friend of mine has a thin b dy and a very large head. I'm afraid it has to spend a lot of time sitting down and it hates walking.

Now here are the details, so pay attention.

We have trree eyes which can move all the way round the tops of our heads so we can get a good look round. We have three ears which are evenly spaced around our heads. Our ears do not move but they do have ear-lids for when we want a bit of peace. I have found these very useful at some school dinners! Instead of a nose, we have three nostrils which pop out of the tops of our heads.

We have one hexagon shaped mouth each. If you're a real chatterbox you would have a large mouth but a quiet Prismon would have a tiny one.

Our arms and legs grow out of the points of the triangles that the top end bottom of our bodies. Our arms are long and curly and our legs are straight and stick out at an angle so that we don't fall over.

Our fingers are quite interesting. Most of them are long and pointed but we can grow special fingertips. For example, my friend has three paint-brush tips and I have a screw-driver end on one finger. It just depends on what you're interested in. Most of us have at least one pencil end. Our toes are the same but shorter.

(continued overleaf)

Finally, what are we made of?

That's a secret I'm afraid. In fact, it's THE secret of our success. You see we can change not only our colour, but also our texture, or what we feel like to touch. So, if we're hiding in a baby's room we can be all soft and cuddly, in a church we can be dark and grainy, like wood, and in a science cupboard we can be hard and metallic!

I wonder if you'll begin to notice us now. We'll have to practise keeping extra-specially still!

That's all I can tell you. Cheerio!

Description of a Prismon 3rd. & 4th. year version

(For teachers' eyes only!) This description is to be read to the class about a week after the Introductory session. It should be read twice and it forms a LISTENING EXERCISE.

SOME INFORMATION ABOUT US : What does a Prismon look like?

(This information is strictly secret. That is why we cannot let everyone have a copy. As good agents do, you must listen for every detail.)

The people of Prismos are called Prismons. Although we have had agents visiting your world for hundreds of years, we hope you have never seen one of us us. We practise keeping very still and humans usually ignore us. They regard us as bits of old equipment that they have forgotten how to use. Sometimes people try to tidy us up by throwing us in the bin, but more often than not, we are tidied into 'Science Resource Cupboards' along with the clocks, batteries and magnets. Magnets, by the way, play havoc with our digestive systems! Dxox had tum tummy-ache for a week after a spell in a Science Resource Cupboard!

Anyway, you want to know what we look like, don't you? We are much smaller than you and we come in three sizes. The size depends on our age. Baby Prismons, called Prisbis, are exactly one prismetre in length, that is exactly SIX centimetres. The middle-sized Prismons are two prismetres tall and full grown Prismons are three prismetres tall. I expect you can work out how tall that is in centimetres....

Now for the details, so pay attention.

We are all based on threes and sixes, whereas you humans are based on twos and fives. For example, you have two eyes, two legs, two feet each with five toes and two hands, each with five fingers. What is more, you expect to have all your limbs from the day you are born!

We Prismons are different. A full grown Prismon has three arms, three legs, three eyes, three nostrils and three ears. Furthermore, we have six fingers on each hand and six toes on each foot. AND our toes are useful, unlike your funny little things!

Another big difference is that a new-born Prisbi has no arms or legs, just a head and a body. The limbs grow later. The head is fully formed. Here is a description of it.

A Prismon's head is cylindrical. The top of its head is a flat circle which can have a large or small diameter. Right on the tops of our heads and in the middle of the circle are three triangles. These are our nostril shutters. The shutters are to keep out the rain and have been especially useful in your climate! When its dry and something smells good, our nostrils pop out on stalks.

(continued overleaf)

We have three eyes which are on the top edge of the cylinder and can move all the way around it so we can have our eyes spaced out evenly to get a panoramic view or we can put all three close together to get a really good look at something. We do not have eyelids like you but we DO have three ears each with an EARLID in case we want a bit of peace! Our ears are evenly spaced out around the midline of our heads.

We have one hexagonal mouth each. Its size gives away how talkative we are. A real chatterbox would have a large mouth but a quiet Prismon's mouth could be very small.

What about our bodies?

They are the shape of triangular prisms or, in other words, the same shape as a certain kind if chocolate packet. The triangular surfaces are at the top and bottom and they can be large or small, so we can have fat or thin Prismons.

Our arms and legs grow from the points of the triangles at the top and bottom of the prism. Each arm has six fingers, as you know, but we can develop special fingertips for specific jobs. It all depends on our interests. Artists of often grow a few bristle-ended fingers (or toes) to paint with; mechanics grow screw-driver and spanner fingertips and most of us grow a set including a knife, a fork, a few pencil ends and a spoon. The remaining fingers are long, thin and conical. Our toes are just like our fingers and can also grow a variety of tips.

What do you think we are made of?

I'm afraid that that's a secret. In fact it's THE secret of our success. You see we can change, not only our colour, but also our texture to suit our task or to blend into the background. That's why you have probably never noticed one of us. In a playroom we can be all soft and cuddly but in a Science cupboard, where we frequently have to hide, we can turn hard and metallic.

I wonder if you'll begin to notice us now. We'll have to stay extra-specially still. And that's all I can say.

Cheerio!

APPENDIX B2

Explanatory leaflet sent to teachers in the PRISMS small schools to provide key to computer print-out of pupil performance. (Table 4.2).

THE PRISMASTON FILE

In the Prismaston File most of the pupil responses were scored either correct/incorrect. Pupils had to select the correct answer from a series of alternatives. The attached Prismaston scores are based on these multiple choice items. In addition to answering the questions, the children were asked to record the time and resources required to obtain the answers. We intend to relate the information in these records to the observation data. The exercises involving drawing require lengthy detailed analysis which is not yet complete, although it is clear that we have received some outstanding work. Such analyses will, therefore, only be carried out for pupils for whom we have a substantial number of observations.

INTERPRETATION OF THE LISTS OF SCORES

The interpretation of the scores for both the YELLOW and GREEN Prismaston Files is the same, except that there are six part-scores for the GREEN file and five part-scores for the YELLOW file.

Here is an example of the YELLOW Prismaston scores:

				OUT OF	60	12	9	9	12	18
CASE NO	ID1	YRG	SEX	DOFB	SCORE	MAPS	MATHS	PICT	GRAPH	LANG
1	23456	2	2	74.11	34.58	6.12	7.08	8.08	5.12	8.18
2	23458	1	1	75.10	29.49	8.09	4.04	6.08	9.11	2.17

The following explanation applies to both YELLOW and GREEN.

CASE NO — This is a computer-assigned number of no relevance here.

ID1 — Pupil identity number: the last two digits refer to the numbers on the class list from your observer.

YRG — Pupil's year group in June/July 1984.

SEX — 1 = boy; 2 = girl; 0 = not recorded.

DOFB — Pupil's date of birth; 74.11 = November, 1974.

SCORE — The pupil's overall score is shown in the first two digits and this is followed, after the full stop, by the number of items attempted by the child. The total number of items in the File is sixty and this is shown above the word SCORE.

So, in the example, the child whose identity number is 23456, is a second year junior girl who answered 34 items correctly out of the 58 items she tried.

The second child, identity number 23458, is a first year boy who answered 29 items correctly out of the 49 he tried.

The Prismaston File contains a variety of items which may be analysed in different ways. One useful way to divide the items is to group them according to the primary source of information to be interpreted to answer the question. The exception to this is the MATHS category in which the child must carry out a mathematical operation to obtain the answer.

Categories MAPS, MATHS, PICT and GRAPH are essentially the same for both YELLOW and GREEN files. In the GREEN file, the language category has been split into two groups, COMPR (comprehension) and INFER (inference) to indicate different levels of understanding.

The categories are:

YELLOW and GREEN

MAPS — map-reading skills e.g. locating points, finding routes

MATHS — items involving mathematical operations

PICT — items which require interpretation of a picture or diagram

GRAPH — items which involve interpretation of graphs and charts: The GREEN scores include the procedures in the construction of a bar chart.

YELLOW

LANG — comprehension of written material: vocabulary

GREEN

COMPR — comprehension and vocabulary

INFER — these items, in the GREEN file, require the child to infer relationships and arguments from written material.

The scores for each part of the file are presented in the same way as the overall SCORE i.e.

'number of correct items.number of items attempted'

In each case, the total number of items in that category appears above the column heading. So in the example,

MAPS — Out of 12 items in this category, the first pupil attempted 12 items and 6 of these were correct.

GREEN			OUT	OF	60	13	12	5	13	9	8
CASE NO	ID1	YRG	SEX	DOFB	SCORE	MAPS	MATHS	PICT	GRAPH	COMPR	INFER
3	54391	4	2	73.01	14.20	10.10	4.7	0	0	.02	.01

In this example, pupil 54391 did not attempt any questions in the PICT and GRAPH categories. This is shown as ' 0 '. In the COMPR category she attempted two items but both answers were incorrect. This is shown as ' .02'.

The Prismaston items were designed to assess children's performance in an atmosphere which matched the teacher's normal classroom procedure as closely as possible. It is, therefore, not appropriate to present comparative scores because the work was not carried out under standardised conditions. The scores of each class can only be interpreted in relation to the classroom conditions at the time. However, in interpreting the results for your class the following mean scores obtained by the pupils in each age group may be of some help. As before the scores are given as '(mean) number correct.(mean number) attempted'.

YELLOW

year	mean correct score . mean items tried	13 MAPS	9 MATHS	8 PICT	12 GRAPH	18 LANG
1 7/8	31.49	7.11	5.08	4.06	6.10	9.15
2 8/9	36.54	8.12	6.09	5.07	7.11	11.17

GREEN

year	mean correct score . mean items tried	13 MAPS	12 MATHS	5 PICT	13 GRAPH	9 COMPR	8 INFER
3 9/10	28.51	6.11	5.10	2.04	7.11	5.08	4.06
4 10/11	31.53	7.12	5.11	2.04	8.11	6.09	4.07

Although some top infants and third year children worked through the yellow Prismaston File, there were insufficient of these children to render valid means.

There are no significant differences between the mean scores for boys and girls on either Prismaston file.

LINDA HARGREAVES
January 1985

APPENDIX B3

Prismaston File: item facilities of multiple choice items broken down by year group

LOWER JUNIOR PRISMASTON FILE

ITEM	All n=418	JI n=159	J2 n=238	ITEM contd	All n=418	J1 n=159	J2 n=238
hx	77.8	73.0	79.0	ta	83.5	78.6	87.4
hv	79.4	78.0	82.3	tb	77.3	75.4	78.6
ht	65.6	69.8	62.2	tc	84.0	77.3	89.9
hs	64.1	60.4	68.1	td	76.8	73.6	79.4
hr	62.4	61.6	63.9	te	87.8	88.1	88.2
mx	90.7	87.4	93.7	tf	51.7	50.3	50.8
mv	89.0	83.6	93.7	tg	53.8	58.5	50.8
mt	61.7	61.6	62.6	ca	82.5	82.4	82.8
ms	83.5	83.6	84.0	cb	82.1	82.4	82.8
pa	86.4	80.5	91.2	ce	74.9	74.2	76.5
pb	84.0	82.4	84.9	cf	79.2	74.2	82.8
pc	80.1	81.1	79.8	cg	56.7	49.7	62.2
pd	83.0	81.1	84.9	ch	73.4	71.1	77.3
pe	53.6	47.8	53.3	ci	53.3	48.4	56.7
pg	74.9	72.3	76.5	ck	74.5	71.1	85.3
pi	73.0	66.7	78.6	cl	64.8	63.5	68.1
pk	19.6	22.0	18.5	cm	56.5	57.2	58.4
pl	45.9	43.3	47.5	fa	61.1	57.2	63.4
pm	70.6	68.5	71.8	fb	66.0	64.2	67.6
pn	41.9	41.5	41.2	fc	60.3	58.5	61.8
ja	68.7	67.9	69.3	fd	61.0	61.0	60.5
jb	72.0	74.9	72.7	fe	56.9	52.2	60.9
jc	41.1	42.1	42.4	ff	52.6	50.3	53.8
jd	39.0	35.2	41.2	fg	33.7	30.8	34.9
je	78.2	71.1	84.5	gx	78.0	72.3	82.4
jf	48.1	40.9	54.2	gv	38.0	35.2	38.7
jg	66.3	61.0	70.2	gt	80.1	73.0	85.7
				gs	48.3	46.5	49.6

UPPER JUNIOR PRISMASTON FILE

ITEM	All n=544	J3 n=234	J4 n=279	ITEM contd.	All n=544	J3 n=234	J4 n=279
ha	86.0	79.1	91.8	da	53.3	51.3	54.1
hb	67.5	65.0	68.8	db	68.4	68.0	71.7
hc	71.5	71.4	73.1	dc	64.0	60.7	68.8
hd	84.7	85.0	85.7	dd	48.9	46.6	51.3
ga	72.1	72.2	74.2	de	62.9	60.3	65.6
gd	34.2	29.1	40.9	dg	51.5	53.9	49.1
cm	45.0	38.0	52.7	dh	57.2	51.3	63.8
cn	29.8	27.8	32.6	di	70.4	68.0	73.1
co	33.8	30.3	36.6	dj	39.5	32.1	48.4
cp	57.9	59.8	58.8	na	90.6	89.7	93.9
cq	33.5	34.2	35.5	nb	71.9	70.1	75.6
cr	34.0	32.5	37.6	nc	72.2	71.4	76.0
cs	49.3	45.7	53.8	nd	36.9	32.5	40.1
ma	77.4	74.8	83.5	nf	86.9	85.0	88.5
mb	67.6	62.4	74.9	ng	77.2	73.1	81.4
md	24.3	20.9	27.2	nh	81.8	79.1	84.9
ta	91.4	89.7	94.6	ni	54.2	56.0	54.8
tb	89.7	87.6	91.6	nj	54.6	54.7	55.9
tc	86.9	76.1	88.2	nk	45.6	43.6	48.4
td	75.4	69.2	87.7	nl	46.7	46.2	48.0
te	75.0	71.4	79.6	nm	30.1	28.6	32.3
tg	64.9	61.5	68.5	ya	70.6	66.2	74.2
th	67.1	60.3	73.1	yc	60.8	55.1	67.0
xa	48.5	41.0	54.5	yd	61.2	52.1	70.6
				yf	72.2	69.2	75.6
				yg	57.4	50.4	66.3

Key

J1 7 - 8 years

J2 8 - 9 years

J3 9 - 10 years

J4 10 - 11 years

APPENDIX B4

Factor analysis of upper junior Prismaston File multiple-choice items

Contents

1 Examples of scattergrams to illustrate equivalence of factors with and without *Richmond Test scores

2 Characteristics of variables in factor analysis

3 Principal factor matrix and variable communalities

4 Varimax factor matrices with and without *Richmond Test scores

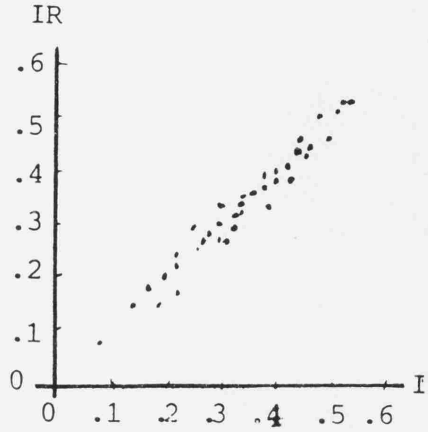
5 Scattergrams of item loadings of four factor varimax factors

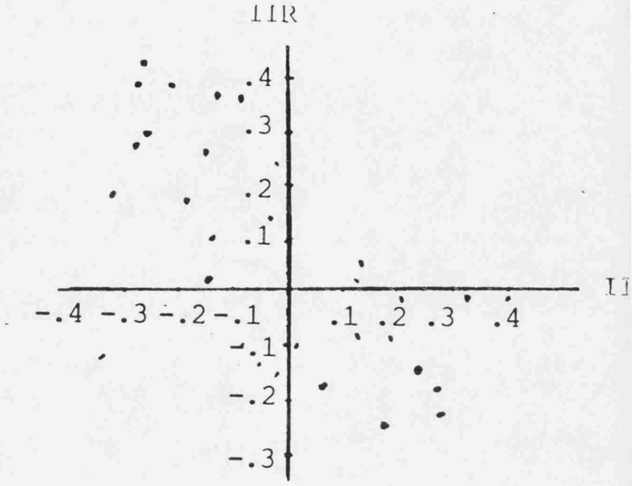
6 Oblique factor pattern and factor structure matrices

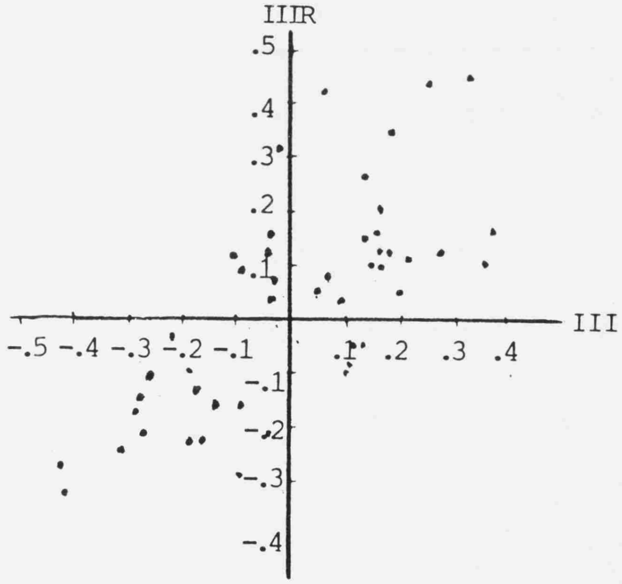
* refers to shortened form of Richmond tests which were adapted for use in the PRISMS project and which are shown in Appendix B6.

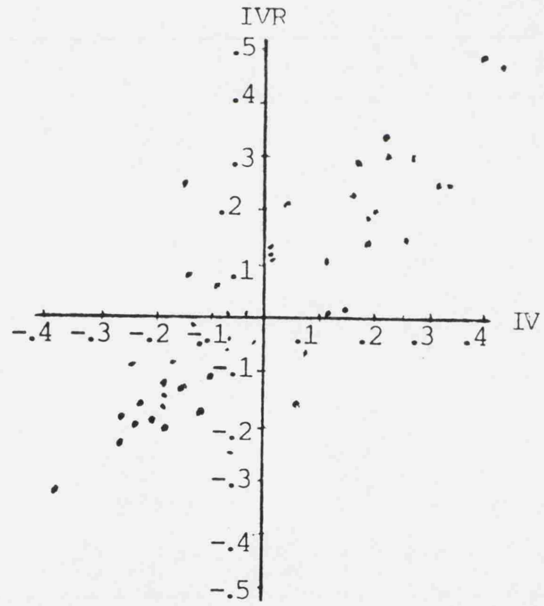
APPENDIX B4   Factor analysis of upper junior Prismaston File

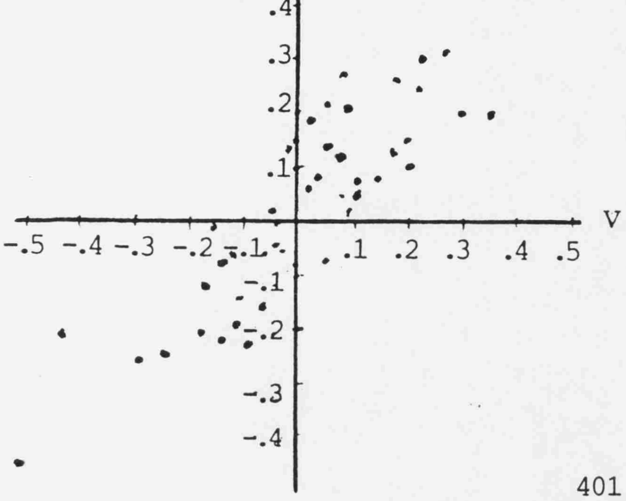
1) Examples of scattergrams of principal factor loadings to show equivalence of factors with and without *Richmond Tests: examples taken from eight factor solution of non-target subset of data.











KEY

I, II: Prismaston factor loadings

IR, IIR: Prismaston factors with *Richmond test scores

* shortened form of Richmond tests; see Appendix B6

APPENDIX B4

Upper Junior Factor Analysis: characteristics of factors

Variable	Item	Mean	Standard Deviation	Eigenvalue	Percentage Variance	Cumulative Percentage
1	ha	86	35	6.40	13.3	13.3
2	hb	68	47	1.80	3.7	17.1
3	hc	72	45	1.74	3.6	20.7
4	hd	85	36	1.57	3.3	24.0
5	ga	72	45	1.41	2.9	26.9
6	gd	34	48	1.39	2.9	29.8
7	cm	45	50	1.34	2.8	32.6
8	cn	30	46	1.30	2.7	35.3
9	co	34	47	1.27	2.6	38.0
10	cq	34	47	1.23	2.6	40.5
11	cs	49	50	1.21	2.5	43.0
12	ka	77	42	1.17	2.4	45.5
13	kb	68	47	1.13	2.4	47.8
14	kd	24	43	1.11	2.3	50.2
15	ta	91	28	1.09	2.3	52.4
16	tb	90	30	1.07	2.2	54.7
17	tc	81	39	1.04	2.2	56.8
18	td	75	43	0.99	2.1	58.9
19	te	75	43	0.96	2.0	60.9
20	tg	65	48	0.93	1.9	62.8
21	th	67	47	0.92	1.9	64.7
22	xa	49	50	0.89	1.9	66.6
23	da	53	50	0.87	1.8	68.4
24	db	68	47	0.86	1.8	70.2
25	dc	64	48	0.83	1.7	71.9
26	dd	49	50	0.78	1.6	73.5
27	de	63	48	0.78	1.6	75.1
28	dg	52	50	0.76	1.6	76.7
29	dh	57	50	0.74	1.5	78.3
30	di	70	46	0.71	1.5	79.7
31	dj	40	49	0.70	1.5	81.2
32	na	91	29	0.67	1.4	82.6
33	nb	72	45	0.66	1.4	84.0
34	nc	72	45	0.65	1.4	85.3
35	nd	37	48	0.63	1.3	86.7
36	nf	87	34	0.61	1.3	87.9
37	ng	72	42	0.60	1.2	89.2
38	nh	82	39	0.57	1.2	90.4
39	ni	54	50	0.55	1.1	91.5
40	nj	55	50	0.54	1.1	92.6
41	nk	46	50	0.51	1.1	93.7
42	nl	47	50	0.50	1.0	94.7
43	nm	30	46	0.48	1.0	95.7
44	ya	71	46	0.45	0.9	96.6
45	yc	61	49	0.43	0.9	97.5
46	yd	61	49	0.41	0.9	98.4
47	yf	72	45	0.39	0.8	99.2
48	yg	57	50	0.37	0.8	100.0

APPENDIX B4 Factor analysis of upper junior Prismaston File

3) Principal factor matrix of four factor solution : communalities of variables, eigenvalues and percentage of variance extracted by first four factors

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	COMMUNALITY
HA	.32938	.11074	-.13257	-.28289	.21835
HB	.22384	.14832	.01149	-.04987	.07472
HC	.27764	.16092	-.06605	.18419	.14126
HD	.27224	.01862	.02336	-.12402	.09039
GA	.31762	.12562	-.08288	.03598	.12433
GD	.16750	.20870	.07390	.12654	.09309
CM	.18422	.09014	.29381	.00385	.12263
CN	.11659	.08027	.31999	-.00757	.12249
CO	.29260	.22993	.32519	.06013	.24785
CP	.26434	.21985	.23371	.18759	.20802
CQ	.31903	.30845	.35916	.42140	.50350
CR	.35927	.33169	.24810	.42629	.48237
CS	.36472	.05974	-.12368	-.02070	.15231
KA	.26789	.13115	-.22889	.25875	.20830
KB	.31564	-.06332	-.30850	.22435	.24921
KD	.32536	.19612	.10976	-.01833	.15649
TA	.49163	-.22251	-.24327	.15420	.37417
TB	.42501	-.02019	-.27679	.03131	.25863
TC	.50738	-.01534	-.25987	.01659	.32548
TD	.40094	.24252	-.43375	.18517	.44199
TE	.41025	.15516	-.44927	.19514	.42950
TG	.37627	.09518	.15086	-.19324	.21074
TH	.34926	.23372	.03024	-.12615	.19343
XA	.22466	.28202	.12324	.05279	.14950
DA	.23318	.30548	-.02297	-.20549	.19035
DB	.45173	.09495	-.25096	-.27536	.35216
DC	.51800	.09628	-.10518	-.38298	.43533
DD	.18686	.09739	-.05847	-.20935	.09166
DE	.37993	.06356	.06611	-.22207	.20208
DG	.33448	-.08667	-.18299	-.06509	.15711
DH	.34214	-.06691	.02104	.14154	.14201
DI	.54513	-.14761	-.04522	-.13161	.33337
DJ	.31089	.15481	.05902	-.04248	.12910
NA	.41674	-.31905	-.02182	.27585	.35203
NB	.44209	-.36935	.17708	.01331	.36339
NC	.43150	-.23499	.13813	.13843	.27974
ND	.13401	.16522	.08872	-.02020	.05354
NF	.38416	-.23554	.13018	.17095	.25287
NG	.40991	-.07229	.03781	.09155	.18307
NH	.49230	-.26491	.10061	.14620	.34404
NI	.22976	-.22293	.09142	.09097	.12009
NJ	.37953	-.25076	.04752	.00062	.20918
NK	.28933	-.00037	.25034	-.27009	.21353
NL	.27533	-.33154	.22071	-.06435	.23853
NM	.17826	.16880	.13500	-.23799	.13513
YA	.47508	-.28935	.20176	-.18105	.38293
YC	.53217	-.02195	.01608	.01481	.28417
YD	.43643	.12251	.01151	-.12616	.22153
YF	.45256	-.21355	.08504	-.07447	.26319
YG	.45452	.04727	.07775	-.19379	.25439
Eigenvalue	6.40	1.80	1.74	1.57	
Percent variance	13.3	3.7	3.6	3.3	

APPENDIX B4 Factor analysis of upper junior Prismaston File

4(i) Varimax rotated factor matrix (four factor solution)

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
HA	.04468	.44146	.14476	-.02270
HB	.02644	.20707	.09353	.14965
HC	.06212	.06338	.27973	.23482
HD	.14270	.25173	.05273	.06230
GA	.08628	.19040	.24091	.15196
GD	-.00906	.05454	.10629	.28059
CM	.12836	.11313	-.11984	.28105
CN	.10245	.07970	-.18422	.26777
CO	.11358	.16995	-.05634	.45043
CP	.09604	.05695	.05456	.43884
CQ	.13430	-.07278	.09751	.68604
CR	.11173	-.04196	.20567	.65224
CS	.14329	.24251	.25601	.08000
KA	.04257	-.00099	.42773	.15341
KB	.18561	-.00278	.46334	-.00810
KD	.08614	.24888	.08527	.28258
TA	.41680	.09843	.43518	-.03707
TB	.20257	.21896	.41172	-.01206
TC	.25234	.27678	.42978	.02206
TD	-.02424	.17305	.63095	.11557
TE	.04027	.15269	.63267	.05744
TG	.17721	.38010	-.01624	.18599
TH	.03615	.36059	.11606	.22052
XA	-.02194	.16280	.06948	.34305
DA	-.11353	.38234	.08262	.15795
DB	.09903	.50485	.29058	-.05519
DC	.16445	.61805	.16212	.00419
DD	-.00192	.29787	.05394	-.00422
DE	.17431	.39895	.03295	.10701
DG	.20754	.21877	.24704	-.07175
DH	.28485	.05951	.18571	.15113
DI	.41031	.36247	.19615	.01288
DJ	.08245	.25245	.10156	.21969
NA	.52019	-.07690	.26816	.06027
NB	.59044	.11583	.00540	.03634
NC	.49382	.05551	.10653	.14647
ND	-.01505	.13565	.00979	.18659
NF	.46949	-.00307	.10916	.14324
NG	.32796	.13343	.18056	.15844
NH	.54334	.07600	.16076	.13115
NI	.34189	-.01799	.03648	.03939
NJ	.42804	.13270	.09120	.00633
NK	.20998	.35775	-.18052	.12236
NL	.46175	.09256	-.12942	-.00718
NM	-.00860	.32760	-.09918	.13381
YA	.53202	.30745	-.06937	.02355
YC	.34965	.27690	.22684	.18380
YD	.16488	.37645	.15092	.17277
YF	.44583	.24079	.06862	.04172
YG	.23861	.41691	.06446	.13956

4 (ii) Varimax rotation of upper junior data with Richmond test scores

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
HA	.37625	.05003	.05856	.20671
HB	.14949	.14820	-.02456	.15383
HC	.32204	.01813	.01352	.29084
HD	.17158	.16061	.12379	.03341
GA	.25529	.16712	.01771	.17535
GD	.21146	-.10434	-.01986	.44180
CM	-.00434	-.06561	.11473	.44395
CN	-.08442	-.06477	.11851	.39082
CO	.01089	.16219	.14658	.51098
CP	-.10527	.45358	.07589	.13122
CQ	-.04322	.26324	.06027	.50489
CR	.02313	.40255	.02645	.37752
CS	.17788	.39307	.11571	-.06537
KA	.27820	.30459	-.07653	-.13286
KB	.37306	.10878	.14761	-.14924
KD	.15292	.20174	.12284	.30488
TA	.43894	.08668	.37622	-.04193
TB	.48611	.08634	.18014	.03280
TC	.48196	.18339	.18483	.07013
TD	.60199	.11509	-.02572	.15957
TE	.63612	.04453	.05786	.12107
TG	.03831	.15851	.26132	.28282
TH	.26270	.17744	-.01843	.33944
XA	.11759	.16466	.00388	.29018
DA	.09250	.33326	-.07318	.19829
DB	.33300	.38460	.04587	-.03488
DC	.19249	56613	.14454	-.01280
DD	.08095	.19579	.06053	.04841
DE	.02916	.34843	.28925	.09457
DG	.24801	.10927	.17086	-.05626
DH	.28951	-.02711	.21269	.17433
DI	.30591	.19424	.41198	.05350
DJ	.09246	.42442	.05475	.03079
NA	.30100	-.06953	.42865	.04250
NB	.10321	.01160	.55550	.06269
NC	.04769	.17836	.40983	.06055
ND	.04062	.20628	-.04946	.07899
NF	.12503	.11154	.46300	-.00263
NG	.25329	.09018	.35678	.20670
NH	.27875	.12520	.49593	.03163
NI	-.01454	-.00512	.37465	.06410
NJ	.16487	.03724	.37649	.05797
NK	-.07722	.25417	.25094	.17729
NL	-.11960	.02583	.50526	.03646
NM	-.11605	.35129	.04967	.05541
YA	-.00164	.22865	.55997	.02203
YC	.20804	.35619	.33297	.01275
YD	.16615	.43201	.18372	.05447
YF	.24093	.03827	.45538	.14895
YG	.18381	.31843	.25863	.13762
LAS	.47193	.51278	.36009	-.03740
LBS	.45961	.51834	.33857	-.01062
MAS	.42802	.50861	.30548	.06068
MBS	.46609	.53763	.26706	.02013

KEY

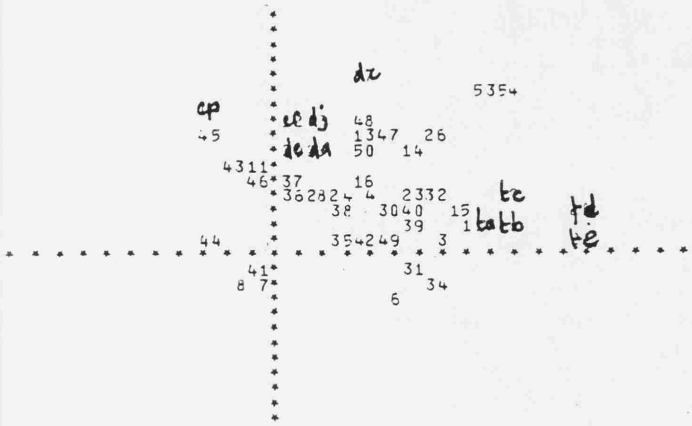
LAS, LBS *Richmond language test taken in October 1983 or June 1984

MAS, MBS *Richmond mathematics test taken in October 1983 or June 1984

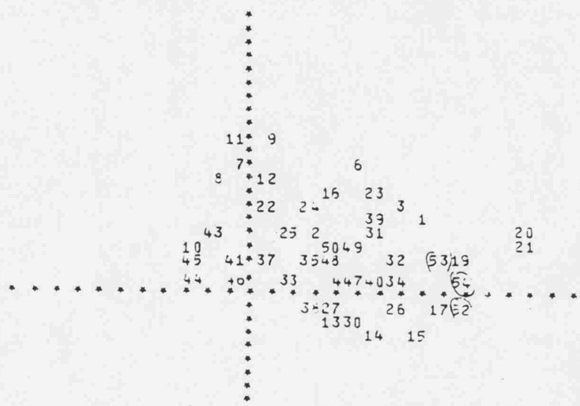
* Shortened versions of the Richmond tests were used. Copies are shown in Appendix B6

APPENDIX B4 5) Factor analysis of upper junior data: item loadings on each varimax factor plotted against each of the other three factors. Richmond* test scores included to show position relative to Prismaston items.

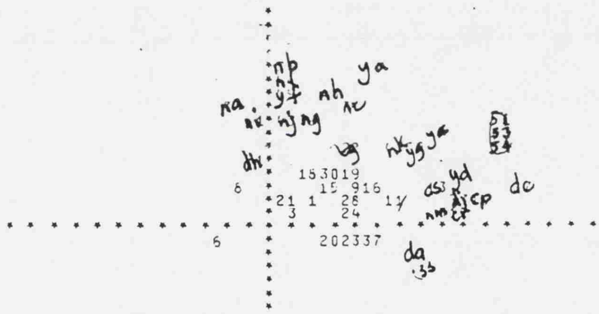
HORIZONTAL FACTOR 1 VERTICAL FACTOR 2



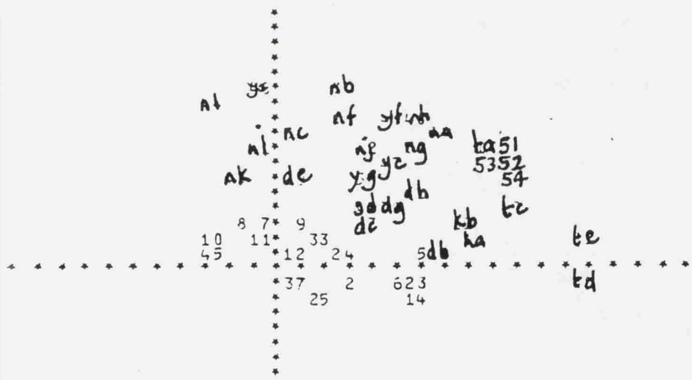
HORIZONTAL FACTOR 1 VERTICAL FACTOR 4



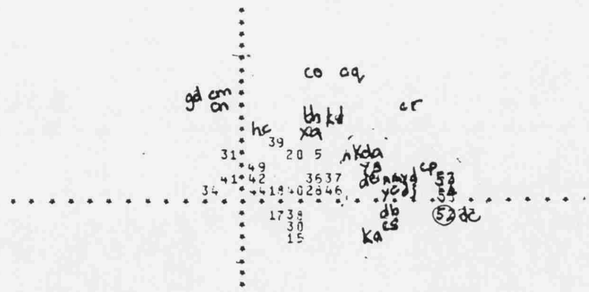
HORIZONTAL FACTOR 2 VERTICAL FACTOR 3



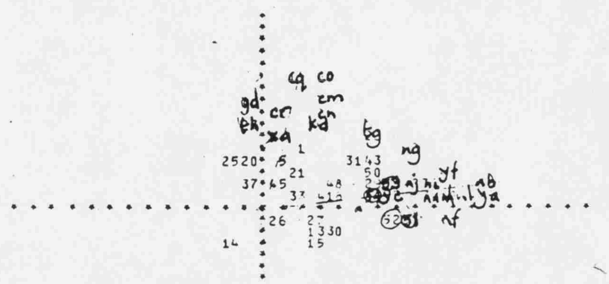
HORIZONTAL FACTOR 1 VERTICAL FACTOR 3



HORIZONTAL FACTOR 2 VERTICAL FACTOR 4.



HORIZONTAL FACTOR 3 VERTICAL FACTOR 4



*Richmond tests:

MAS, MBS (53, 54) mathematics test;

LAS, LBS (51, 52) language test;

A = test taken in October 1983

B = test taken in June 1984

* shortened form see Appendix B6

1 = HA	2 = HB	3 = HC	4 = HD
5 = GA	6 = GD	7 = CM	8 = CN
9 = CO	10 = CP	11 = CQ	12 = CR
13 = CS	14 = KA	15 = KB	16 = KD
17 = TA	18 = TB	19 = TC	20 = TD
21 = TE	22 = TG	23 = TH	24 = XA
25 = DA	26 = DB	27 = DC	28 = DD
29 = DE	30 = DG	31 = DH	32 = DI
33 = DJ	34 = NA	35 = NB	36 = NC
37 = ND	38 = NF	39 = NG	40 = NH
41 = NI	42 = NJ	43 = NK	44 = NL
45 = NM	46 = YA	47 = YC	48 = YD
49 = YF	50 = YG	51 = LAS	52 = LBS
53 = MAS	54 = MBS		

ALL GREENS FACTOR ANALYSIS
FILE AMFGAS7 (CREATION DATE = 85/06/18.)

APPENDIX B4 Factor analysis of upper junior Prismaston File

6) Oblique factor pattern and factor structure matrices

OBLIQUE FACTOR PATTERN MATRIX
AFTER ROTATION WITH KAISER NORMALIZATION

DELTA = 0

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
HA	.17218	.02912	.19320	-.25088
HB	.10291	.00706	.14195	-.19550
HC	.30149	-.03098	.34158	.10783
HD	.04683	-.10973	.09507	-.17254
GA	.23191	-.04561	.14363	-.11510
GD	.14378	.03938	.53438	.17554
CM	-.15889	-.10346	.41588	-.02363
CN	-.20270	-.09125	.39204	.01484
CO	-.08934	-.07859	.47136	-.09993
CQ	.01188	-.12979	.42969	.00936
CS	.19070	-.09421	-.13030	-.34143
KA	.37086	-.01558	-.16652	-.15149
KB	.42414	-.16576	-.14987	-.01459
KD	.08353	-.04055	.34775	-.12503
TA	.39711	-.40238	-.11858	-.00987
TB	.41523	-.1565[illegible]	.06741	-.05921
TC	.40347	-.19661	.02630	-.16688
TD	.65199	.09320	.15361	-.03246
TE	.66341	.01681	.12793	.02988
TG	-.06256	-.11756	.17810	-.35249
TH	.10774	.03512	.29018	-.26565
XA	.05025	.06743	.36569	-.11468
DA	.10513	.18413	.22220	-.30387
DB	.26403	-.01298	-.13035	-.50149
DC	.11701	-.07241	-.10084	-.63403
DD	.02626	.05228	-.07390	-.35550
DE	-.03062	-.11272	.00853	-.44531
DG	.21427	-.17437	-.12798	-.19516
DH	.17131	-.27369	.23090	.09922
DI	.14028	-.36075	.03912	-.25904
DJ	.04992	-.03017	.09312	-.30905
NA	.20585	-.53670	.02974	.17452
NB	-.06953	-.59876	.03819	-.02062
NC	.02971	-.50209	.0115[illegible]	-.03282
ND	-.00925	.04334	.1225[illegible]	-.16229
NF	.04108	-.48504	.0408[illegible]	.04280
NG	.14091	-.30773	.16626	-.02914
NH	.07159	-.54161	.02925	-.03876
NI	-.01416	-.35927	-.01226	.04478
NJ	.05340	-.42635	.04056	-.01427
NK	-.22169	-.17176	.12702	-.33791
NL	-.19007	-.48199	-.07147	-.07262
NM	-.14713	.05636	-.01119	-.44127
YA	-.15590	-.51724	-.05702	-.28729
YC	.14947	-.30339	.02954	-.28754
YD	.09305	-.10274	.03860	-.40624
YF	.03294	-.42148	.17358	-.06475
YG	.00880	-.17615	.09264	-.39519

FACTOR PATTERN CORRELATIONS

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
FACTOR 1	1.00000	-.22686	.11833	-.22188
FACTOR 2	-.22686	1.00000	-.17643	.27150
FACTOR 3	.11833	-.17643	1.00000	-.22232
FACTOR 4	-.22188	.27150	-.22232	1.00000

OBLIQUE FACTOR STRUCTURE MATRIX
AFTER ROTATION WITH KAISER NORMALIZATION

DELTA = 0

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
HA	.24410	-.11215	.26422	-.32413
HB	.15039	-.08084	.18523	-.19796
HC	.32501	-.13037	.35875	-.04342
HD	.12126	-.18397	.15833	-.23386
GA	.28479	-.15481	.20471	-.21087
GD	.15913	-.03986	.50542	.03553
CM	-.08097	-.14721	.42058	-.10893
CN	-.13891	-.11040	.38085	-.05212
CO	.00644	-.16861	.49687	-.20624
CQ	.09009	-.20576	.45191	-.12404
CS	.27241	-.20716	-.01520	-.38035
KA	.38830	-.11146	-.08621	-.20096
KB	.44725	-.23950	-.06719	-.12036
KD	.16161	-.15480	.39256	-.23168
TA	.47655	-.47423	.00159	-.18086
TB	.47186	-.27874	.15733	-.20883
TC	.48822	-.33809	.14583	-.31563
TD	.65623	-.09062	.22153	-.18597
TE	.66810	-.14815	.19682	-.14119
TG	.06339	-.23040	.26981	-.41012
TH	.19305	-.11265	.35579	-.34454
XA	.10367	-.03962	.38524	-.18882
DA	.15707	.03857	.26971	-.32660
DB	.36282	-.18604	.01467	-.53462
DC	.26218	-.25330	.06674	-.65723
DD	.08453	-.03716	-.00098	-.33070
DE	.09476	-.22818	.12380	-.47102
DG	.28199	-.25339	-.02847	-.26159
DH	.23870	-.32635	.27740	-.06443
DI	.28422	-.46980	.17696	-.39681
DJ	.13635	-.14184	.17306	-.34902
NA	.29241	-.54127	.10999	-.02346
NB	.07540	-.59532	.14019	-.17625
NC	.15225	-.51977	.11089	-.17828
ND	.03143	-.02025	.14990	-.17572
NF	.14645	-.48994	.12174	-.10708
NG	.23687	-.37695	.24371	-.18092
NH	.20652	-.57353	.14189	-.20819
NI	.05596	-.34174	.03949	-.04690
NJ	.15809	-.44950	.12527	-.15089
NK	-.09272	-.23562	.20622	-.36360
NL	-.07307	-.44598	.00723	-.14542
NM	-.06334	-.02809	.05956	-.39084
YA	.01844	-.54981	.07967	-.38045
YC	.28559	-.42058	.16468	-.40964
YD	.21106	-.24095	.15805	-.46336
YF	.16346	-.47716	.26623	-.22508
YG	.14740	-.30179	.21262	-.46556

APPENDIX B5

Factor analysis of lower junior Prismaston File

Contents

1 Variable means and standard deviations

2 Eigenvalues and percentage of variance extracted by each factor

3 Principal factor matrix

4 Varimax rotation of four factor solution

5 Varimax rotation of four factor solution with *Richmond test scores

6 Table of significant loadings of varimax solution with and without shortened Richmond test scores.

* refers to shortened version of Richmond tests as shown in Appendix B6

APPENDIX B5

Factor analysis of lower junior data

1) Variable means and standard deviations (N = 418)

VARIABLE	MEAN	STANDARD DEV	CASES
HX	.7775	.4164	418
HV	.7943	.4047	418
HT	.6555	.4758	418
HS	.6411	.4302	418
HR	.6244	.4849	418
MX	.9067	.2912	418
MV	.8900	.3133	418
MT	.6172	.4566	418
MS	.8349	.3717	418
PA	.8636	.3436	418
PB	.8397	.3673	418
PC	.8014	.3994	418
PD	.8301	.3760	418
PE	.5359	.4993	418
PG	.7488	.4342	418
PI	.7297	.4447	418
PK	.1962	.3976	418
PL	.4593	.4989	418
PM	.7057	.4563	418
PN	.4187	.4939	418
JA	.6866	.4644	418
JB	.7201	.4495	418
JC	.4115	.4927	418
JD	.3900	.4883	418
JE	.7823	.4132	418
JF	.4809	.5002	418
JG	.6627	.4734	418
TA	.8349	.3717	418
TB	.7727	.4196	418
TC	.8397	.3673	418
TD	.7679	.4227	418
TE	.8780	.3277	418
TF	.5167	.5003	418
TG	.5383	.4991	418
CA	.8254	.3801	418
CB	.8206	.3842	418
CE	.7488	.4342	418
CF	.7919	.4065	418
CG	.5670	.4961	418
CH	.7344	.4422	418
CI	.5335	.4995	418
CK	.7847	.4115	418
CL	.6483	.4781	418
CM	.5646	.4964	418
FB	.6603	.4742	418
FC	.6029	.4899	418
FE	.5694	.4958	418
FF	.5263	.4999	418
FG	.3373	.4734	418
GX	.7799	.4148	418
GV	.3804	.4861	418
GW	.8014	.3994	418
GS	.4833	.5003	418

APPENDIX B5

2) Factor analysis of lower junior data : Eigenvalues; variance extracted.

VARIABLE	EST COMMUNALITY	FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT
HX	1.00000	1	6.99920	13.2	13.2
HV	1.00000	2	2.01650	3.8	17.0
HT	1.00000	3	1.81967	3.4	20.4
HS	1.00000	4	1.79326	3.4	23.8
HR	1.00000	5	1.64810	3.1	26.9
MX	1.00000	6	1.56112	2.9	29.9
MV	1.00000	7	1.50138	2.8	32.7
MT	1.00000	8	1.44793	2.7	35.4
MS	1.00000	9	1.38029	2.6	38.1
PA	1.00000	10	1.36843	2.6	40.6
PB	1.00000	11	1.30998	2.5	43.1
PC	1.00000	12	1.26308	2.4	45.5
PD	1.00000	13	1.21519	2.3	47.8
PE	1.00000	14	1.20630	2.3	50.1
PG	1.00000	15	1.15674	2.2	52.2
PI	1.00000	16	1.11410	2.1	54.3
PK	1.00000	17	1.06685	2.0	56.4
PL	1.00000	18	1.00864	1.9	58.3
PM	1.00000	19	1.00300	1.9	60.2
PN	1.00000	20	.94327	1.8	61.9
JA	1.00000	21	.91982	1.7	63.7
JB	1.00000	22	.89748	1.7	65.4
JC	1.00000	23	.89382	1.7	67.0
JD	1.00000	24	.86772	1.6	68.7
JE	1.00000	25	.83768	1.6	70.3
JF	1.00000	26	.83066	1.6	71.8
JG	1.00000	27	.79813	1.5	73.3
TA	1.00000	28	.77254	1.5	74.8
TB	1.00000	29	.76360	1.4	76.2
TC	1.00000	30	.73719	1.4	77.6
TD	1.00000	31	.72917	1.4	79.0
TE	1.00000	32	.69569	1.3	80.3
TF	1.00000	33	.67616	1.3	81.6
TG	1.00000	34	.65288	1.2	82.8
CA	1.00000	35	.63554	1.2	84.0
CB	1.00000	36	.62890	1.2	85.2
CE	1.00000	37	.60945	1.1	86.4
CF	1.00000	38	.60078	1.1	87.5
CG	1.00000	39	.59740	1.1	88.6
CH	1.00000	40	.56649	1.1	89.7
CI	1.00000	41	.53655	1.0	90.7
CK	1.00000	42	.52365	1.0	91.7
CL	1.00000	43	.50840	1.0	92.6
CM	1.00000	44	.48158	.9	93.5
FB	1.00000	45	.45871	.9	94.[illegible]
FC	1.00000	46	.45355	.9	95.3
FE	1.00000	47	.42245	.8	96.1
FF	1.00000	48	.41961	.8	96.8
FG	1.00000	49	.39167	.7	97.6
GX	1.00000	50	.37757	.7	98.3
GV	1.00000	51	.33421	.6	98.9
GW	1.00000	52	.32541	.6	99.5
GS	1.00000	53	.25210	.5	100.0

APPENDIX B5

3) Factor analysis of lower junior data: principal factor matrix and communalities

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	COMMUNALITY
HX	.30540	.23156	.25005	.08050	.21591
HV	.40388	.15745	.16836	-.30538	.30351
HT	.30356	.39381	.08538	-.09062	.26273
HS	.19850	.42051	.04244	.07542	.22372
HR	.45390	.20433	.07743	.00998	.25389
MX	.27670	-.14076	.51139	-.17510	.38952
MV	.30134	-.31891	.35441	.00058	.31806
MT	.35174	.08437	.10152	-.07892	.14745
MS	.47275	.15165	.20039	-.14054	.30640
PA	.34157	-.23410	.29253	.22423	.30157
PB	.23186	-.32954	-.00191	.34775	.28329
PC	.13839	-.19069	-.14472	.25735	.14269
PD	.12298	-.17173	.15421	.21015	.11256
PE	.21978	-.05839	-.03517	.25420	.11757
PG	.09617	-.01639	.11883	.28433	.10448
PI	.30099	.14309	.11755	.00700	.12496
PK	.03786	-.09343	.07502	.29921	.10472
PL	.33897	.13685	.06986	.11547	.15184
PM	.26508	-.01125	.05394	.09604	.08253
PN	.25975	.27817	.02305	.14058	.16514
JA	.35335	.01928	.30350	-.04217	.21912
JB	.47699	.03500	.20212	-.20907	.31338
JC	.29940	.05003	-.01154	.02670	.09299
JD	.28659	.04020	-.01659	-.11070	.09628
JE	.34403	-.13330	.07487	-.11652	.15531
JF	.26366	-.16580	.10617	.12822	.12472
JG	.36909	.16125	-.01672	.15491	.18650
TA	.39191	-.28348	.03663	.07023	.24023
TB	.50025	.05185	-.10231	-.12752	.27967
TC	.48400	-.05552	-.04319	.05528	.24225
TD	.51790	-.03532	-.13767	.04177	.29017
TE	.33865	.08852	-.16646	-.28373	.23073
TF	.18483	.07265	-.03930	-.03078	.04193
TG	.33137	-.02401	-.37586	.04764	.25392
CA	.34818	-.27769	.02239	.17407	.22914
CB	.47254	-.26787	.00974	.08292	.30202
CE	.13035	-.08094	-.22326	-.20129	.11390
CF	.30867	-.27485	-.13032	-.16223	.21413
CG	.39437	-.26243	-.24666	.00421	.28528
CH	.46803	-.07993	-.34352	-.06421	.34756
CI	.34477	-.12701	-.03652	.02707	.13707
CK	.43238	.00140	.03899	-.25162	.25179
CL	.54469	-.02131	.11264	-.36219	.44104
CM	.53307	.02272	.12424	-.31393	.39367
FA	.51647	-.03479	-.13776	.12949	.30370
FB	.57593	-.05433	-.14916	-.01337	.35828
FC	.55998	.08632	-.36645	-.02930	.45617
FD	.51715	.00351	-.32496	-.00659	.37310
FE	.41622	-.12135	.16628	.04726	.21785
FF	.42431	-.17281	-.05281	.10009	.22271
FG	.34282	-.08689	-.17909	.01051	.15725
GX	.37236	.40855	.15795	.25709	.39662
GV	.19894	.43034	-.37416	.17305	.39472
GW	.29543	.24540	.15092	.51817	.43878
GS	.33221	.27610	-.00084	.22365	.23388

APPENDIX B5

4) Factor analysis of lower junior data: Varimax rotation of four factor solution

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
HX	-.03056	.38960	.26022	.07935
HV	.23575	.23780	.40260	-.16103
HT	.08884	.44104	.18317	-.17494
HS	-.00059	.46623	.01998	-.09021
HR	.18156	.39357	.25335	.05452
MX	-.06634	.01437	.63314	.08736
MV	.02105	-.07955	.49767	.29342
MT	.21913	.21889	.21345	.02107
MS	.26535	.32486	.33477	.00141
PA	.01863	.07516	.33188	.43389
PB	.14941	-.04069	-.01532	.51964
PC	.14507	-.01917	-.12455	.32655
PD	-.04462	.00865	.11082	.32213
PE	.15591	.13722	-.07854	.30053
PG	-.08212	.14463	.00175	.28955
PI	.13852	.27239	.15335	.04406
PK	-.09697	.05511	-.04614	.32204
PL	.12539	.31741	.12816	.13753
PM	.08541	.15506	.16501	.16798
PN	.05137	.39357	.05763	.02903
JA	.02977	.20221	.43471	.10574
JB	.27595	.21019	.42384	.00706
JC	.20321	.18901	.10132	.08485
JD	.26355	.12784	.12775	-.02269
JE	.29093	.02573	.25363	.10003
JF	.12139	.04904	.14951	.30114
JG	.20375	.35972	.03082	.18929
TA	.29015	-.01257	.21278	.34155
TB	.45875	.23076	.16583	.03530
TC	.35888	.20261	.16057	.23392
TD	.44942	.21755	.10433	.20362
TE	.44029	.12376	.09629	-.16793
TF	.19854	.13010	.00124	-.00998
TG	.48155	.11321	-.17402	.10840
CA	.21825	.00064	.16427	.39083
CB	.32738	.03600	.25670	.35374
CE	.34001	-.09190	-.05023	.08861
CF	.43469	-.13994	.11482	.11701
CG	.51139	-.04889	.00315	.24033
CH	.57528	.03945	-.00163	.09529
CI	.29886	.06815	.12113	.19640
CK	.35324	.12507	.33138	-.05399
CL	.43570	.12808	.48103	-.09643
CM	.40319	.17725	.44350	-.07782
FB	.44094	.18435	.24226	.13696
FC	.49825	.28203	.07110	.06003
FE	.17945	.13151	.33525	.24501
FF	.33489	.09095	.14311	.29721
FG	.33508	.06904	.08282	.10629
GX	.03693	.60670	.05392	.11961
GV	.24057	.46178	-.35338	-.06663
GW	-.06314	.52562	.05466	.38630
GS	.12663	.45497	-.01549	.13450
EIGENVALUES	6.999	2.017	1.820	1.793
PERCENT VARIANCE	13.2	3.8	3.4	3.4

APPENDIX B5

5) Factor analysis of lower junior data: varimax rotation with Richmond test scores

VARIMAX ROTATED FACTOR MATRIX
AFTER ROTATION WITH KAISER NORMALIZATION

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
HX	.03792	-.03604	.47556	.19077
HV	.22886	.10122	.48447	-.01848
HT	-.06234	.29201	.42898	-.01943
HS	.03646	.06864	.43196	-.02227
HR	-.03554	.28923	.42830	.27713
MX	.06292	-.18015	.46879	.05450
MV	.08687	-.08115	.16590	.34505
MT	.18158	.12657	.30703	.04511
MS	.32675	.23807	.38019	-.01189
PA	.12989	-.11761	.15088	.35558
PB	.22066	-.05956	-.08878	.43466
PC	.09058	.05729	-.18868	.03408
PD	.16140	-.15114	-.01691	.20924
PE	.32149	.05952	-.01155	.11072
PG	-.11128	.03921	.03221	.38221
PI	.27323	.04729	.33969	.05649
PK	-.20028	-.01434	.04190	.37442
PL	.26669	.12434	.17985	.06083
PM	.16040	.04443	.17248	.22071
PN	-.02865	.24149	.20749	.07653
JA	.13859	-.03304	.45030	.28033
JB	.22774	.17555	.42477	.11354
JC	.24003	.07235	.27583	.02492
JD	.20185	.10505	.15414	.07208
JE	.42350	.06835	.10310	-.01668
JF	.24293	-.15123	.05257	.34798
JG	.25129	.15042	.23780	.09201
TA	.04219	.16444	.10102	.55140
TB	.06211	.54034	.17919	.30837
TC	.05702	.41757	.16311	.46573
TD	.23586	.50325	.11150	.26459
TE	.20809	.38753	.11327	-.17379
TF	.17617	.18956	.09385	-.02498
TG	.24705	.41860	-.10484	.01767
CA	.08042	.14017	-.01615	.39994
CB	.18184	.22872	.02683	.43757
CE	.10110	.12926	-.06664	.06270
CF	.31363	.20235	-.17499	.18580
CG	.40050	.23051	-.16970	.32185
CH	.18115	.56590	.02672	.13061
CI	.18966	.16192	.08615	.34228
CK	.39120	.27691	.15803	.09599
CL	.48965	.33973	.20993	.04195
CM	.39216	.30117	.25601	.09159
FB	.30020	.30942	.15395	.20225
FC	.26208	.52256	.13181	.12701
FE	.20542	.03099	.20472	.24320
FF	.31620	.16767	-.01156	.37577
FG	.32604	.12865	-.04885	.04564
GX	.09811	.27539	.39397	-.03024
GV	-.06246	.48042	.03263	-.11903
GW	.04345	.11776	.29351	.19523
GS	.18926	.31029	.16393	-.04300
LAS	.72556	.08627	.15328	.12103
LBS	.74561	.11305	.13464	.10524
MAS	.69024	-.03613	.24019	.18679
MBS	.73258	.00872	.17712	.12293

LAS language test taken October, 1983
LBS language test retaken, June 1984
MAS mathematics test taken October 1983
MBS mathematics test retaken, June 1984

APPENDIX B5: 6) Lower Junior Prismaston File: Four Factor Varimax Solution with and without Richmond Test Scores

N = 418 without Richmonds (-R), N = 327 with Richmonds (+R)

	I		II		III		IV	
	-R	+R	-R	+R	-R	+R	-R	+R
hx			39			48		
hv					40	48		
ht			44			43		
hs			47			43		
hr			39			43		
mx					63	47		
mv					50			35
mt						31		
ms			32		33	38		
pa					33		43	35
pb							52	43
pc							33	
pd							32	
pe							30	
pg								38
pi						34		
pk							32	37
pl			32					
pm								
pn			39					
ja					43	45		
jb					42	42		
jc								
jd								
je		42						
jf							30	35
jg			36					
ta							34	55
tb	45			54				31
tc	36			42				47
td	45			50				
te	44			39				
tf								
tg	48			41				
ca							39	40
cb	33						35	44
cc	34							
cf	43	31						
cg	51	40						32
ch	58			57				
ci	30							34
ck	35	39		34	33			
cl	44	49		30	48			
cm	40	39			44			
fa								
fb	44	30		31				
fc	50			52				
fd								
fe					34			
ff	33	32						37
fg	34	33						
gx			61			39		
gu			46	48	-35			
gw			53				38	
gs			45	31				
RICHMOND TESTS								
Language 1		73		09		17		12
Language 2		75		11		13		11
Mathematics 1		69		-04		24		19
Mathematics 2		73		01		18		12

Note: Loadings under 0.3 omitted

APPENDIX B6

Copies of shortened version of Richmond tests of language and mathematics which were used in the PRISMS project. These tests were administered in October 1983 and June 1984. A time limit of 20 minutes was applied for each test.

Shortened Richmond language test

NAME:

SCHOOL:

. Some of these groups contain a mistake in punctuation. When you find a mistake put a line under it If there is no mistake in a group of words put a line under D) (no mistakes). No group of words has mistakes in more than one line. The first two are done for you:

A)	Our family tries	A)	We do our best
B)	to practise	B)	to make our home
C)	rules of safety	C)	a safe place to live.
D)	(no mistakes)	D)	(no mistakes)

1 A) Mother sent Bob to buy a
B) dozen rolls He ate six
C) of them on the way home.
D) (no mistakes)

2 A) I think the ferry is coming.
B) Did you hear a fog-horn blowing?
C) It is hard to see in this mist.
D) (no mistakes)

3 A) Do you know why the
B) River Thames is called
C) Old Father Thames.
D) (no mistakes)

4 A) Among Joes books there is
B) one very old one. Its
C) date is too faded to read.
D) (no mistakes)

5 A) The guide remarked,
B) Get your cameras ready for
C) Buckingham Palace."
D) (no mistakes)

6 A) In his grubby fist little Oliver
B) clutched four, fat worms.
C) He was going fishing.
D) (no mistakes)

. Some of these groups contain a mistake in the use of words. When you find a mistake put a line under it. If there is no mistake in a group of words put a line under D) (no mistakes). No groups of words has a mistake in more than one line. The first two are done for you:

A)	He showed us the way.	A)	Tim went first.
B)	Are you afraid to try?	B)	The bird flew away.
C)	Me and him took turns.	C)	Pat found a penny.
D)	(no mistakes)	D)	(no mistakes)

1 A) Give me your ticket, please.
B) Jack telled a funny joke.
C) Don gave me a push.
D) (no mistakes)

2 A) Me and him study together.
B) An owl flew into our tent.
C) Has anyone heard the bell?
D) (no mistakes)

3 A) Joy she is afraid of thunder.
B) Who left the gate open?
C) I took my painting home.
D) (no mistakes)

4 A) Us boys made a big bonfire.
B) We sat around it and sang songs.
C) We threw sand on it to put it out.
D) (no mistakes)

5 A) There wasn't a cloud in the sky.
B) We can move more quiet without shoes.
C) Both of the twins came to the party.
D) (no mistakes)

6 A) Grandmother told the most delightfulest story.
B) We thought she must have made up every word of it.
C) However, we learned later that what she said was true.
D) (no mistakes)

3. Some of these groups of words have a spelling mistake. When you find a mistake, put a line under it. If there is no mistake in a group of words, put a line under E) (no mistakes). No group of words has more than one mistake. The first two are done for you:

A)	our	A)	fill
B)	mi	B)	keep
C)	your	C)	was
D)	them	D)	saw
E)	(no mistakes)	E)	(no mistakes)

1
A) abel
B) sold
C) talk
D) busy
E) (no mistakes)

2
A) body
B) company
C) dawn
D) handle
E) (no mistakes)

3
A) outfit
B) radeo
C) anybody
D) sailor
E) (no mistakes)

4
A) feild
B) pride
C) self
D) belt
E) (no mistakes)

5
A) tast
B) mumps
C) spread
D) wound
E) (no mistakes)

6
A) sandals
B) allthough
C) blizzard
D) trapeze
E) (no mistakes)

7
A) object
B) whisper
C) thimble
D) gloomey
E) (no mistakes)

8
A) consider
B) complete
C) bathe
D) intrupted
E) (no mistakes)

9
A) enormus
B) literature
C) physician
D) destination
E) (no mistakes)

4. In each group of words below put a line under the word which means the same as the word underlined at the top. The first one is done for you:

Close the door
A) shut
B) hold
C) behind
D) open

1 A final look
A) first
B) last
C) long
D) backward

2 On even ground
A) smooth
B) rough
C) ploughed
D) rocky

3 His cut healed
A) hurt badly
B) bled a little
C) was bandaged
D) got well

4 Destroy a note
A) discover
B) hide
C) tear up
D) describe

5 Treated us fairly
A) badly
B) justly
C) lightly
D) frequently

6 Explain the problem
A) write down
B) work on
C) make plain
D) solve

7 Knit a scarf
A) make with needles
B) sew together
C) try to buy
D) line with fur

8 Individual effort
A) community
B) one person's
C) distinguished
D) questionable

9 Suburb of a city
A) business section
B) shopping precinct
C) slum area
D) outlying part

Shortened Richmond mathematics test

NAME:

SCHOOL:

Four answers are given to each question, but only one answer is right. Tick the answer you think is the best. The first one is done for you:

> How many dots are there below?
>
> . . . . .
>
> A) 4 C) 6
>
> B) 5 ✓ D) 7

1 What whole number is greater than 7 and less than 9?

A) 2 C) 8
B) 6 D) 10

2 There were seven people ahead of George in the queue. In which place was George?

A) sixth C) eighth
B) seventh D) tenth

3 Which numeral tells you how many tens there are in sixty?

A) 6 C) 16
B) 10 D) 60

4 Al's mother bought 1 dozen oranges. If Al ate three oranges, how many were left?

A) 7 C) 13
B) 9 D) 15

5 Which of these sets of coins has the greatest value?

A) 2 tenpence pieces
B) 23 pence
C) 4 fivepence pieces
D) 3 tenpence pieces

6 Which of the numbers represented below is nearest in value to 2500?

A) 2498 C) 2510
B) 250 D) 2599

7 Which statement below is <u>false</u>?

A) A triangle has more sides than a rectangle.
B) Five fivepence pieces are worth more than two tenpence pieces.
C) The sum of 212 and 301 is greater than 500.
D) March is the third month of the year.

8 What numeral is needed to make the number sentence

$\square \times \square = 16$ true?

A) 2 C) 6
B) 4 D) 8

9 What should replace the $\square$ to make $(6 + 7) + 3 = 6 + \square$ a true number sentence?

A) 13 C) 7
B) 10 D) 3

10 A policeman counted the number of cars that passed a busy junction. In 30 minutes he counted 120 cars. At that rate how many cars would pass the junction between 4.00 pm and 6.00 pm?

A) 60 C) 240
B) 120 D) 480

11 Which of these fractional numbers is greater than one half:

A) $\frac{1}{3}$ C) $\frac{1}{4}$

B) $\frac{2}{3}$ D) $\frac{2}{5}$

2. Three answers are given to each question. If the right answer is given, put a tick beside it. If the right answer is not given, put a tick beside D) (not given). The first two are done for you:

Jason had 3 pennies. His mother gave him two more. How many did he have then?	Tracey had 6 sweets. She ate two of them. How many did she have left?
A) 2 C) 5 ✓	A) 2 C) 5
B) 4 D) (not given)	B) 3 D) (not given) ✓

1 Marion visited a pet shop. The pet shop had 13 kittens and 7 puppies. How many more kittens than puppies did the pet shop have?

A) 6   C) 20
B) 14   D) (not given)

2 Marion saw 4 budgerigars, 2 love birds, and 5 parrots in the pet shop. How many birds in all did Marion see?

A) 6   C) 11
B) 9   D) (not given)

3 The high diving board at the Empire Swimming Pool is $3\frac{1}{2}$ metres above the water. The low diving board is 1 metre above the water. How many metres further above the water is the high diving board than the low one?

A) $1\frac{1}{2}$ C) 3
B) $2\frac{1}{2}$ D) (not given)

4 Mr. Cole of the Garden Shop planted 105 boxes with petunia seeds. He estimated that each box would yield 6 good plants. Based on this estimate, what would be the total number of good petunia plants from this planting?

A) 111   C) 900
B) 630   D) (not given)

5 Tickets to go swimming cost 15p for each time. Last week Bill went swimming 6 times. How much did Bill pay for tickets for the whole week?

A) 21p   C) 90p
B) 60p   D) (not given)

6 Dora bought 3 boxes of Christmas cards. She bought 36 cards in all. If there was the same number of cards in each of the three boxes, how many cards were in each box?

A) 12   C) 13
B) 10   D) (not given)

7 The train left Victoria for Bexhill at 12.05pm. What time did it arrive in Bexhill if the journey took 1 hour and 42 minutes?

A) 1.37pm   C) 3.47pm
B) 1.47pm   D) (not given)

8 The park had an area of 1500 hectares. About one third of the park was a lake. About what was the area of the lake in hectares?

A) 300   C) 500
B) 400   D) (not given)

9 In a recent census the population of Worcestershire was 702,605. In the same census the population of Worcester, the county town, was 70,270. At the time of the census about what fraction of the people of Worcestershire lived in Worcester?

A) $\frac{1}{4}$ C) $\frac{1}{10}$
B) $\frac{1}{5}$ D) (not given)

APPENDIX C The records of use of resources and teacher help

Appendix C1

Lower junior Prismaston File: percentage frequencies of children's recorded resource use (N = 202)

item	resource	plan/pic p	ref book *	apparatus a	friend f
hx	p - map	59	7	0	18
hv	p - map	61	7	0	16
ht	p - picture	55	10	1	20
hs	p - picture	50	7	1	17
hr	p - map	56	7	0	15
gx	p - picture	55	12	0	10
gv	p - picture	55	5	1	11
gt	p - picture	53	4	1	9
gs		40	4	0	12
mx	p - map	64	8	0	18
mv	p/* map/ref	62	15	0	14
mt	p - map	64	7	0	19
ms	p - map	60	7	0	16
pg	* - timeline	47	13	0	13
pi	* - timeline	29	13	1	11
pk	* - plan signs	29	15	0	18
pl	* - timeline	16	34	1	16
pm	* - timeline	17	22	1	15
pn	* - dictionary	3	18	0	6

Appendix C1 continued.

Lower junior Prismaston File: percentage frequencies of children's recorded resource use (continued) (N = 202)

item	resource	plan/chart/ picture p	reference book *	apparatus a	friend f
ja	p - map	65	5	2	16
jb	p - map	62	4	0	15
jc	p - map	64	5	5	13
jd	p - map	62	4	5	13
je	(picture)[1]	27	1	1	16
jf	(picture)	25	3	1	13
jg	p - map	47	5	22	17
ta	* - dictionary	15	10	1	15
tb	p - chart	33	3	1	12
tc	p - chart	37	3	1	12
td	p - chart	38	3	1	12
te	p - chart	38	3	2	7
tf	p - chart	26	2	1	10
tg	p - chart	31	2	2	13
ca	-	15	5	1	11
cb	-	15	5	0	9
cc	-	20	0	0	9
cd	* - dictionary	21	9	0	10
ce	(picture)	27	0	0	12
cf	-	14	4	0	11
cg	-	12	4	0	12
ch	-	12	4	1	10
ci	-	16	4	1	9
ck	p - chart	30	1	0	12
cl	p - chart	27	0	0	7
cm	-	16	3	0	7
fa	(chart)	36	3	0	11
fb	(picture)	24	4	0	9
fc	p - chart	31	3	0	1
fd	(picture)	3	3	1	8
fe	(chart)	30	3	0	13
ff	p - chart	29	4	1	12
fg	(picture)	33	3	1	10

1 Items with resources listed in brackets required the use of that resource but no hint was given.

Appendix C1 (continued)

Upper junior Prismaston File: percentage frequencies of children's recorded resource use (N = 216)

item	resource	map/picture/ chart p	reference book *	apparatus a	friend f
ha	p - map	75	6	0	11
hb	p/* map/ref book	78	5	0	9
hc	p - map	76	4	0	12
hd	* - dictionary/ (picture)	58	11	0	12
ga	p - map	79	3	2	12
gb	p - map	79	3	7	10
gc	p - map	78	5	5	15
gd	p - map	72	5	3	14
mx	p/* map/ref book	49	16	1	9
mv	p - map	49	10	1	5
cm	p/* map/ref book	80	11	3	13
cn	p/* map/ref book	80	8	1	10
co	p - map	71	7	9	13
cp	p - map	72	3	10	16
cq	-	41	5	1	13
cr	-	34	4	2	10
cs	(chart)[1]	28	8	2	10
ma[2]	p - map	79	10	2	10
mb	p - map	81	6	2	11
mc	p - map	81	3	2	9
md	p - map	78	4	3	8
me	p - map	73	5	3	10
ta	* - dictionary	15	23	3	13
tb	p - chart	44	7	3	10
tc	p - chart	43	7	2	8
td	(table)	38	7	3	10
te	(table)	38	10	1	11
tg	(diagram)	33	9	1	8
th	(diagram)	31	9	1	12

continued

1 Items with resources listed in brackets required the use of that resource but no hint was given.

2 This group of items was labelled ka to ke in the analyses.

Appendix C1 (continued)

Upper junior Prismaston File: percentage frequencies of children's recorded resource (continued) (N = 216)

item	resource	map/picture/ chart p	reference book *	apparatus a	friend f
xa	-	16	7	1	14
xb	-	15	7	0	12
xc	-	12	8	1	8
da	-	18	7	0	12
db	-	17	7	1	10
dc	-	19	7	1	11
dd	-	18	9	1	8
de	-	17	8	0	7
dg	-	14	9	0	7
dh	-	16	9	1	8
di	-	16	9	1	6
dj	-	13	9	2	8
na	* - ref book	11	55	0	7
nb	* - ref book	9	60	0	7
nc	* - ref book	9	57	0	7
nd	* - ref book (pic)	11	59	1	7
nf	* - ref book	7	50	0	6
ng	* - ref book	9	62	1	6
nh	* - ref book	7	57	1	6
ni	* - ref book (pic)	9	46	1	3
nj	* - ref book (pic)	14	65	0	7
nk	* - ref book (pic)	15	61	0	10
nl	* - ref book	9	57	0	5
nm	* - ref book	10	49	0	6
ta[1]	* - refbk/timeline	20	60	0	6
tb	* - refbk/timeline	20	56	1	6
tc	* - refbk/timeline	20	58	1	5
td	* - refbk/timeline	21	51	1	8
tf	* - refbk/timeline	17	50	1	7
tg	* - refbk/timeline	17	43	1	8

[2] This group of items was labelled ya to yg in the analyses.

Appendix C2

Results of t tests to show whether resource use was recorded for the appropriate items

Use of 'p' to show reference to a plan, picture, map or chart

ITEMS REQUIRING..		UPPER JUNIOR			LOWER JUNIOR		
PLAN/MAP	HINT	n items	df	t	n items	df	t
yes	yes	20	41	16.54***	28	39	9.56***
no	no	23			13		
yes	no	16	37	2.53*	14	25	2.46*
no	no	23			13		

Use of '*' to show reference to 'Prismmem' reference book

REF BOOK	HINT	n items	df	t	n items	df	t
yes	yes	25	58	8.38***	12	27	7.29***
no	no	35			17		

Appendix C3

Table of means of boys' and girls' records of resource use and teacher help at upper junior level

RESOURCES		Upper junior children mean	s.d.	F
CHART	all	21.5	13.0	0.93
	boys	22.4	12.6	
	girls	20.7	13.3	
REFERENCE BOOK	all	13.0	11.3	0.07
	boys	12.8	10.6	
	girls	14.2	11.9	
APPARATUS	all	0.9	2.8	0.47
	boys	0.8	1.6	
	girls	1.0	3.7	
FRIEND	all	5.3	10.1	0.65
	boys	4.8	9.7	
	girls	5.9	10.6	
TEACHER HELP				
READ	all	0.2	0.8	0.37
	boys	0.2	0.6	
	girls	0.3	1.0	
HINT	all	0.6	1.4	0.17
	boys	0.7	1.6	
	girls	0.6	1.2	
EXPLAIN	all	0.6	1.4	0.01
	boys	0.6	1.3	
	girls	0.6	1.6	
OMIT	all	0.2	0.7	
	boys	(not computed)		
	girls	(not computed)		

N boys = 110
N girls = 109
missing = 4

Note: This analysis included seven J2 children who had used the upper junior version.

Appendix C3 continued

Table of means for boys' and girls' records of resource use and teacher help at lower junior level

		Lower junior children		
RESOURCES		mean	s.d.	F
CHART	all	19.4	15.1	1.15
	boys	18.3	15.6	
	girls	20.7	14.6	
REFERENCE BOOK	all	4.1	8.3	0.32
	boys	4 4	9.2	
	girls	3.7	7.1	
APPARATUS	all	0.5	1.7	1.57
	boys	0.7	2.2	
	girls	0.4	0.7	
FRIEND	all	6.6	10.5	0.86
	boys	5.9	10.3	
	girls	7.3	10.8	
TEACHER HELP				
READ	all	0.9	3.2	2.03
	boys	1.2	4.1	
	girls	0.5	1.6	
HINT	all	1.8	4.9	0.87
	boys	2.1	6.5	
	girls	1.4	2.0	
EXPLAIN	all	1.5	4.2	0.02
	boys	1.5	4.1	
	girls	1.5	4.3	
OMIT	all	0.2	0.6	0.01
	boys	0.2	0.7	
	girls	0.2	0.5	

N boys = 96
N girls = 84
missing = 22

Appendix C4

Factor analysis of help and resource records at upper junior level; varimax factor loadings

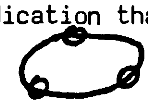
	I	II	III	communality
use of chart/picture/map	-	-54	51	57
use of reference book	36	-	64	58
use of apparatus	-	37	71	66
consulted friend	-	37	-	15
teacher help:				
read	62	-	-	40
hint	65	-	-	42
explanation	72	-	-	56
omit item	-	77	-	62
eigenvalue	1.53	1.29	1.14	
percentage of variance	19.2	16.1	14.2	
cumulative variance	19.2	35.2	49.4	

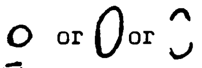
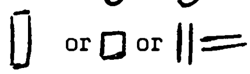
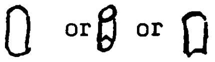
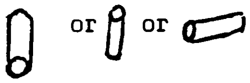
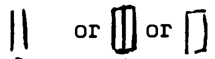
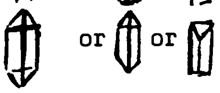
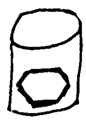
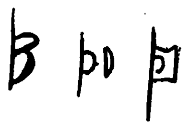
N = 223
loadings < 0.3 omitted

APPENDIX D The 'Draw a Prismon' listening task

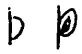
APPENDIX D1

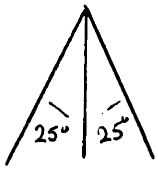
Detailed mark scheme for the 'Draw a Prismon' listening-drawing task

Item No	Score	Feature(s)	Rules (general: if in doubt, give it nowt)
LENGTH: GREEN ONLY			
1	1	prisbi 6 cms	i.e. head and body; no arms or legs
	1	prismon 12 cms or 18 cms	allow 11-13 and 17-19 cms for toes etc. (the page is 30 cms by 21 cms)
NUMBER OF LIMBS, FEATURES, ETC.			
2	1	3 eyes	three eyes: all visible or clearly indicated (one could be at back of head, but must be explicit)
3	1	3 ears	three ears: beware of mistaking a 'front ear' for a nose: ears at the back must be made explicit
4			
5	1	1 mouth	one mouth
6	1	3 nostrils/noses	look on top of head but score one point for three nostrils regardless of position
7	1	3 arms	three distinct arms
8	1	3 legs	three distinct legs
9	1	6 fingers on one hand	six definite protrusions from each hand must be easily discernible
	2	on two hands	
	3	on three hands	
10	1	6 toes on one foot	as fingers - must be clearly differentiated
	2	on two feet	
	3	on three feet	
11	1	other 3/6	any feature whether incorrect or extra, which retains the 3 or 6 theme, e.g. 3 teeth; 6 arms; 3 toes
POSITION			
12	1	nostrils	top of head 
13	1	eyes	top edge of head/
14	1	ears	evenly spaced around head
15	1	arms	attached to point(s) of triangle or edges of prism
16	1	legs	attached to point(s) of triangle or edges of prism
17	1	eyes movable	clear indication that eyes can move by arrow or if drawn  or 

Item No	Score	Feature(s)	Rules (general: if in doubt, give it nowt)
SHAPE - HEAD			cumulative score so the more 3D, the more points
18	1		circle, oval or CURVED lines as part of drawing
19	1		rectangle, square or PARALLEL LINES as part of drawing
20	1		combination of curves and lines in attemted 3D
21	1		successful 3D drawing or cylinder (so successful cylinder gets 4 points in all)
BODY			cumulative score so the more accurate 3D approaches to TRIANGULAR PRISM, the more points, max = 4
22	1		triangle or angle as part of drawing
23	1		parallel lines as part of drawing; rectangle
24	1		attempt at 3D drawing of triangular prism combining angles, triangles and 3 parallel lines (gets 3)
25	1		successful triangular prism (gets 4 in all)
26	1	mouth hexagonal	other six-sided shape acceptable, e.g.
27	1	mouth large or tiny	large must be over half width of face, tiny must be less than a quarter width of face. 
28	1	fingers	long, pointed,(conical) (ordinary fingers)
29	1	toes	pointed (ordinary toes)
30	0	earlids	loop ear as on human sketch inadequate
	1	- double line (not)	double loop ear may represent a 'lid' so give one: any ear with two lines or two parts gets this point.
31	1		any second, different shaped or different coloured part attached to the ear is counted as an earlid (gets 2).

32

Item No	Score	Feature(s)	Rules (general: if in doubt, give it nowt)
HUMANNESS			features which might be drawn the same way in a drawing of a human
FACIAL FEATURES			
33	1	eyes 	almond; oval shape
34	1	 or 	other human eye characteristic e.g. lashes, pupil, iris
35	1	nose  or  or 	(be sure it is not an ear) in middle of face
36	1	ears 	single loop or more humanoid shape
37	1	mouth	humanoid e.g. smile; ellipse; circular; teeth; lips
38	1	hair	be sure its not nostril stalks
39	1	neck	Prismons do not have necks
40	1	clothing	any indication of clothing e.g. tie, buttons, watch, earrings, etc.
LIMBS			
41	1	arms 	if single bend equivalent to elbow
42	1	hands 	hands and fingers no different than might appear on human
43	1	legs 	e.g. if knee shown;
44	1	feet 	foot and toes just as human feet
45	1		No humanoid characteristics at all
46			
CONTEXT			
47	1	texture	drawn on prismon to suggest e.g. green grass; dark night; soft and cuddly; hard metallic; dark, grainy, wood
48	1	colour/shading	
49	1	background	or other indication of context
50			
51			

Item No	Score	Feature(s)	Rules (general: if in doubt, give it nowt)
ELABORATION YELLOW			
SHAPE			
52	1	arms 	long and curly; if long but not curly must be VERY long: curly but not long scores one
53	1	legs 	stick out at angle or more than 25° to vertical
54			
ELABORATION - fingertips			
YELLOW ONLY			
55	xx		total elaborated fingertips count ALL including repeats
56	1	paintbrush	
57	1	screwdriver	
58	1	pencil	
59	yy		count others excluding repeats: draw in long margin
60	z	other elaboration e.g. battery	
61	1	Note	(write note in margin)
ELABORATION GREEN			
62	1	either nostril shutters	triangular and on top of head
		or nostril stalks	from top of head
63	1	ears	midline of head; evenly spaced (N.B. look in nose place)
64			
65	xx	fingertips	total elaborated including repeats
66	1	paintbrush(es)	
67	1	pencil	
68	1	screwdriver	
69	1	spanner	
70	1	knife	
71	1	fork	
72	1	spoon	

Item No	Score	Feature(s)	Rules (general: if in doubt, give it nowt)
73	yy	others	no repeats: draw in margin
74	z	other	elaboration e.g. battery
75		Notes	write in margin

YELLOW AND GREEN

76	A		if drawing very good or remarkable
77			
78			
79			

APPENDIX D2

Prismon drawings : intermarker comparison

subscale	out of*	Pearson correlation (23 drawings)
numbers	9	0.92
position	4	0.71
shape	13	0.85
elaboration	5	0.72
humanness	10	0.76
fingertips	3	0.92
f-tips devel	(36)	0.87
fluency	(36)	0.97

(*Subscale composition and totals are slightly different in the reported analyses, as the marking system was refined)

APPENDIX D3

Prismon drawings : final composition of marking subscales

ACCURACY SUBSCALES

Numbers (12) content	mark
3 eyes	1
3 ears	1
1 mouth	1
3 nostrils	1
3 arms	1
3 legs	1
6 fingers per hand	1, 2, 3 according to no. of hands
6 toes per foot	1, 2, 3 according to no. of feet

Position (4) content	mark
nostrils top of head	1
eyes top edge of head	1
arms at points or edges	1
legs at points or edges	1

Shape (6)

head 3D cylinder	1
body 3D prism	1
mouth hexagonal	1
fingers pointed if no tips	1
toes pointed if no tips	1
ears with earlids	1

Details (9)

texture shown	1
colour	1
other context indicator	1
point for each of	
extra 3/6 feature	1
eyes on track	1
ears spaced	1
clear mouth size	1
nostril stalks / curly arms	1
ears mdline / legs at <25}	1

Fingertips (given) (7 upper junior; * 3 lower junior)

paintbrush	1*
screwdriver	1*
pencil	1*
spanner	1
knife	1
fork	1
spoon	1

APPENDIX D4

Profiles of Prismon drawings in Figures 6.1 to 6.4

Figure 6.1: Examples of high scoring Prismons

ID	year	nos. (12)	shape (6)	positn (4)	detls (9)	f-tips (7)	total acc. (36)*	invent (36)*	human (12)
21304	3	12	6	4	5	6	33	5	2
27303	4	11	3	4	4	7	24	18	6
12107	1	12	5	4	6	4	31	11	0
75208	2	11	3	3	2	3	22	18	1

Figure 6.2: Examples of low scoring Prismons

ID	yr	nos. (12)	shape (6)	positn (4)	detls (9)	f-tips (7)	total acc. (36)*	invent (36)*	human (12)
34401	4	3	0	0	0	0	3	0	1
42319	4	4	0	1	0	0	5	0	5
71508	4	1	0	1	1	0	3	0	4
85308	4	4	1	0	0	0	4	0	3

Figure 6.3: Humanoid Prismon drawings

ID	year	nos. (12)	shape (6)	positn (4)	detls (9)	f-tips (7)	total acc. (36)*	invent (36)*	human (12)
15403	4	2	0	0	0	0	2	0	10
44310	3	5	0	0	1	0	6	0	9

APPENDIX D4 continued

Figures 6.4 and 6.5: Examples of attempts to draw three-dimensional solids

Key

HEAD		BODY	
H1	circle or curve	B1	triangle or acute angle
H2	parallel lines	B2	parallel lines
H3	circle/curve + parallel lines	B3	tri/angle + parallel lines
H4	'3D' cylinder	B4	'3D' triangular prism

ID/yr	H1	H2	H3	H4	Head	B1	B2	B3	B4	Body	'3D'
Figure 6.4											
52104/2	1	0	0	0	1	1	1	1	0	3	4
72209/1	1	1	1	1	4	1	0	0	0	1	5
76303/2	1	1	1	0	3	1	0	0	0	1	4
52109/1	1	1	1	0	3	0	1	0	0	1	4
Figure 6.5											
33204/1	1	0	0	0	1	0	1	0	0	1	2
33206/2	1	1	1	0	3	0	1	0	0	1	4
53102/2	1	1	1	0	3	1	1	1	0	3	6
75206/2	1	1	1	0	3	1	1	1	1	4	7

APPENDIX E The 'journey to school' cognitive mapping task

APPENDIX E1

Marking scheme for journey-to-school maps

Code Content

1,2,0 yeargroup (1 = J1, 2 = J2; 0 = top infant)
1,2 sex (1=boy,2=girl)
blank
0 - 6 xa : 0=omitted a = 1 walk
b = 2 car c = 3 bus
d = 4 bike e = 5 taxi
f = 6 other
0 - 3 xb : 0=not used; 1=ticked; 2=ticked and drawn;
3=drawn but not ticked
church
petrol station
shop
fields
hill or mountain
water - lake, river
tree
large building
'something you find interesting' - if this is named and
in the preceding list e.g. tree, church, mark
appropriate column (e.g. 20 or 14, with 1 or 2)
0 - 7 xc 0 omitted a = 1 terrace 0 - 7
b = 2 detached c = 3 cottage
d = 4 flat e = 5 bungalow;
f = 6 farm; g = 7 semi=detached
(if 2 letters circled, take first)

picture - no attempt at plan e.g. picture of car, self, house 1
(if a pure picture has been drawn, code zero for map grades and
stages etc.)
Beck and Wood (1976) Picture-Plan coding (as used by Matthews
1984)
Grade I elements shown pictorially (lying down): no rotation
1 Ia pictorial
2 Ib pictorial-verbal
GradeII some rotation; some symbolisation i.e. 'selection of
line, point or area signs to portray spatial phenomena'
e.g. roads in plan form;
some evidence of scaling - 'reflected in the selectivity of
mapped data' (Matthews)
3 IIa pictorial-plan
4 IIb pictorial-plan-verbal

Code Content

Grade III : complete orthogonal transformation of space ; involve both 'representation and externalisation; child holds mental image of what is to be drawn and consciously carries out processes of scaling, rotation, symbolisation, generalisation so that a map 'is finally externalised'

5 IIIa plan
6 IIIb plan-verbal

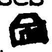
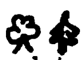
any use of symbols e.g. for tree, church, to show gardens cf. Prismaston plan
key
scale
route marked clearly by arrows, dots, coloured line etc. (single road home/school maps not counted)
home labelled
school labelled
transport shown - drawing includes car, bus, bike
self shown

line, point, area codes adapted from Matthews (1984)

LINE i.e. road or paths shown
0 no roads
1 line
2 line-focal
3 line-branch
4 line-loop
5 line-net

POINT i.e. landmarks such as houses, trees, school, church
0 no landmarks shown
1 1 to 5 landmarks
2 6 or more

AREA i.e. clear indications of areas given to same land use e.g. fields, woods, shops; may be shaded, bounded, labelled to distinguish area fronm other parts
0 no areas shown
1 segmental areas (adjoining each other; may cover space) 
2 stellar areas (separated from each other; may be only one such area) 

4,5,6 houses any view involving a vertical or elevated perpective
4 =  ; 5 =  ; 6 =  (symbol)
1,2,3 houses any 'street' view - horizontal projection or image
1 =  ; 2 =  ; 3 =  ;
(put codes in both columns if necessary)
0,1,2 trees
0 = no trees; 1 =  ; 2 =  plan view)
(may include other objects if significant e.g. sign posts, market cross, bollards

Map coding continued

0,1	use of space 1 = map uses the full space available
0,1	special feature - note at end of line
blank	
	Catling's Classification (Catling 1978)
0	not coded (pure picture or too ambiguous)
1	TOPOLOGICAL; link picture map; places connected to home; no scale, distance, orientation shown
2	PROJECTIVE 1; picture map; partial coordination and connection of known places; direction more accurate; road in plan form but buildings iconic
3	PROJECTIVE 2; quasi-map; more detailed; better coordination, distance, scaling, orientation, perpective
4	EUCLIDEAN; true map; plan form; accurate scale, distances orientation.

APPENDIX E2

Full distribution of map grades across year-groups

(a) GRADES OF CARTOGRAPHIC COMPETENCE

	Map grade	7 - 8	8.5	9	9.5 - 10	
I	pictorial	4	16	11	0	31
	pictorial-verbal	1	11	7	0	19
II	pictorial-plan	0	14	23	0	37
	pictorial-plan-verbal	1	17	36	1	55
III	plan	0	4	6	0	10
	plan-verbal	0	9	18	0	27
	totals	6	71	101	1	179*

* 25 pictures or 'can't code' total sample = 204

* * * * *

(b) CATLING STAGES OF COGNITIVE MAP REPRESENTATION

	Map stage	top infant 6-7	jun 1 7-8	jun 2 8-9	jun 3 9-10	
1	Topological link-picture map	3	20	11	0	34
2	Projective 1 picture map	3	25	43	2	73
3	Projective 2 quasi-map	0	15	27	0	42
4	Euclidean true map	0	6	20	0	26
	totals	6	66	101	2	175*

* 29 pictures or 'can't code' total sample = 204

APPENDIX E3

Frequency tables; sample composition and responses to items xa to xc

Variable	code	class		absolute frequency	percentage frequency
Yeargroup	0	top infant		7	3.4
	1	junior 1	J1	81	39.7
	2	junior 2	J2	114	55.9
	3	junior 3	J3	2	1.0
				204	100.0
Gender	1	boys		102	50.0
	2	girls		102	50.0
				204	100.0
Item xa transport	0	no response		9	4.4
	1	walk		96	47.1
	2	car		55	27.0
	3	bus		30	14.7
	4	bike		6	2.9
	5	taxi		8	3.9
	6	other		0	0.0
				204	100.0

Item xb Features 'passed on the way' to school:
for each row, n = 204

code		passed 1 % freq	passed&drawn 2 % freq	drawn only 3 % freq	no response 0 % freq
a	church	17.2	6.4	2.5	74.0
b	petrol stn	6.9	2.0	2.5	88.7
c	shop	16.7	10.3	3.9	69.1
d	fields	27.9	12.3	5.9	53.9
e	hill	4.4	1.0	1.5	93.1
f	water	6.9	4.4	2.5	86.3
g	tree	26.5	19.6	6.4	47.5
h	lge bldg	6.9	5.4	1.5	86.3
i	interestg	17.2	5.9	0.0*	77.0

* Many children responded 'yes' to the question, 'Do you pass something you think is interesting?', but it was not possible to identify which feature unless it was named.

Item xc own house	code	class	absolute frequency	percentage frequency
	0	no response	26	12.7
	1	terrace	29	14.2
	2	detached	45	22.1
	3	cottage	21	10.3
	4	flat	3	1.5
	5	bungalow	14	6.9
	6	farm	18	8.8
	7	semi-detached	48	23.5
			204	100.0

APPENDIX E4

Gender differences in cartographic competency in junior year groups 1 and 2

Yeargroup = 1 (7 - 8 year olds)

		Grade I	Grade II	Grade III	Total
boys	observed freq.	11	10	8	29
	expected freq.	11.0	12.7	5.3	
girls	observed freq.	16	21	5	42
	expected freq.	16.0	18.3	7.7	
total		27	31	13	71

chi-square = 3.25 df = 2 p > .05

Year group = 2 (8 - 9 year olds)

		Grade I	Grade II	Grade III	Total
boys	observed freq.	7	36	13	56
	expected freq.	10.0	32.7	13.3	
girls	observed freq.	11	23	11	45
	expected freq.	8.0	26.3	10.7	
total		18	59	74	101

chi-square = 2.75 df = 2 p > .05

APPENDIX F

Table 1 Product-moment correlations between Prismaston factors and records of resource use

Upper junior level (n = 53)

	pic/map	ref book	apparatus	friend	teacher
I charts	37**	37**	17	-05	-12
II comprehension (story)	42**	34*	32*	-15	-18
III map-math	40**	35**	-09	-04	-24
IV adv. comp (statements)	38**	19	18	-07	-20

Lower junior level (n = 33)

I (charts)	37*	37*	25	28	-36*
II (pictures)	44**	30	45**	32	-25
III (map)	31	53***	31	35*	-20
IV (timeline)	20	21	21	32	-41*

* .01 < p < .05; ** .001 < p < .01 ; *** p < .001

Table 2 Correlations between Prismon scores and study skills achievement measures (upper junior level)

1 Prismon intercorrelations (n = 53)

	Listening -accuracy	3-D shapes head	body	Elaboration -fingertips
Listening-accur	-	29*	62***	36**
Head/ cylinder	-	-	13	04
Body/ tri-prism	-	-	-	31*

2 Prismaston factors and Prismon scores (n = 53)

I charts/coordinates	21	29*	23	14
II comprehension	40**	40**	27*	05
III map-mathematics	12	24	-07	-03
IV adv. compreh	22	28*	17	-08

3 Richmond tests and Prismon scores (n = 49)

WS-1 mapreading test	37**	-04	13	13
WS-2 graphs	63***	04	33*	13
WS-3 use of references	19	03	13	04

* .01 < p < .05 ; ** .001 < p < .01 ; *** p < .001

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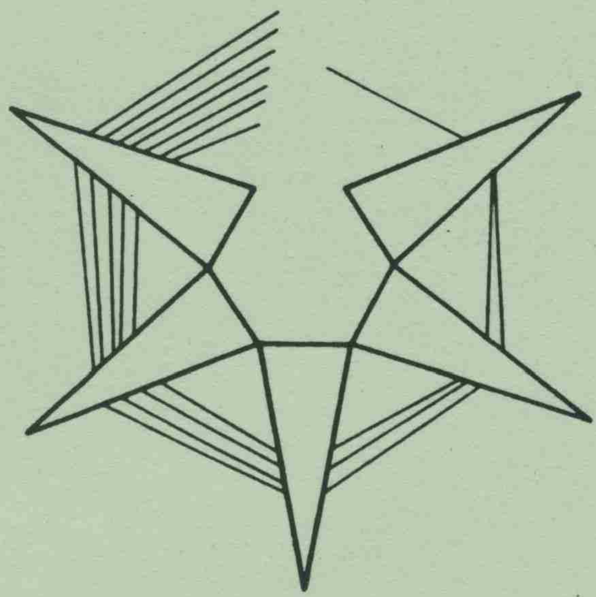
THE PRISMASTON FILE



Materials for

the assessment of study skills

at primary level

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Supplementary Volume submitted in conjunction with the thesis:

<u>Study skills in project-based assessment at primary level</u>

Linda M. Hargreaves

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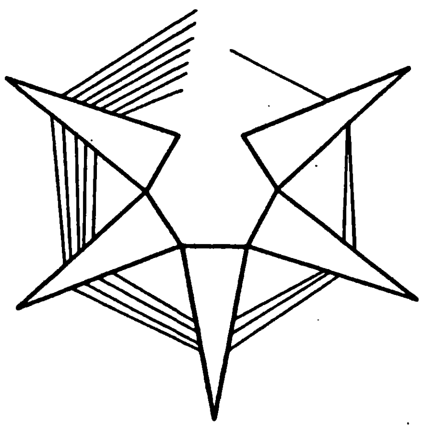

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THE PRISMASTON FILE

Materials for the assessment of study skills devised for the Curriculum Provision in Small Primary Schools Project (PRISMS)

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The Prismaston File Datacheck 1

(lower junior question book)

The Prismaston Data Collection 1 : Agent's Code-book

(lower junior answer book)

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The Prismaston File Datacheck 2

(upper junior question book)

The Prismaston Data Collection 2 : Agent's Code-book

(upper junior answer book)

Description of a Prismon

(1st. and 2nd. year version of the listening task)

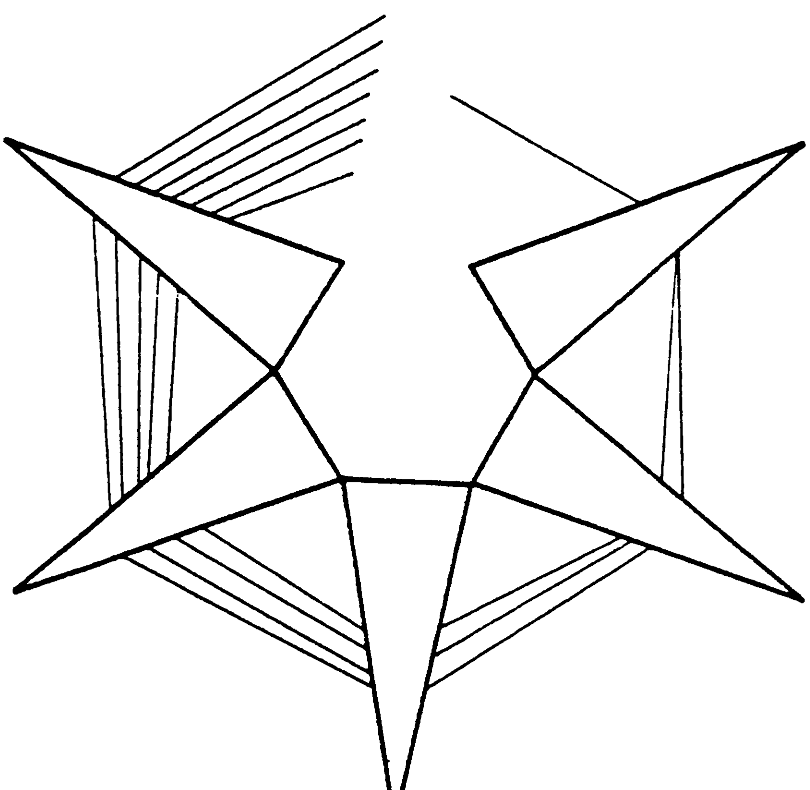
Description of a Prismon

(3rd. and 4th. year version of the listening task)

Teachers Notes

THE PRISMASTON FILE

datacheck 1



*These materials have been prepared by Linda M. Hargreaves,
for use in the schools participating in The PRISMS project,
(Provision in Small Schools) at*

*The School of Education,
University of Leicester.*

The project is funded by the Department of Education and Science.

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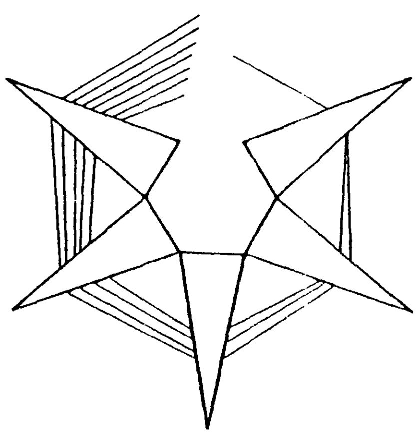
Hello!

This book is about four children who live in a small place code-named Prismaston. They are about the same age as you and their names are Nicola, Paul, Mark and Sarah.

It is from the friendly world of PRISMOS, where we are making a book about worlds close to PRISMOS.

We have had four secret agents called Anen, Bakk, Ckek and Dxox, but known as A, B, C and D, working in Prismaston, watching the four children.

A, B, C and D have told us a great deal about the children but we need checks on some of their information. A, B, C and D each have a different theory about some of the facts.



YOUR assignment is to decide who is right,
Anen, Bakk, Ckek or Dxox,
by checking the evidence in this file, code-named

THE PRISMASTON FILE

Become a secret agent!

Use your powers of detection!

Now look at the front of the booklet called

PRISMASTON DATA COLLECTION
AGENT'S CODE-BOOK

1 Write your full name after 'Agent's name:'
2 Write the name of your school after 'Agent's school:'
3 Write your class number and junior year group after 'Agent's class:'
4 To become a Prismoan Agent you need your own PRISMOAN NAME.
Use the Prismoan alphabet to make up your own Prismoan name.
This is the Prismoan alphabet:
A B C D E G I K L M N O P Q R S T V X
Our alphabet is not qite the same as yors. We are very sorry if we have made suome spelling mistackes.

YOUR PRISMOAN NAME MUST HAVE FOUR LETTERS. USE ONE LETTER TWICE.

Write it on the front of your Agent's Code-book, in the boxes after 'Prismoan name:'.

5 Finally, all Prismoan agents have a SECRET CODE.
Look at the boxes at the bottom of the Code-book.

i) Your teacher will tell you what to put in the first five boxes.
ii) The next four boxes are for the year and month you were born. On Prismos, we write the year first and the month second. So, someone born in March, 1976 would write 19 $\boxed{7}\boxed{6}\boxed{0}\boxed{3}$
year month
iii) Now write your PRISMOAN NAME in the next four boxes.
iv) Write your junior year group (1,2,3 or 4) in the last box.

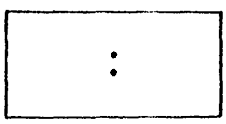
NOW YOU ARE A REGISTERED PRISMOAN AGENT.
We know you can help us!

HOW TO USE YOUR AGENT'S CODE-BOOK

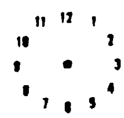
Now you can learn to use our secret codes.
Open your code-book and look at page 1. You will see that almost everything in this book is in code. We try to avoid using words as much as possible.

TIME-BOXES

Below the word 'Examples', there is a Time-box like this:



or



Good agents always record the time when they begin and end a datacheck.
There are two ways to do it:

1 Copy the time from a digital watch.

OR 2 Copy the positions of the hands from a clock or watch.

Fill in the time now. Your teacher will check that you have done it properly.
There is a time-box at the beginning and end of every section of checks.
Some long sections have time-boxes part of the way through them. If you have to stop work in the middle of a section, record the time when you stop and again when you re-start datachecking. Ignore the extra clocks if you do not have to stop work.

DATACHECK CODE

The first datacheck is **ea**. Point to ea in both this book and in your Agent's Code-book.
When you have found both ea's, read datacheck ea in this book.
Example

ea What age are Paul, Mark, Nicola and Sarah? (Hint: look at the top of page 1 in this book.)

A: 7-8 years old	B: 8-9 years old
C: 9-10 years old	D: 10-11 years old

Do you remember that your assignment is to decide WHO is right....
Anen, Bakk, Ckek or Dxox?
Can you remember what A, B, C and D stand for?
So, how old does Bakk think the children are?
Now, how old do YOU think the children are? (Use the hint.)
Remember, YOU may ALL have different theories, just like Anen, Bakk, Ckek and Dxox. Decide which ONE you agree with MOST.

NOW LOOK AT YOUR CODE-BOOK AGAIN.

Find ea again and then circle the code-letter for the agent you think is right. IF you think A is right, circle A in your CODE-BOOK. (Other agents may think B, C, or D was right. You decide what YOU think.)

Now try another example, **eb**, which will teach you about CLUE-CODES and the MAP of Prismaston. find example eb in this file and in your CODE-BOOK.

Example

eb	How many shops are there on Church Street in Prismaston?			
?	A : 4	B : 5	C : 6	D : 0
map				

?

Sharp-eyed agents will have noticed the signs map below eb.
? means CLUE : the letters underneath tell you where to look for the clue; 'map' means look on the map of Prismaston which you will find in the centre of this book. Anen and Dxox made the map from an observo-copter hovering silently above Prismaston. Look at the map now . Find Church Street and carefully count the shops. Decide which agent you agree with most.

Now find eb in your code-book and circle the agent YOU think is right.

CLUE-CODES

You could only check the data for eb by looking on the map or PLAN of Prismaston so please would you now circle the letter 'p' in the string of letters after A, B, C and D in your code-book.
That string of letters is the list of CLUE-CODES. They are:

p * a f Tr Th Tx Tm

Good agents collect clues from many different sources like plans, pictures, books and people. BUT they ALWAYS record WHERE they collected the extra clues. The clue-code letters are to help you do this. Simply circle the letter or letters which say where you got your clues. Some datachecks will not need any extra clues; some will need one extra and some may need two or more sources of extra clues! You must circle a clue-code for each source of information that you use. Here is a detailed list of what the clue-codes stand for:

CLUE-CODE	SOURCE OF INFORMATION
p	PLANS; pictures; maps; drawings; charts; graphs; etc.
*	PRISMMEM; this is a special book; more details soon.
a	APPARATUS; rulers; tape measures; string; etc.
f	FRIEND; good agents usually keep their ideas secret but sometimes they **have** to discuss a problem with ONE friend.
T-CODE	TEACHER; The T-codes are to show that you are forced to seek adult advice. Remember, though, that we are interested in CHILDREN'S ideas and NOT teacher's ideas! Your teacher will either tell you which T-code to circle or do it for you.
Tr	READ; read the data again; teacher helps you to read it.
Th	HINT; your teacher gives a hint, e.g.where to find a clue
Tx	EXPLAIN; your teacher explains some data in detail.
Tm	MISS OUT; your teacher suggests you miss out the datacheck. (After all, you can't expect teachers to know EVERYTHING!)

Before you start checking the data, there is one more thing to learn. Don't worry, Agents' Training Courses are very hard work but you have nearly finished. You'll soon be using the codes without thinking!

THE PRISMMEM

THE PRISMMEM is a book made by Anen, Bakk, Ckek and Dxox. It contains information that they found useful, interesting or puzzling. It might be useful to you. We have sent enough copies for you to share about one between four. They should be kept on a shelf with other reference books so that everyone will know where they are. (Perhaps one class agent could check that they are all in the right place each day.) Your teacher will decide where the Prismmems should be kept. Have a look through one now. Your teacher could show one to all of you.

The contents of the PRISMMEM include:

Contents	The contents will tell you the page number of a topic.
Index	The index is in alphabetical order on the last page. It will tell you the page number of each small topic.
Plan signs	This page tells you about the signs on the map; about how to use an earth compass and about earth area.
Castles	These pages have some information about castles. Anen and the others were fascinated by these unfriendly buildings.
Prismaston Time-line	The time-line is a sort of ruler of time. The markings on it mean years. This time-line is divided into years and decades.(you can look 'decades' up in the dictionary......)
Dictionary	Anen, Bakk, Ckek and Dxox found some English words rather difficult so they wrote them down in alphabetical order with their meanings to make a dictionary.

NOW, after all that, can you remember which CLUE-CODE to circle if you DO use the Prismmem?

SUPPOSE you use the TIME-LINE in the PRISMMEM, which TWO code letters will you circle?

Hint: The time-line is really a chart and it is in the Prismmem..... so you must circle p AND *.

Your intensive training as a secret agent is over. Now you can try some datachecking for yourself! Your target finishing date is two weeks from today. We know you won't let us down. GOOD LUCK!

Alphabets

First of all, please would you help A,B,C and D with some information about your alphabet? It took them a long time to learn it and they are still not sure.
You probably know the English alphabet off by heart, but use a dictionary or the Prismmem if you cannot remember it. (From here on, hints will be in code like this : ? or ?.)
map *

aa How many more letters are there in your alphabet than
? in the Prismoan alphabet?
* A : 6 B : 4 C : 1 D : 7
ab Which of these groups of letters is in the English AND
? the Prismoan alphabets?
* A : efg B : tuv C : qrs D : vwx

Did you remember to circle the clue-codes and T-codes if you used any extra clues?
Don't forget to fill in the time-box.

Houses

Look closely at the plan of Prismaston in the centre of this file. We have put the names of the roads and some buildings on it. A, B, C and D tried to find out where Paul, Nicola, Sarah and Mark live. Please would you check these addresses for us?
We know that :

Nicola's house is 5, Westgate;
Sarah lives at 2, Westgate;
Mark's address is 13, Westgate.

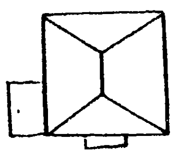
We know that Paul lives nextdoor to Sarah but not his address.

hx What is Paul's address?
? A : 3, Westgate B : 1, Westgate
map C : 5, Westgate D : 4, Westgate
(You may make small pencil marks on the map if this helps you to remember where the children live.)

There are some pictures of the children's houses in this file. Can you find them?

Anen, Bakk, Ckek and Dxox drew these pictures of the children's houses. We need to match them to their sky-views (that is, how they look from the sky). Can you help us?

hv Which house does this sky-view belong to?
? A : Nicola's house
map B : Mark's house
C : Sarah's house
D : Paul's house



ht What kind of house does Paul live in?
? A : terraced B : bungalow
picture C : detached D : semi-detached

hs Nicola lives in a row of terraced houses. Which house
? is Nicola's house?
picture A : house e B : house b
C : house c D : house a

hr If you walked along Westgate, starting at Castle Hill
? Clock, in which order would you pass the children's
map houses?
A : Mark's -Sarah's - Paul's - Nicola's
B : Nicola's - Sarah's - Paul's - Mark's
C : Nicola's - Paul's - Sarah's - Mark's
D : Paul's - Mark's - Nicola's -Sarah's

Architecture

Look in the Prismmem to see what we mean by architecture if you are not sure. Bakk is a builder and he is very interested in the way your houses look. They are not at all like ours. Our houses are made of three- and six-sided shapes. (You call them triangles and hexagons we think.)

gx Look at the pictures of the children's houses again.
? Whose house has a triangular roof when seen from the
picture front?
A : Nicola's B : Mark's
C : Sarah's D : Paul's

gv One of the houses seems to have had a new window
? put in. Which one is it?
picture

A : 2, Westgate	B : 3, Westgate
C : 5, Westgate	D : 13, Westgate

gt Look carefully at Mark's house. It has no ....
? A : door B : windows C : garage D : chimneys
picture

Over twenty years ago, most houses were heated by coal or wood fires. They were built with chimneys to let the smoke out.
Nowadays many houses do not have open fires and so they do not need chimneys.

gs What can we be **sure** about when we look at Mark's house?

A : It has electric heating.
B : It has gas heating.
C : It is not heated by coal fires.
D : It has no heating.

The Town

Look carefully at the plan of Prismaston.

mx There is no .... on the plan.
?
map A : church B : school C : library D : play park

mv In the play park, there is no ....
?
map/*

A : see-saw	B : slide
C : climbing frame	D : roundabout

mt In which order would you pass these things if you
? walked along Castle Path towards School Lane?
map

A : bridge - clock - gardens -roundabout
B : gardens - clock - roundabout - bridge
C : roundabout - gardens - bridge - clock
D : clock - bridge - gardens -roundabout

ms In which order would you pass these things, if you
? were on the bus going from Moat Road to School Lane?
map
A : shops - stream - swings - church
B : church - stream -swings - shops
C : church - swings - stream - shops
D : swings -shops - church - stream

The Past

Nicola's house was built in 1883.

pa We know when it was built because...............
?
A : it has a date-stone which says 1883.
picture B : it is very old
time- C : it is made of brick.
line D : it is a terraced house.

Nicola's house has stood for more than one hundred years.

pb One hundred years is called a ....
? A : decade B : centurion
* C : millenium D : century

pc If Nicola's house is about one hundred years old, it must be ....
A : about your mother's age
B : about your age
C : older than your great grandmother is, or would be
D : about your grandmother's age

Remember your clue-codes, T-codes and time-boxes!

Nicola's house has no room for a car or a garage.

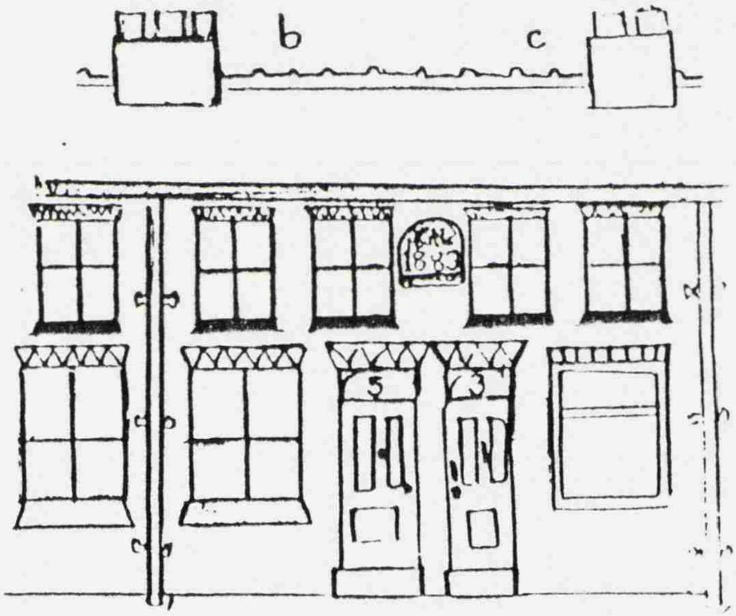
pd Why do you think most people did not have a car in
? those days?
* A : because cars were only just being invented then.
time- B : because they did not have garages.
line C : because they did not go out at all.
D : because it was always fine enough to walk.

pe When do you think Sarah's house was built?
? A : earlier than Nicola's
* B : at the same time as Nicola's
time- C : later than Nicola's, when more people owned cars
line D : last year

These houses are all on Westgate.

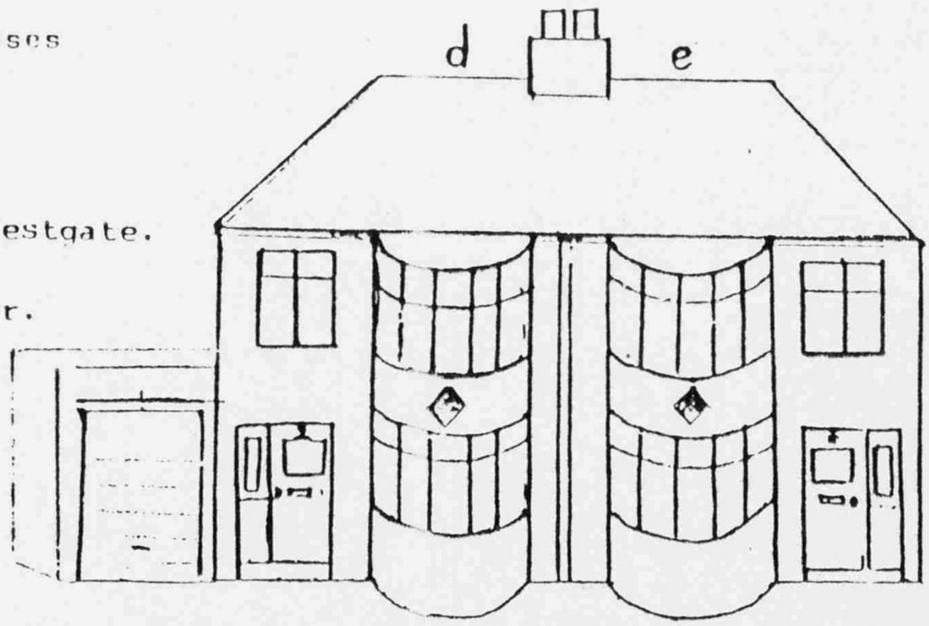
This is Mark's house.

a detached house



Nicola lives at number 5.

terraced houses

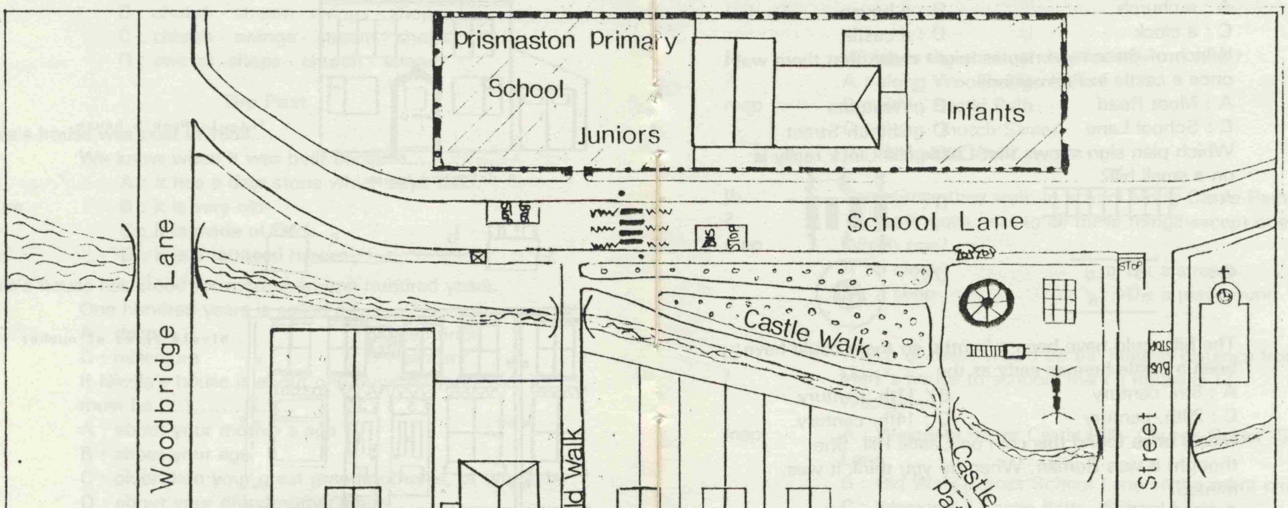


Sarah lives at 2 Westgate.

Paul lives nextdoor.

semi-detached houses

Prismaston

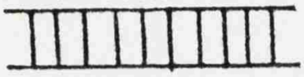
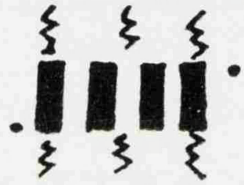


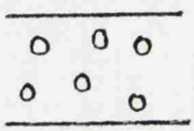
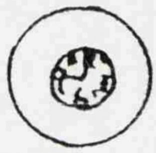
Prismaston Primary
School
Juniors
Infants
School Lane
Castle Walk
Castle path
Woodbridge Lane
Old Walk
to Lowton
Westgate
Church Street
butcher
baker
chemist
Super market
green grocer
Castle Hill Clock
Moat Road
BUS STOP

Look at the plan of Prismaston again.
Find Castle Hill Clock.

pg What do you think there might have been on the hill a
? long time ago?
* A : a church B : a house
C : a clock D : a castle

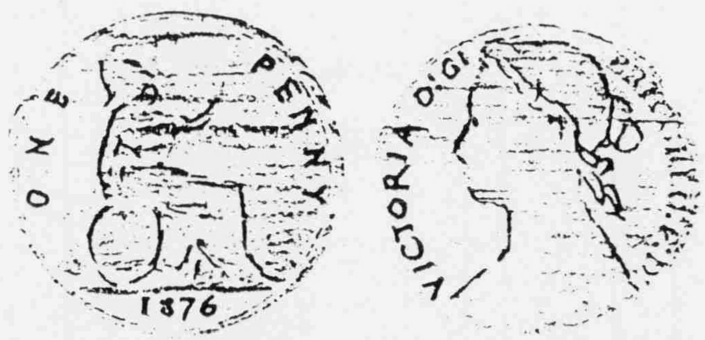
pi Which of these road names might mean that there was
? once a castle in Prismaston?
* A : Moat Road B : Westgate
C : School Lane D : Church Street

pk Which plan sign shows that Castle Hill Clock really is
? on a small hill?
* A :  B : 

C :  D : 

pl The hill could have been a 'motte',so there could have
? been a castle here as early as the ....
* A : 5th. century B : 11th. century
C : 20th. century D : 14th. century

pm Nicola once found this coin on Castle Hill. She
? thought it was Roman. When do you think it was
minted?
* A : in Roman times B : in Victorian times
C : in Norman times D : last week



pn What kind of coin is it?
? A : bunpenny B : veiled head penny
* C : newpenny D : farthing

Journeys

Paul, Sarah, Mark and Nicola walk to school on dry days. Look at the plan of Prismaston to find the way they get to Prismaston Primary School.

ja	Which is the shortest way for them to walk?
?	A : along Woodbridge Lane
map	B : along Castle Path
	C : along Church Street
	D : along Old Walk

jb	Sometimes they walk to school along Castle Path	
?	The path goes near to all these things except one.	
map	Which one?	
	A : a clock	B : a stream
	C : a shop	D : a playground

jc	Which of these would be the longest distance from
?	Mark's house to school? Mark's house is 13, Westgate.
map	A : Westgate - over Castle Hill - Church Street -School Lane
	B : Old Walk - cross School Lane at the zebra crossing
	C : Westgate - Castle Path - School Lane
	D : Westgate - Woodbridge Lane - School Lane

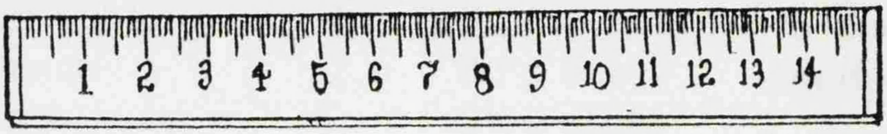
(If you used anything to help you measure the distances, remember to circle a in the clue-codes, and p for plan, of course.)

jd	Which is the shortest way for Nicola to walk from her
?	house to the church?
map	A : Westgate - Castle Path - School Lane
	B : Westgate -round Castle Hill - Church Street
	C : Westgate - over Castle Hill -Church Street
	D : Westgate - Moat Road - Church Street

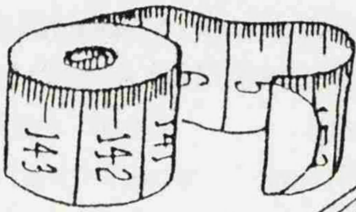
REMEMBER to circle the right clue-codes and to fill in the time-boxes.

Anen, Bakk, Ckek and Dxox were interested in the different things you use to measure lengths and distances. They drew some of the things you use. Here are their drawings.

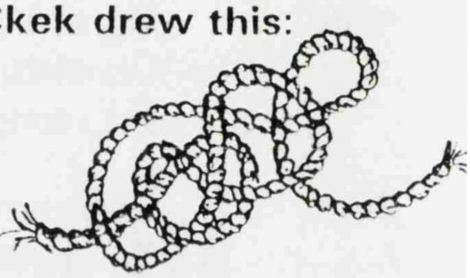
Anen drew this:



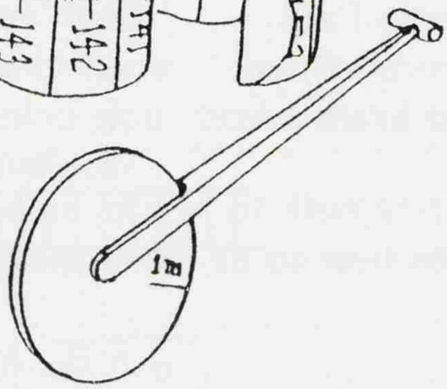
Bakk drew this:



Ckek drew this:



Dxox drew this:



je Which agent drew the right thing to measure the ACTUAL length of Old Walk?

A B C D

jf Which agent drew the thing you would use to measure Old Walk ON THE MAP?

A B C D

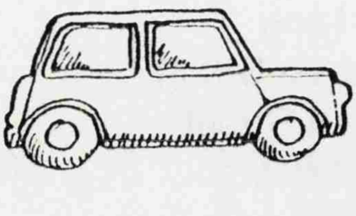
jg Which agent measured Old Walk correctly ON THE MAP

? map

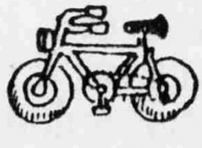
A : 6cm. B : 8cm. C : 4cm. D : 10cm.

Travel on land

Here is a group of ways to travel on land.

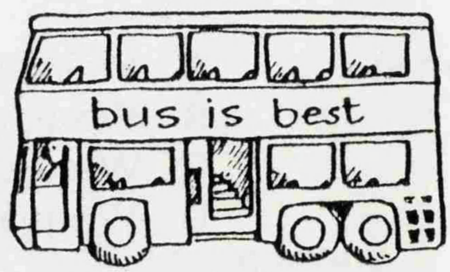


by car



by bicycle

on foot



by bus

Anen, Bakk Ckek and Dxox watched some children at Prismaston Primary School. They were working out how to split these ways of travelling into ways they are the same or ways they are different. BUT they forgot to write down what the children said!

Can you work out which agents thought of the right answers?

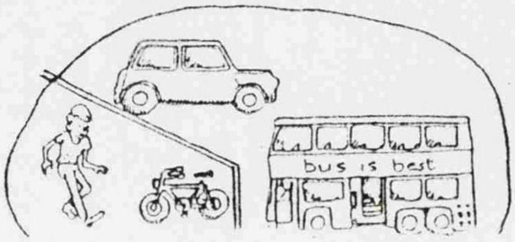
sa This split means:

A : wheels / no wheels

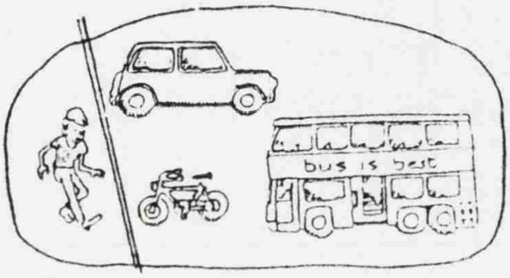
B : engine / no engine

C : stairs / no stairs

D : pedals / no pedals



sb



A : wheels / no wheels

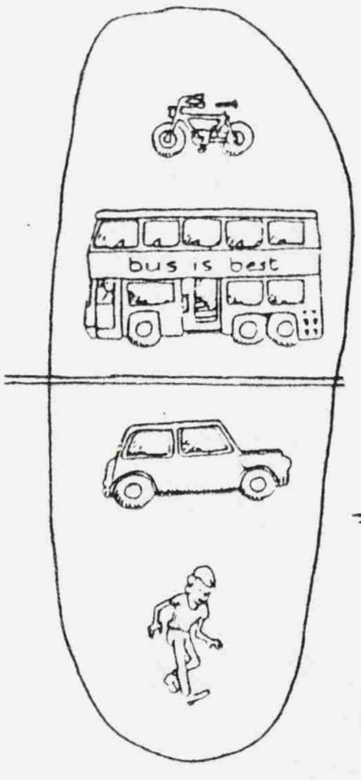
B : engine / no engine

C : stairs / no stairs

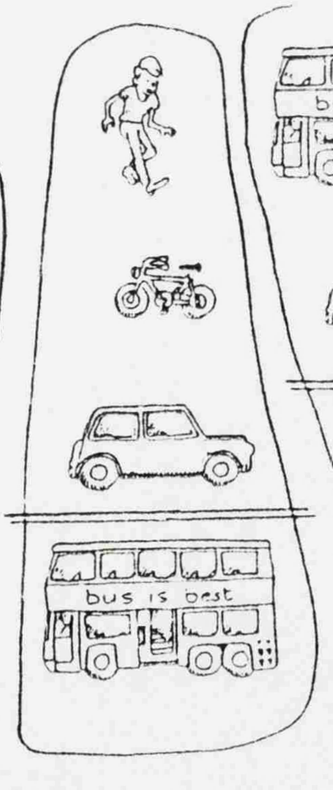
D : have bells / do not have bells

sc Which group is split: made of metal / not made of metal?

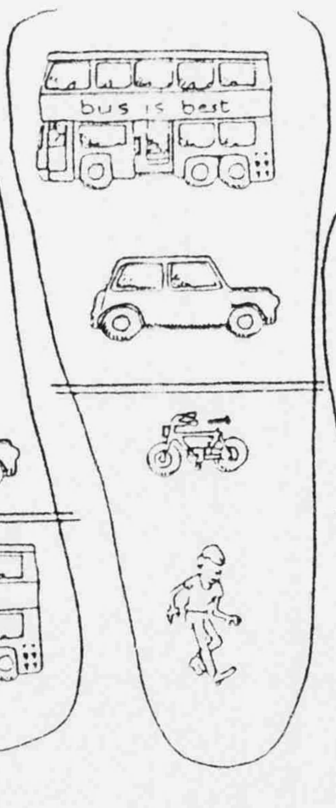
A :



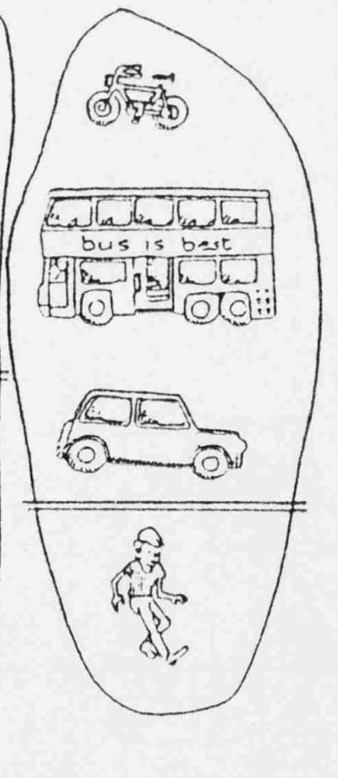
B :

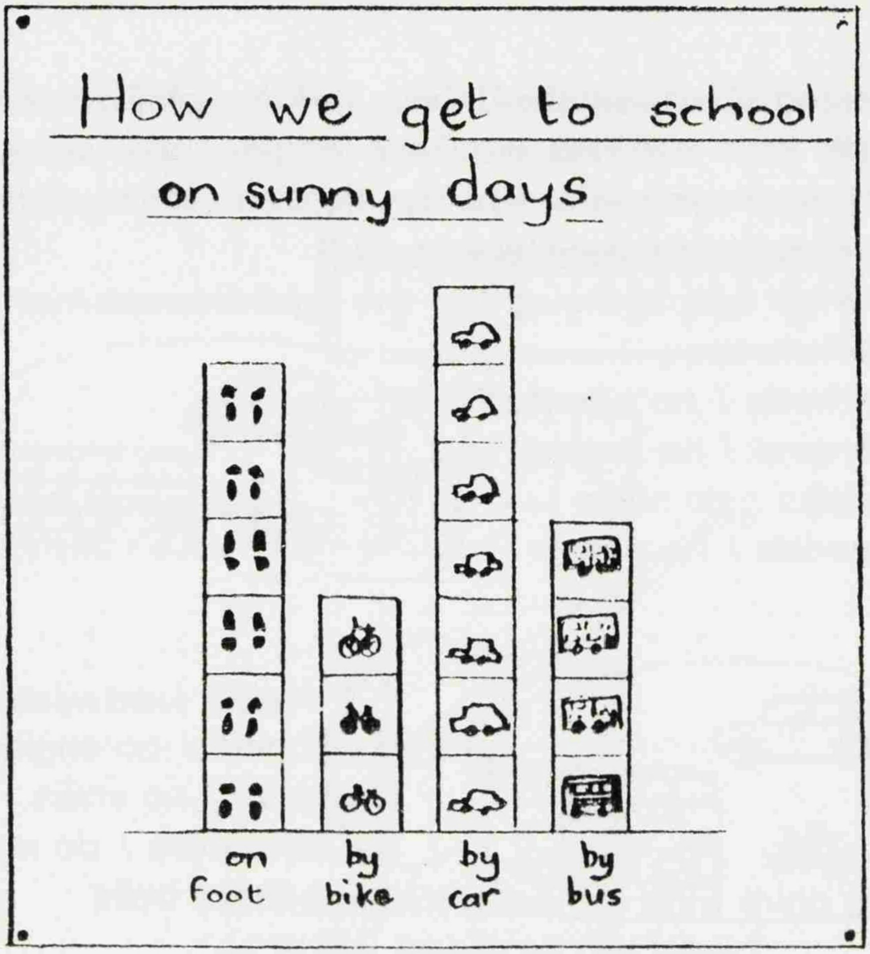


C :



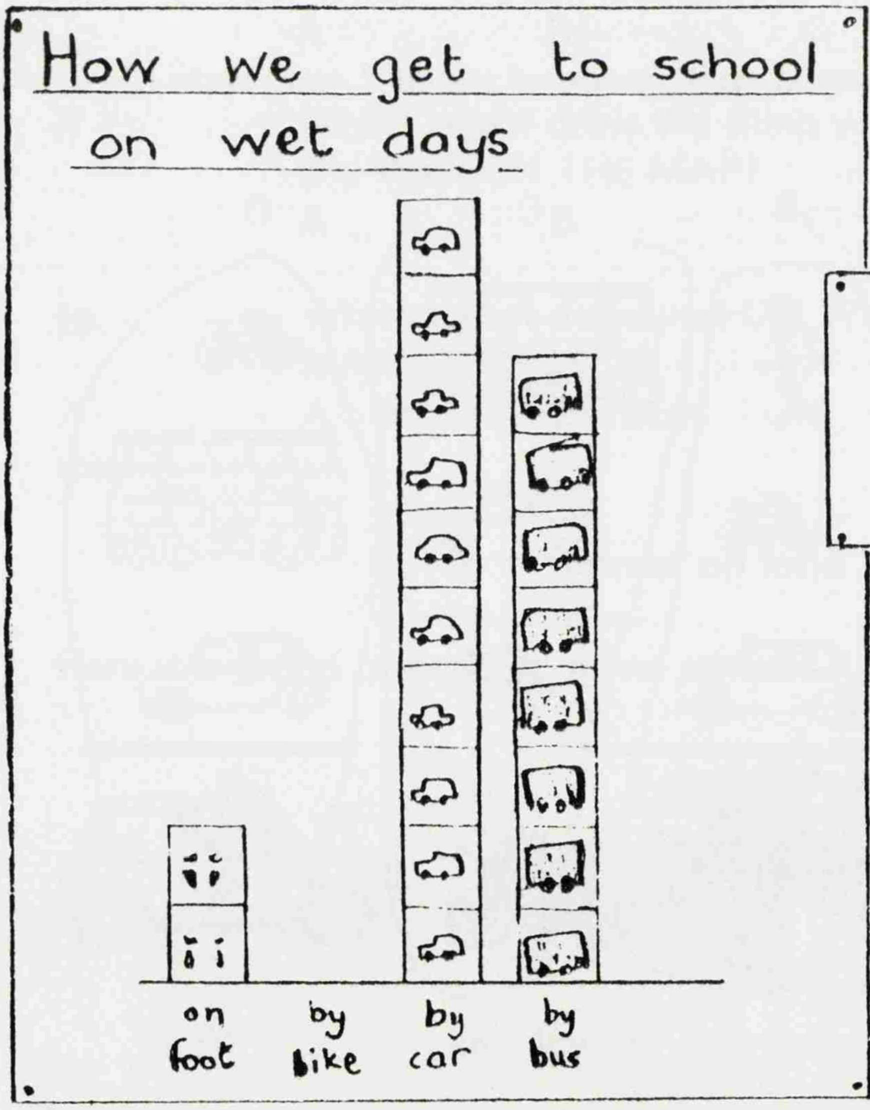
D :





Transport Survey

	6	2
	3	0
	7	10
	4	8
total	20	20



Have you all stuck your squares on this chart?

Transport

We would like to know more about transport in Prismaston.

ta What does the word 'transport' mean?

? A : games like football, tennis, cricket...

* B : a place where boats are kept

dictionary C : a big lorry

D : the way people travel about from place to place; by bus, car, ship, aeroplane ....

Nicola, Paul, Sarah and Mark are all in the same class at Prismaston Primary School. A, B, C and D went to the school one day to see what happens inside. There were some charts on the wall about how the children travel to school. A, B, C and D copied the charts but they could not understand them. Can YOU explain them for us? We have put a copy of them in this book. Find them now. The first one is called:

'HOW WE GET TO SCHOOL ON SUNNY DAYS'

tb Can you tell how many children come by car?

? A : 6 B : 7 C : 3 D : 20

chart

tc Only three children came ......

? A : by bike B : on foot C : by car D : by bus

chart

td How many children came altogether?

? A : 18 B : 7 C : 24 D : 20

chart

NOW LOOK AT THE CHART CALLED 'HOW WE GET TO SCHOOL ON WET DAYS'

te How many children come by bike when it is wet?

? A : 2 B : 8 C : 8 D : 0

chart

tf How many more children come by ~~bike~~ bus when it is wet?

? A : 4 B : **3** C : **5** D : 20

chart

tg Which idea CANNOT be checked by looking at the chart?

? A : on fine days more children walk than on wet days

chart B : on wet days nobody rides a bike to school

C : on wet days more children come by car than on fine days

D : the bus is full on wet days

'It's quicker by bus'

One day Mark brought a picture to school. His Mum is a bus driver and she got the picture at the bus station. Here is the picture:

Sarah said, 'Is it really quicker by bus?'
'Quicker than what?' asked Nicola.
'Quicker than walking, of course,' said Paul, 'But I think bikes are best'.
'Look at the picture! It means buses get there quicker than cars,' explained Mark, sounding a bit cross.
'I know,' said Mrs. Tryit, their teacher, 'instead of arguing about it, why not find out for yourselves?'
'HOW?' said all four children at once.
'Try it!' replied Mrs, Tryit and she left them to think about it.

\- - - - -

We'd like you to check some facts about this story, please.

ca Who brought the picture to school?
A : Mark B : Sarah C : Paul D : Nicola

cb Whose Mum drives buses?
A : Mark' Mum B : Niçola's Mum
C : Sarah's Mum D : Paul's Mum

cc Look at the people on the bus.
Do you think they look ....?
A : tired B : cross C : sad D : happy

cd Which word does not describe the car drivers?
? A : grumpy B : frustrated
* C : amused D : angry
dictionary

ce In the PICTURE, what APPEARS to be moving fastest?

A : the front car B : the bus
C : the back car D : 'Express Deliveries'

cf Who likes bikes best?
A : Paul B : Sarah C : Nicola D : Mark

cg How many people speak in the story?
A : 6 B : 4 C : 1 D : 5

ch Who felt a little bit angry?
A :Nicola B : Paul C : Mark D : Sarah

ci What do you think the picture means?
A : Buses are quicker than walking
B : Cars are quicker than buses
C : Buses are quicker than bikes
D : Buses are quicker than cars in town

- - - - -

The children did try it. They had a race to school. Mark went by BUS along Moat Road and Church Street. Nicola WALKED along Old Walk. Paul went by BIKE along Woodbridge Lane. Sarah went by CAR along Woodbridge Lane. Her dad was the driver.
They all set off from Westgate bus stop at half past eight.
Here are the results:

child	Mark	Nicola	Paul	Sarah
went by	bus	walking	bike	car
set off at	8:30	8:30	8:30	8:30
at school by	8:50	8:45	8:40	8:45

ck Who took the longest time?
? A : Mark B : Nicola C : Paul D : Sarah
chart

cl The children found that going to school was quickest
? by ....
chart A : bus B : walking C : bike D : car

cm What would be a better title for the story?
'It's quicker .... A : ..by bus.'
B : ..on foot.'
C : ..by bike.'
D : ..by car.'

Your journey to school

This section is slightly DIFFERENT from the others so read it carefully. We are interested in how YOU travel to school.

xa How did you come to school today?

a) walk b) car c) bus d) bike e) taxi f) another way

(Just circle the right letter in your code-book.)

xb Which of these do you pass on your way to school?

a) a church	e) a hill or mountain
b) a petrol station	f) water (lake; river;..)
c) a shop	g) a tree
d) fields	h) a large building

If you pass some thing unusual or special, like a windmill or a statue, or something you always like to see, write what it is in the space in the code-book. It could be lovely garden .

xc What kind of house do you live in?

a) terraced b) detached c) cottage d) flat
e) bungalow f) farm g) semi-detached

In the CODE-BOOK, there is a space for you to draw a picture or plan of your journey to school.

DRAW ....your house ; your school; yourself ; the way you get to school ; three of the things you pass on the way.

Draw the best picture/plan that you can. Use pencils, felt tips, crayons or whatever you usually use for drawing.

Money

On Prismos, we do not use money. Anen, Bakk, Ckek and Dxox were interested in your coins. They could not understand this list that Mark was reading at the bus stop. Can you help them?

fa How much did Mark have to pay to travel from the bus stop outside his house to Prismaston Primary School?

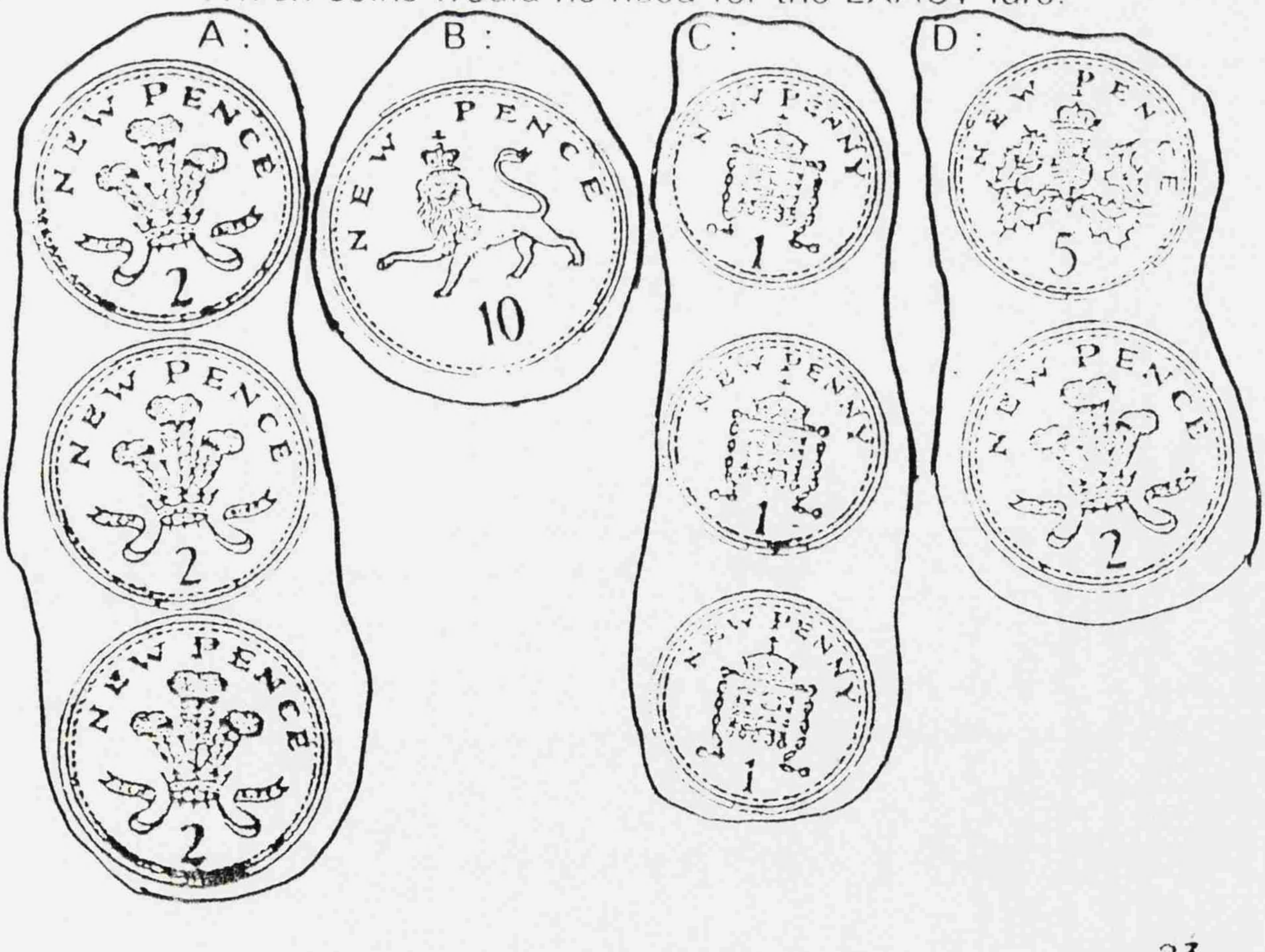
A : 15p B : 8p C : 6p D : 12p

Here is a copy of the list which Mark was reading.

FAST BUS COMPANY, Lowton.	FARES UNTIL FURTHER NOTICE			
BUS	FROM	TO	FULL	HALF
12	Lowton Bus Station	Westgate	18p	9p
	Lowton High School	School Lane	15p	8p
	Westgate	Church Street	6p	3p
	Westgate	School Lane	12p	6p
14	Moat Road	Westgate	7p	4p
	Westgate	Lowton High School	18p	9p
	Moat Road	Lowton Bus Station	22p	

Children under five travel free.
5 - 13 year olds and O.A.P.s pay half fare.
Others pay full fare. NO DOGS

fb Which coins would he need for the EXACT fare?



Mark's sister Joanne is fifteen. She catches bus number 14 to Lowton High School from the bus stop outside 8, Westgate.

fc What is her fare to Lowton High School?

? A : 9p B : 18p C : 7p D : 20p

chart

fd If Joanne gives the driver ...

How much change should she get?

A : 11p B : 3p

C : no change D : 2p

There is a fold in one corner of the fares list.

fe What letter is missing from the last word?

A : O B : U C : I D : o

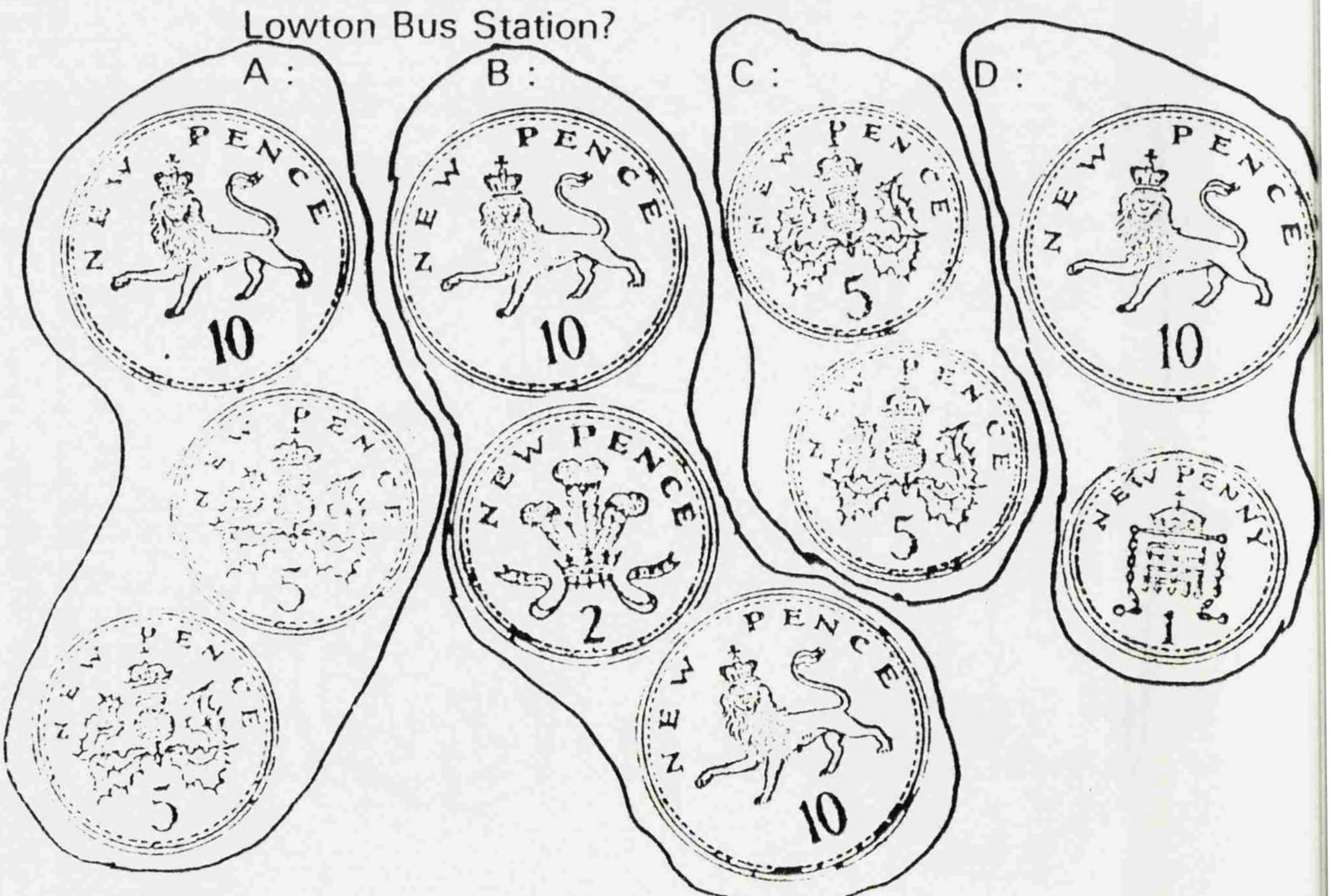
ff What is the word on the fold on the line above the bottom line?

?

chart A : five B : fair C : free D : fare

fg What would it cost Paul to travel from Moat Road to Lowton Bus Station?

A : B : C : D :



Something about us

Would you like to know something about us? LISTEN very carefully to your teacher who is going to read a description of one of us. The people of Prismos are called Prismons.

Wait until your teacher has read about us twice.

We have had many Prismons studying your world and to check whether you have seen one of us without knowing it, we want you to try to draw a Prismon. Another day, you could even make a model of one.
When you have finished your drawing, PRETEND that you are going to make a model. You can write at the side of your drawing what materials you would use for your model.

Find the space in the middle of your code-book for your drawing.

Agents Picture Gallery

There is one last, but very important task for you. On Prismos we have a picture gallery of ALL our agents. We have not got a picture of you yet.
Please draw a good picture of yourself on the empty page after your drawing of a Prismon. REMEMBER to put your EARTH name AND your PRISMOAN name underneath your picture.

That completes the datachecks. Thank you for all your hard work!

Prismaston Data Collection 1

Agent's Code-book

Prismoan Name:

Agent's Name:...

Agent's Class:..

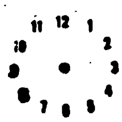
Agent's School:...

19

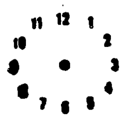
TSECRETSECRETSECRETSECRETSECRETSECRETSECRETSECRETSECRETSECRETSECRETSECRETSECRETSI

Tr - T reads : Th - T hints : Tx - T explains : Tm - T says miss out

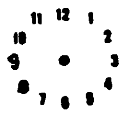
Examples

time-box $\boxed{\quad : \quad}$ or 

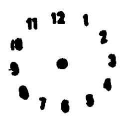
ea	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
eb	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box $\boxed{\quad : \quad}$ or 

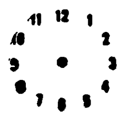
Alphabets

time-box $\boxed{\quad : \quad}$ or 

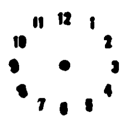
aa	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
ab	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box $\boxed{\quad : \quad}$ or 

Houses

time-box $\boxed{\quad : \quad}$ or 

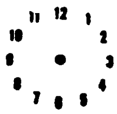
hx	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
hv	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
ht	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
hs	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
hr	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box $\boxed{\quad : \quad}$ or 

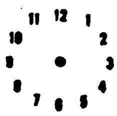
p - plan : * - Prismmem/ book : a - apparatus : f - friend.

Tr - T reads : Th - T hints : Tx - T explains : Tm - T says miss out

Architecture

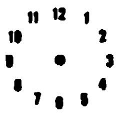
time-box [:] or 

gx	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
gv	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
gt	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
gs	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

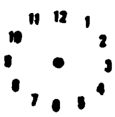
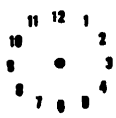
time-box [:] or 

[The Town : back cover]

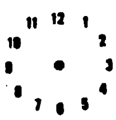
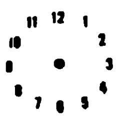
The Past

time-box [:] or 

pa	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
pb	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
pc	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
pd	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

[:] or  : [:] or 

pe	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
pg	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
pi	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
pk	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

[:] or  : start? [:] or 

p - plan : * - Prismmem/ book : a - apparatus : f - friend

Tr - T reads : Th - T hints : Tx - T explains : Tm - T says miss out

pl	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
pm	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
pn	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box : or

Journeys

time-box : or

ja	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
jb	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
jc	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
jd	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

: or : : or

je	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
jf	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
jg	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box : or

Travel on Land (back cover)

Transport

time-box : or

ta	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
tb	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

p - plan : * - Prismmem/ book : a - apparatus : f - friend

MY JOURNEY TO SCHOOL

MY DRAWING OF A PRISMON

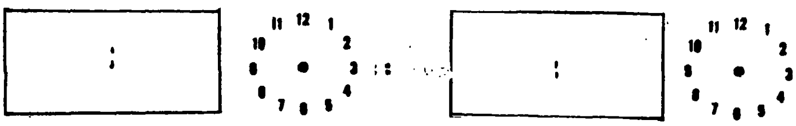
BY (Earth name) ....

AGENTS' PICTURE GALLERY

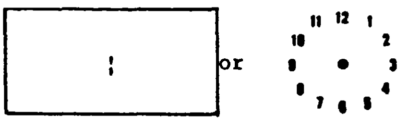
We need a good picture of you for our Agents' Picture Gallery. It must be a GOOD drawing in case it is required for purposes of identification at a later date. Draw the best picture you can.

PRISMOAN NAME: [ ] [ ] [ ] [ ]

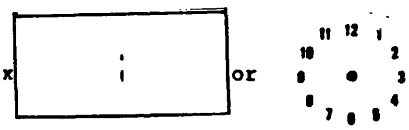
Tr - T reads : Th - T hints : Tx - T explains : Tm - T says miss out



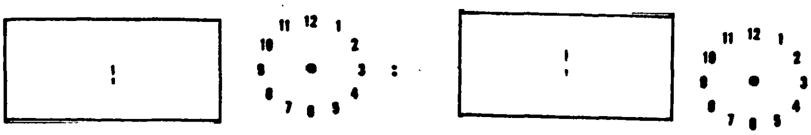
tc	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
td	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
te	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
tf	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
tg	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box  or

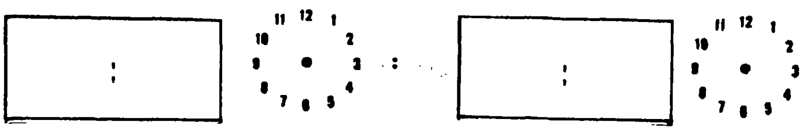
It's Quicker by Bus

time-box  or

ca	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
cb	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
cc	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
cd	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
ce	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm



cf	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
cg	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
ch	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
ci	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm



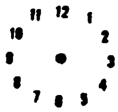
p - plan : * - Prismmem/ book : a - apparatus : f - friend

Tr - T reads : Th - T hints : Tx - T explains : Tm - T says miss out

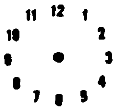
ck A B C D p * a f Tr Th Tx Tm

cl A B C D p * a f Tr Th Tx Tm

cm A B C D p * a f Tr Th Tx Tm

time-box : or 

Your journey to school

time-box : or 

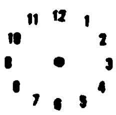
xa a b c d e f

xb a b c d e f g h

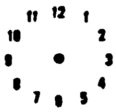
Do you pass something you think is interesting?................

xc a b c d e f g

Find the space near the middle of the book. DRAW a picture/plan of your journey there. Remember to draw the things you have put on this page.

time-box : or 

Money

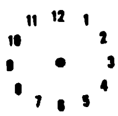
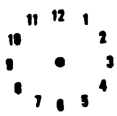
time-box : or 

fa A B C D p * a f Tr Th Tx Tm

fb A B C D p * a f Tr Th Tx Tm

fc A B C D p * a f Tr Th Tx Tm

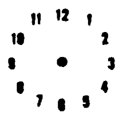
fd A B C D p * a f Tr Th Tx Tm

: or  : : or 

p - plan : * - Prismmem/ book : a - apparatus : f - friend

Tr - T reads : Th - T hints : Tx - T explains : Tm - T says miss out

fe	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
ff	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
fg	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box $\boxed{\quad : \quad}$ or 

Something about us

1) Listen to your teacher very carefully and then draw your idea of a Prismon across the centre pages of this book.

2) We need a drawing of you for our Agents' Picture Gallery so please would you draw the best picture you can of yourself on the page after the centre page.

YOU HAVE NOW COMPLETED ALL THE DATACHECKS. A PRILLION THANKS FOR YOUR HARD WORK. YOU HAVE BEEN A MOST VALUABLE AGENT. GOOD-BYE!

p - plan : * - Prismmem/ book : a - apparatus : f - friend

The Town

$\boxed{\quad : \quad}$ begin

mx	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
mv	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
mt	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tn
ms	A	B	C	D	p	*	a	f	Tr	Th	Tx	Ti

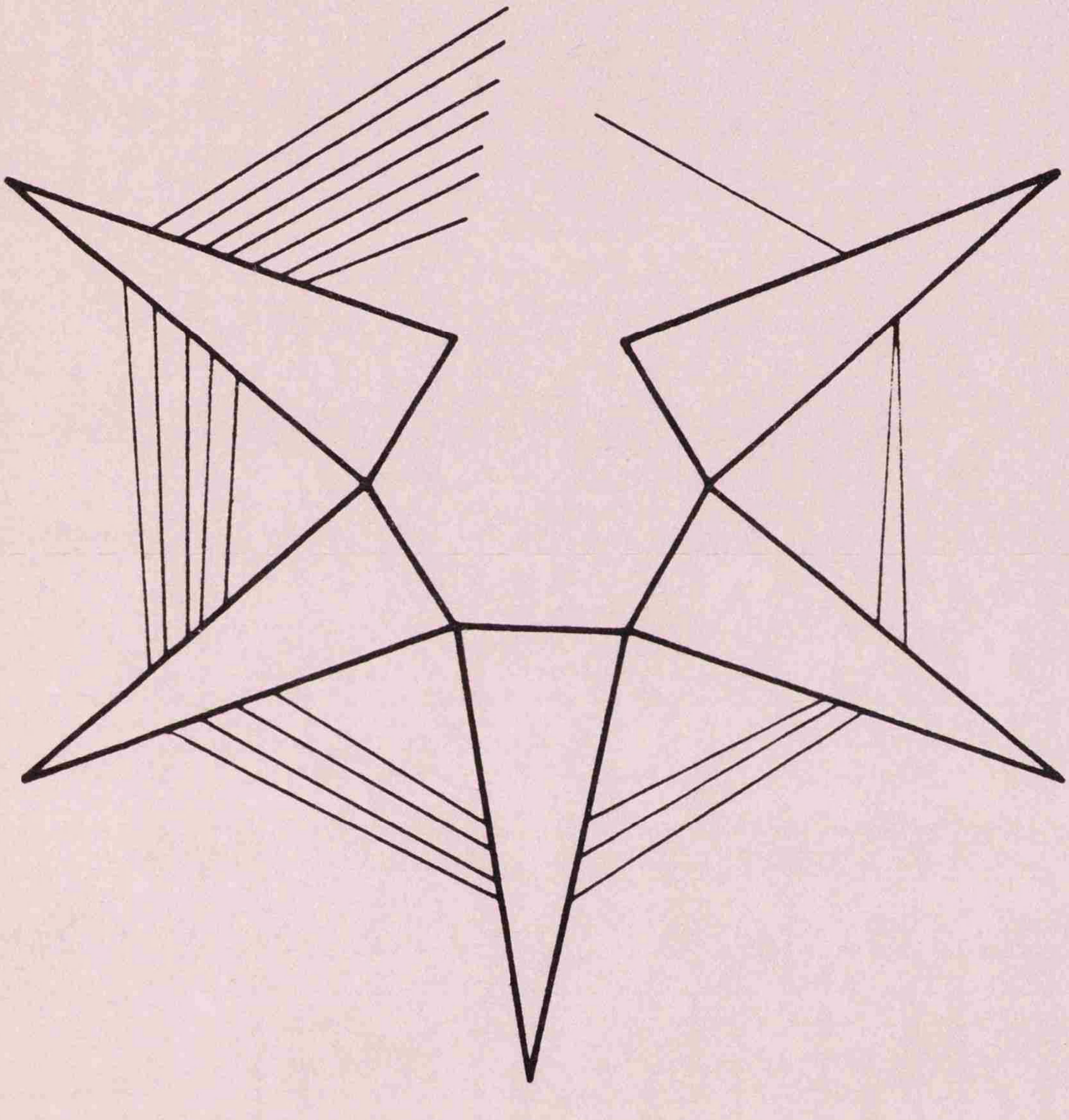
end : $\boxed{\quad : \quad}$

Travel on Land

begin : $\boxed{\quad : \quad}$

sa	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
sb	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
sc	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

end : $\boxed{\quad : \quad}$



Prismmem

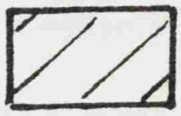
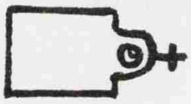
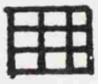
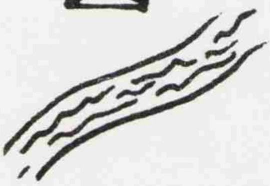
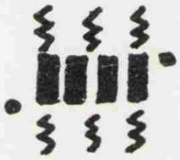
Contents **page**

Plan signs	2
Castles	3
History in England: Notes to explain Time-line	5
Prismaston Time-Line	6
Prismmem Dictionary	8
Index	13

This book contains some of the background information needed for the Prismaston Datachecks. Please use any other earth reference books that you need as well.

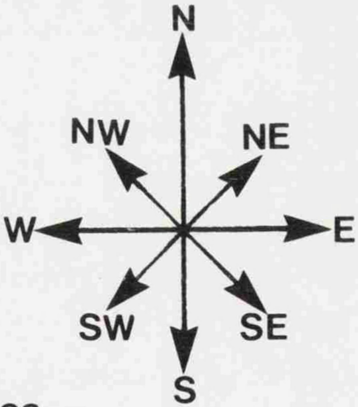
How to read the map

PLAN SIGNS

bridge		round-a-bout	
chimney		school playground	
church		school wall	
climbing frame		slide	
clock		steps	
gardens		swings	
post-box		telephone box	
river		zebra crossing	

COMPASS

A compass is used to show directions: NORTH (N); SOUTH (S); EAST (E); WEST (W).



In Prismaston, the church is:

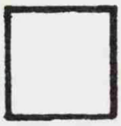
a) North of the shops
b) East of the play park

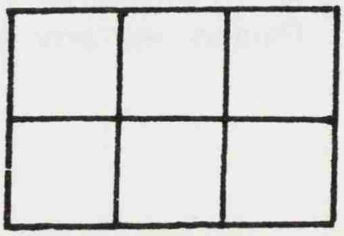
SCALE

On the town plan:

1 centimetre stands for 10 metres.

In other words, this length on the paper means 10 metres on the ground.

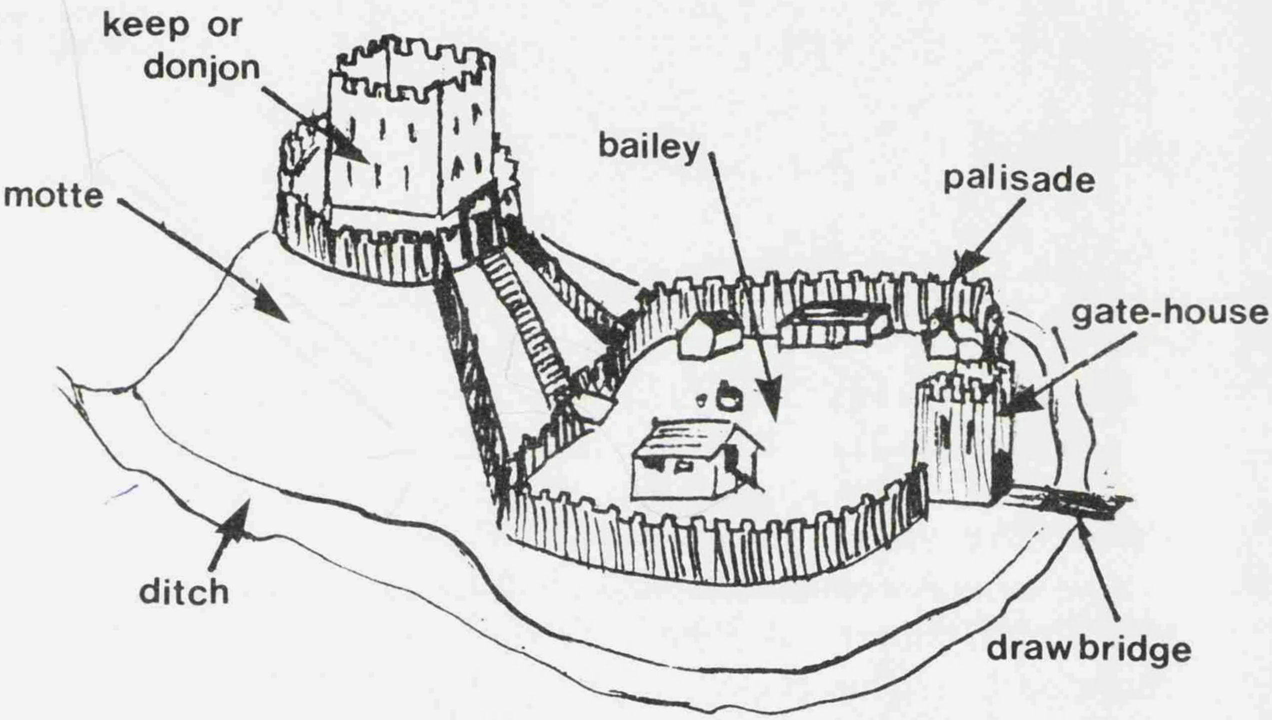
A square this size:  stands for 100 square metres ($100m^2$).

so this area  stands for $600m^2$.

CASTLES

When William the Conqueror invaded England in 1066, his army of French soldiers had to build castles in a hurry, to protect themselves from the English.

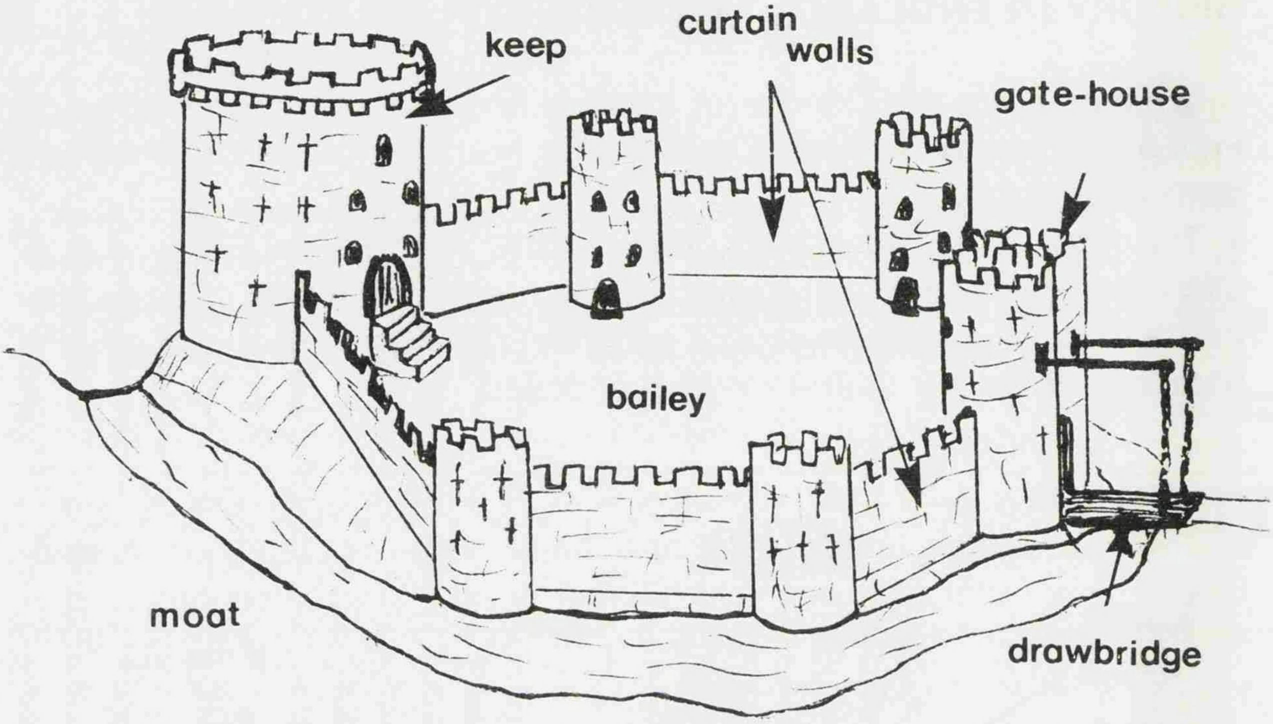
The first castles they built were usually 'earthworks'. They dug a deep ditch around a high mound of earth called a 'motte'. Beside the motte was a low, flat area called a 'bailey'. This drawing shows what a **Motte and Bailey castle** may have looked like.



Archaeological evidence tells us that the buildings were made of wood. Many of them were replaced by stone buildings during the 12th. Century because attackers often set fire to the timber. Sometimes the wood was plastered and painted to make it look like stone!

The castles of the 12th. century were built with round towers in the high walls. The square keeps were often replaced by round ones. Stone towers could be built higher than wooden ones so there was no need for a motte.

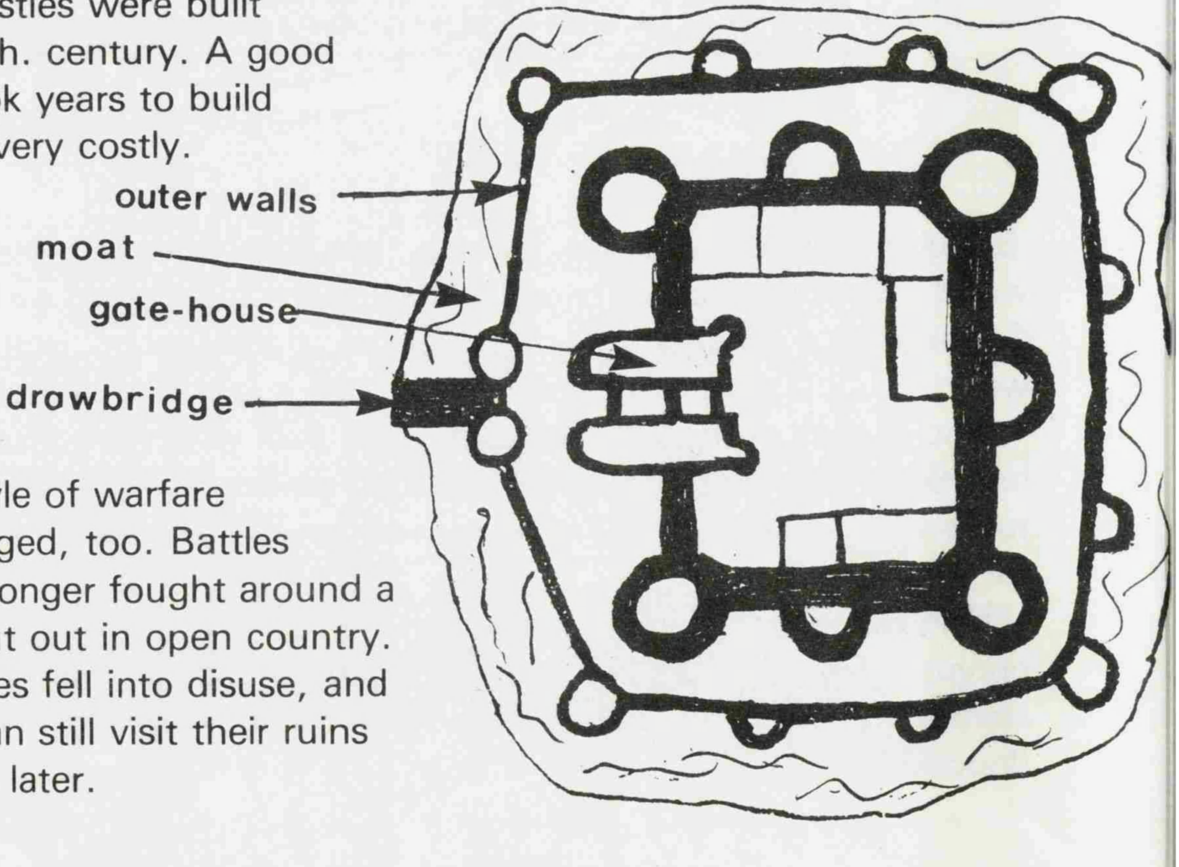
One way of attacking these castles was to tunnel under the walls. To prevent this, the castle builders began to make moats around the castles by filling the old ditches with water. Any tunnels would be flooded!



12th.Century Castle

During the 13th. century castle design changed again. Here is a ground plan similar to that of a castle built between 1295 and 1300 A.D. This kind of castle is called a **Concentric Castle.** It has the 'keep' in the centre protected by two rings of defences.

Few castles were built in the 14th. century. A good castle took years to build and was very costly.



The style of warfare had changed, too. Battles were no longer fought around a castle, but out in open country. The castles fell into disuse, and yet we can still visit their ruins 700 years later.

HISTORY IN ENGLAND : NOTES TO EXPLAIN TIME-LINE

PLAGUE

The Black Death 1349

In 1348 and 1349, there was a serious outbreak of disease in England. The disease or plague was called Bubonic plague. The 1348-9 outbreak was the worst ever known in this country. It claimed the lives of nearly half the population and in some areas it wiped out whole villages.

The Great Plague 1665

In 1665, there was another outbreak of Bubonic plague but this time is was confined to London and to a small village in Derbyshire called Eyam. This outbreak killed over 60,000 people in London out of the 450,000 people living there.

INVENTIONS

Watt's Steam Engine 1765

Although many people think that James Watt invented the steam engine, this is not quite true. James Watt(1736-1819) was a Scotsman who made great improvements to the first kind of steam engine which was invented by Newcomen in 1763. One of Newcomen's engines was taken to Watt's works to be repaired and this led Watt to design a condenser (to convert steam to water) and a steam jacket for the boiler cylinder.

Stephenson's Rocket 1829

George Stephenson (1780-1848) was an engineer who worked at a colliery near Newcastle on Tyne. In 1814 he invented a steam locomotive to pull coal trucks to the docks from the mine. He became a railway engineer and in 1829, his train, 'The Rocket' won a competition for the fastest steam train. After that his design was used for years. The Rocket went at 15 miles per hour!

Motor Cars

The first motor cars were invented about a hundred years ago. People called them 'horse-less carriages'. Before cars were invented, people travelled on foot, on horse-back, in carts or carriages pulled by horses or by steam train.

THE PRISMASTON TIME-LINE

in England	A.D.	in Prismaston
	1000	
Norman Invasion 1066		Norman soldiers build motte and bailey castle
	1100	Work begun on stone castle; walls built and moat made 1130-1160
	1200	
	1300	First church building
Battle of Boroughbridge 1322		
Black Death 1349		100 deaths
	1400	
Battle of Bosworth 1485		
	1500	
King Henry VIII 1509 - 1547		Church spire struck by lightning 1552
Queen Elizabeth I 1558 - 1603		
	1600	
Gunpowder Plot 1605		
Great Plague 1665		
	1700	
Inventions:		New church building begun 1725
Watt's steam engine 1765		
	1800	
Stephenson's Rocket 1829		
First steam trains		
Queen Victoria 1837 - 1901		Prismaston school opened
		New houses on Westgate
First motor car 1886		
	1900	Castle Hill Clock
World War I		
World War II		
Queen Elizabeth II 1952 -		The Queen's Visit 1958
		Prismon Landing 1983
	2000	

1 centimetre stands for 50 years

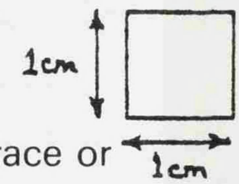
Although there was a settlement at Prismaston in Saxon times, this time-line begins in 1000 A.D.

THE PRISMMEM DICTIONARY

This dictionary will tell you the meanings of the difficult words in the Prismaston File. If the word you are looking for is not here, look in one of the class dictionaries.

aA

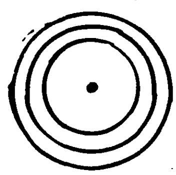
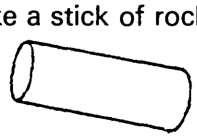
agenda	a list of matters to discuss
agent	someone whose job is to arrange things for another person : a spy
alphabet	all the letters used to write down a language: the English alphabet is: a b c d e f g h i j k l m n o p q r s t u v w x y z
amused	feeling of wanting to smile or laugh at something : being happily interested
archaeological	(say arkiolojical) something to do with archaeology : archaeological evidence tells us about life hundreds or thousands of years ago
archaeology	(say arkioloji) the study of ancient objects which have been hidden or buried for hundreds of years
architecture	(say arkitektyor) design of buildings
area	the size of a surface : the area of the square is 1 square centimetre or 1cm^2.
assignment	task or job you are given to do
athletics	running, jumping, throwing, often in a race or competition



bB

bailey	part of a castle: in the motte and bailey type, this was where the kitchen, stables and chapel were.
bungalow	a house without an upstairs: all the rooms are on the ground floor
bunpenny	an old penny showing Queen Victoria with her hair in a bun: (see veiled head penny)

cC

centimetre	a length that is exactly one hundredth of a metre : this line—— is 1 centimetre or 1cm long
centipede	a small, crawling animal with many tiny legs
centurion	an important Roman soldier : Roman army officer in charge of 100 soldiers
century	100 years : 100 runs by one batsman in cricket From 1900 to 1999 is the 20th. Century. From 1000 to 1099 is the 11th. Century. From 1100 to 1199 is the 12th. Century. From 1300 to 1399 is the 14th. Century.
circulation	the way blood goes round the body
code	a set of letters, figures or signs used to send messages secretly or quickly
code-name	a secret made-up name to hide the real name of a person or place
concentric	rings of different sizes all with the same centre: these circles are concentric: 
conclusion	the end of a story or discussion: the final decision
council	the group of people elected to be in charge of a town or county
councillor	a person elected to be a member of a council
cottage	a small, old house
cylinder	the shape of a tin of beans: a long shape with the same sizes circle from top to bottom, like a stick of rock: a 3-D shape like this 

dD

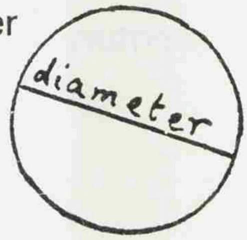
decade	ten years: 1970 to 1980 is a decade
decimal	number system based on ten: a way of writing fractions by using a dot called a decimal point: so 12.5 means 12½ : 3.75 means 3¾

detached — separated from other things: a detached house is not joined to any other houses

detection — finding out by looking for clues

detective — someone who looks for clues to solve a problem or a mystery

diameter — a straight line across a circle which goes through the centre of the circle from one side to the other

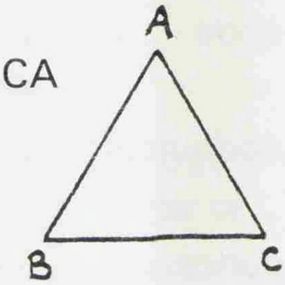


discussion — a serious conversation about something

eE

equilateral — equal sides: a triangle with sides of the same length is an equilateral triangle

AB = BC = CA



exhaust — waste gas and steam from an engine

expensive — costs a lot of money

fF

farthing — a small coin (about the size of a 1p) which was worth a quarter of an old penny

frustrated — unhappy and angry because you cannot do what you intended to do

fumes — smoke or gas

gG : hH

hexagon — a shape with six sides: a regular hexagon has its sides of equal length

iI

ignore — to take no notice of someone or something

international — between many different countries: involving people from many countries

invade — to enter a country and to fight to control it

invasion — when an army fights its way into another country

issue — an important matter: a problem

jJ

journey	the way from one place to another: the distance between two places

kK

keep	1: to have something and not let it go: or
	2: the strongest part of a castle: the large tower in a motte and bailey castle

lL

litre	(say leeter) a certain amount of a liquid: petrol for cars is measured in litres or gallons

mM

metre	(say meeter) a certain length which many countries use as a measure of other lengths 1,000 metres = 1 kilometre or 1,000m = 1 km
millenium	a thousand years : 1,000 years
minimum	the smallest amount or smallest number
minted	made by stamping out of metal: the date on a coin tells when it was made or minted
moat	the deep ring of water around a castle of the 12th. century and later
motte	the mound of earth or hill which was made for the keep of a motte and bailey castle in the 11th. century

nN : oO

opposite	as different as can be: big is the opposite of little: sitting opposite means facing

pP

palisade	a high fence of pointed wooden poles
pollution	an impurity: the air is polluted by smoke, fumes and noise
prism	a solid with the same cross-section (slice) throughout its length

Q : rR

ridiculous — so silly it should be laughed at

Q sS

scheme — plan

semi-detached — a semi-detached house is joined to one other house

site — place to build a building: a place to put something

sky-view — the way something looks from above

solar system — the sun and the planets

summary — a short account of a story or of some information

survey — a careful look over a wide area: asking lots of people the same question to find out about something

tT

terraced — houses joined together in a row

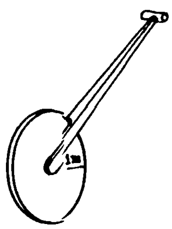
territory — an area of land which belongs to a person or group: the piece of land that an animal marks out as its own

transport — the way people and things are moved from one place to another; by horse by ship and so on

treasurer — person who is in charge of the money

triangle — a three-sided shape

trundle wheel — a wheel to push along the ground to measure the distance between two places



uU

unidentified — cannot be named or labelled : something which has not been seen before

vV

veiled head penny — old penny showing Queen Victoria with a veil covering her hair: these pennies were minted in the later part of her reign

wW : xX : yY : zZ

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These materials have been prepared by Linda M. Hargreaves, for use in the schools participating in The PRISMS project, (Provision in Small Schools) at

The School of Education,
University of Leicester.

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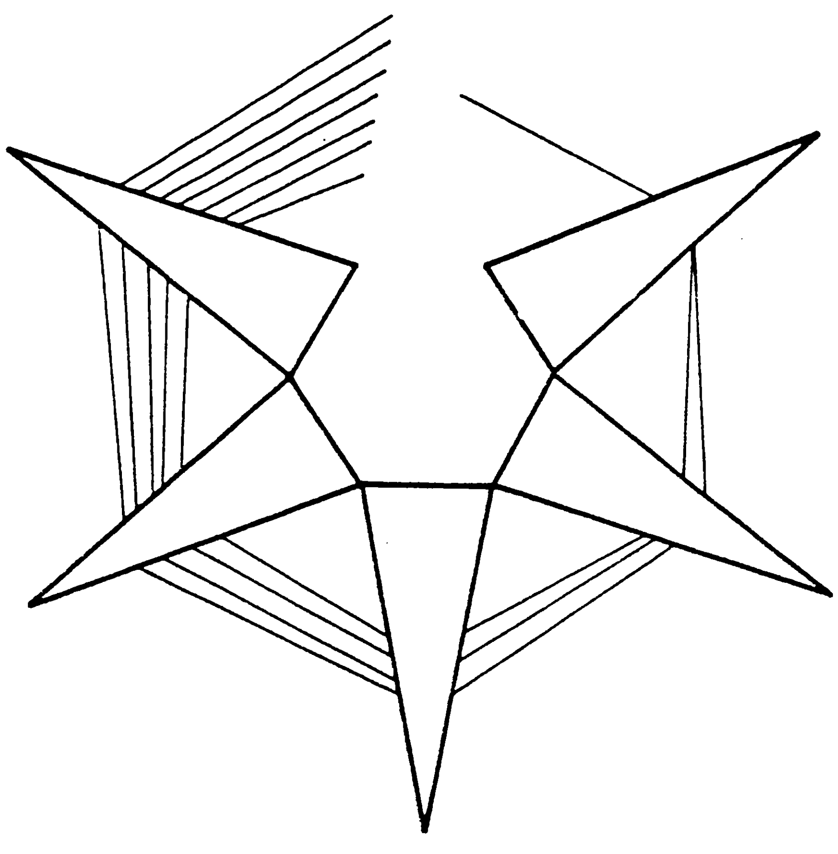
THE PRISMASTON FILE

datacheck 2



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ISBN 0 902254 332 June, 1984

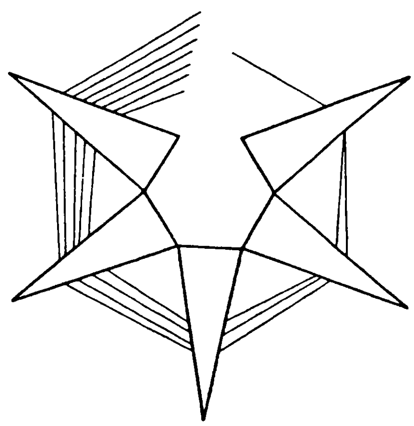
Hello!

This book is about four children who live in a small place code-named Prismaston. They are about the same age as you and their names are Nicola, Paul, Mark and Sarah.

It is from the friendly world of PRISMOS, where we are making a book about worlds close to PRISMOS.

We have had four secret agents called Anen, Bakk, Ckek and Dxox, but known as A, B, C and D, working in Prismaston, watching the four children.

A, B, C and D have told us a great deal about the children but we need checks on some of their information. A, B, C and D each have a different theory about some of the facts.



YOUR assignment is to decide who is right,
Anen, Bakk, Ckek or Dxox,
by checking the evidence in this file, code-named

THE PRISMASTON FILE

Become a secret agent!

Use your powers of detection!

Now look at the front of the booklet called

PRISMASTON DATA COLLECTION
AGENT'S CODE-BOOK

1 Write your full name after 'Agent's name:'
2 Write the name of your school after 'Agent's school:'
3 Write your class number and junior year group after 'Agent's class:'
4 To become a Prismoan Agent you need your own PRISMOAN NAME.
Use the Prismoan alphabet to make up your own Prismoan name.
This is the Prismoan alphabet:
A B C D E G I K L M N O P Q R S T V X
Our alphabet is not qite the same as yors. We are very sorry if we have made suome spelling mistackes.

YOUR PRISMOAN NAME MUST HAVE FOUR LETTERS. USE ONE LETTER TWICE.

Write it on the front of your Agent's Code-book, in the boxes after 'Prismoan name:'.

5 Finally, all Prismoan agents have a SECRET CODE.
Look at the boxes at the bottom of the Code-book.

i) Your teacher will tell you what to put in the first five boxes.
ii) The next four boxes are for the year and month you were born. On Prismos, we write the year first and the month second. So, someone born in March, 1976 would write 19 $\underbrace{\boxed{7}\boxed{6}}_{\text{year}}\underbrace{\boxed{0}\boxed{3}}_{\text{month}}$
iii) Now write your PRISMOAN NAME in the next four boxes.
iv) Write your junior year group (1,2,3 or 4) in the last box.

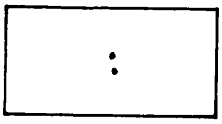
NOW YOU ARE A REGISTERED PRISMOAN AGENT.
We know you can help us!

HOW TO USE YOUR AGENT'S CODE-BOOK

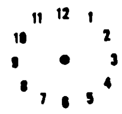
Now you can learn to use our secret codes.
Open your code-book and look at page 1. You will see that almost everything in this book is in code. We try to avoid using words as much as possible.

TIME-BOXES

Below the word 'Examples', there is a Time-box like this:



or



Good agents always record the time when they begin and end a datacheck.
There are two ways to do it:

1 Copy the time from a digital watch.

OR 2 Copy the positions of the hands from a clock or watch.

Fill in the time now. Your teacher will check that you have done it properly.
There is a time-box at the beginning and end of every section of checks.
Some long sections have time-boxes part of the way through them. If you have to stop work in the middle of a section, record the time when you stop and again when you re-start datachecking. Ignore the extra clocks if you do not have to stop work.

DATACHECK CODE

The first datacheck is **ea.** Point to ea in both this book and in your Agent's Code-book.
When you have found both ea's, read datacheck ea in this book.
Example

ea What age are Paul, Mark, Nicola and Sarah? (Hint: look at the top of page 1 in this book.)

A: 7-8 years old B: 8-9 years old
C: 9-10 years old D: 10-11 years old

Do you remember that your assignment is to decide WHO is right.... Anen, Bakk, Ckek or Dxox?
Can you remember what A, B, C and D stand for?
So, how old does Bakk think the children are?
Now, how old do YOU think the children are? (Use the hint.)
Remember, YOU may ALL have different theories, just like Anen, Bakk, Ckek and Dxox. Decide which ONE you agree with MOST.

NOW LOOK AT YOUR CODE-BOOK AGAIN.

Find ea again and then circle the code-letter for the agent you think is right. IF you think A is right, circle A in your CODE-BOOK. (Other agents may think B, C, or D was right. You decide what YOU think.)

Now try another example, **eb**, which will teach you about CLUE-CODES and the MAP of Prismaston. find example eb in this file and in your CODE-BOOK.

Example

eb	How many shops are there on Church Street in Prismaston?			
?	A : 4	B : 5	C : 6	D : 0
map				

?

Sharp-eyed agents will have noticed the signs map below eb.
? means CLUE : the letters underneath tell you where to look for the clue; 'map' means look on the map of Prismaston which you will find in the centre of this book. Anen and Dxox made the map from an observo-copter hovering silently above Prismaston. Look at the map now . Find Church Street and carefully count the shops. Decide which agent you agree with most.

Now find eb in your code-book and circle the agent YOU think is right.

CLUE-CODES

You could only check the data for eb by looking on the map or PLAN of Prismaston so please would you now circle the letter 'p' in the string of letters after A, B, C and D in your code-book.
That string of letters is the list of CLUE-CODES. They are:

p * a f Tr Th Tx Tm

Good agents collect clues from many different sources like plans, pictures, books and people. BUT they ALWAYS record WHERE they collected the extra clues. The clue-code letters are to help you do this. Simply circle the letter or letters which say where you got your clues. Some datachecks will not need any extra clues; some will need one extra and some may need two or more sources of extra clues! You must circle a clue-code for each source of information that you use. Here is a detailed list of what the clue-codes stand for:

CLUE-CODE	SOURCE OF INFORMATION
p	PLANS; pictures; maps; drawings; charts; graphs; etc.
*	PRISMMEM; this is a special book; more details soon.
a	APPARATUS; rulers; tape measures; string; etc.
f	FRIEND; good agents usually keep their ideas secret but sometimes they **have** to discuss a problem with ONE friend.
T-CODE	TEACHER; The T-codes are to show that you are forced to seek adult advice. Remember, though, that we are interested in CHILDREN'S ideas and NOT teacher's ideas! Your teacher will either tell you which T-code to circle or do it for you.
Tr	READ; read the data again; teacher helps you to read it.
Th	HINT; your teacher gives a hint, e.g.where to find a clue
Tx	EXPLAIN; your teacher explains some data in detail.
Tm	MISS OUT; your teacher suggests you miss out the datacheck. (After all, you can't expect teachers to know EVERYTHING!)

Before you start checking the data, there is one more thing to learn. Don't worry, Agents' Training Courses are very hard work but you have nearly finished. You'll soon be using the codes without thinking!

THE PRISMMEM

THE PRISMMEM is a book made by Anen, Bakk, Ckek and Dxox. It contains information that they found useful, interesting or puzzling. It might be useful to you. We have sent enough copies for you to share about one between four. They should be kept on a shelf with other reference books so that everyone will know where they are. (Perhaps one class agent could check that they are all in the right place each day.) Your teacher will decide where the Prismmems should be kept. Have a look through one now. Your teacher could show one to all of you.

The contents of the PRISMMEM include:

Contents	The contents will tell you the page number of a topic.
Index	The index is in alphabetical order on the last page. It will tell you the page number of each small topic.
Plan signs	This page tells you about the signs on the map; about how to use an earth compass and about earth area.
Castles	These pages have some information about castles. Anen and the others were fascinated by these unfriendly buildings.
Prismaston Time-line	The time-line is a sort of ruler of time. The markings on it mean years. This time-line is divided into years and decades.(you can look 'decades' up in the dictionary......)
Dictionary	Anen, Bakk, Ckek and Dxox found some English words rather difficult so they wrote them down in alphabetical order with their meanings to make a dictionary.

NOW, after all that, can you remember which CLUE-CODE to circle if you DO use the Prismmem?

SUPPOSE you use the TIME-LINE in the PRISMMEM, which TWO code letters will you circle?

Hint: The time-line is really a chart and it is in the Prismmem..... so you must circle p AND *.

Your intensive training as a secret agent is over. Now you can try some datachecking for yourself! Your target finishing date is two weeks from today. We know you won't let us down. GOOD LUCK!

Alphabets

First would you help us to agree about your alphabet.

aa How many more letters are there in the English alphabet
? than in the Prismoan alphabet?
* A : 6 B : 4 C : 0 D : 7

ab Which of these groups is in both the English AND the Prismoan alphabets?
A : efg B : grs C : tuv D : vwx

Houses

Look closely at the plan of Prismaston in the centre of the book. We have put some words on the plan to point out roads and buildings. A, B, C and D tried to find out where Paul, Nicola, Sarah and Mark live. They need you to tell them if they have got the plan right. Please sort them out!

We know that:

Nicola's house is 5, Westgate;
Sarah lives at 2, Westgate;
Mark's address is 13, Westgate;
Paul lives nextdoor to Sarah.......but..

ha What is Paul's address?
? A: 3, Westgate B: 1, Westgate
map C: 5, Westgate D: 4, Westgate

Look at the compass points on the map. On Prismos, we have six points of the compass. Anen, Bakk, Ckek and Dxox were not sure how to use your compass.

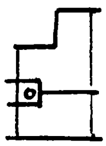
hb Sarah's house is .... of the school.
?
map A: West B: South C: North D: East
*

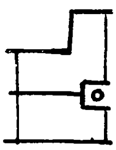
Sky-Views

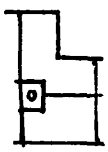
Anen, Bakk, Ckek and Dxox drew pictures of the children's houses. Their drawings are on the next page. On the plan, you can see how the houses look from the sky. You can see 'sky-views' of the houses.

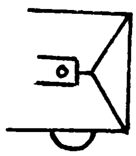
hc Which sky-view goes with Nicola's house?

? map

A: 

B: 

C: 

D: 

Ckek is a builder in his spare time, and he was interested in the names you use for your houses. Would you check these names?

hd What kind of house does Paul live in?

? A: terraced B: detached

* C: bungalow D: semi-detached

Territories

Anen and friends were puzzled by the sizes of your territories. That is the land the house is built on, and the yard or garden around it. Some houses have enormous gardens and others have quite small ones. On Prismos, every family has the same sized territory. Look at the territories along Westgate, for example.

One of these houses has a much bigger territory than the others.

ga Which one is it? (Territory is house AND garden space)

? A: 13, Westgate B: 8, Westgate

map C: 3, Westgate D: 2, Westgate

Some of them do have the same sized space, but not many!

gb Which house has the same sized territory as 6, Westgate?

? A: 8, Westgate B: 13, Westgate

map c: 7, Westgate D: 4, Westgate

These houses are all on Westgate.

a detached house

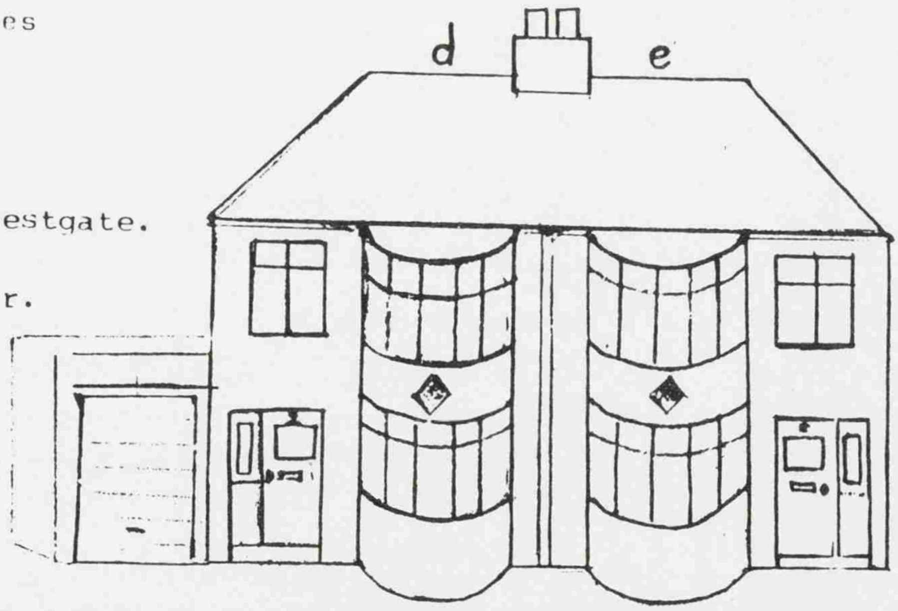
This is Mark's house.

terraced houses

Nicola lives at number 5.

Sarah lives at 2 Westgate.

Paul lives nextdoor.



semi-detached houses

	Your HOUSES seem to be different sizes too.
gc	Who lives in the house with the biggest floor space?
?	A: Nicola B: Paul C: Mark D: Sarah
map	Your territories are different SHAPES as well.
gd	Whose territory is NOT a rectangle?
?	A: Mark's B: Paul's C: Sarah's D: Nicola's
map	

The Town Plan

Look carefully at the plan of Prismaston. You may need to look at the list of plan signs as well.

mx	In the play park, these is no ....
?	A: see-saw B: slide
map	C: climbing frame D: round-a-bout
*	
mv	These is no .... on the town plan.
?	A: library B: church C: school D: play park
map	

Bakk and Ckek went to a Prismaston Council Meeting. Here is the list of items for discussion.

Prismaston Council Meeting

Agenda

1. Minutes of last meeting.
2. Site of new clinic.
3. Site for large carpark to ease traffic along Church Street.
4. New school wall.
5. Road markings on Church street.
6. Reports of Unidentified Flying Objects over Prismaston; discussion to be led by Councillor Moon.

Bakk and Ckek were really looking forward to item 6! Had the observo-copter been spotted????

Prismaston Council Meeting

Item 2 : SITE OF NEW CLINIC WITH SMALL CAR PARK

A space of 800m² will be needed. Clinic must be central for old people and people bringing babies.
(one square on the plan means 100m² on the ground.)
Our agents thought it should be close to the shopping centre. They argued about where it should be built.

cm Where do you think the clinic should be built?
? A: West of Woodbridge Lane and South of the river.
map B: West of Woodbridge Lane and North of the river.
* C: Next to the Junior playground.
D: East of the Infant playground.

Item 3 : SITE OF LARGE CAR PARK to keep cars away from shopping area and to get more people to use the bus service. Car park needs 1000m² minimum space.

cn Which of our agents thought of the best site?
? A: East of Woodbridge Lane; south of the river.
map B: West of Woodbridge Lane; north of the river.
* C: North side of School Lane; west of the school.
D: West of Woodbridge Lane; south of the river.

Item 4 : NEW SCHOOL WALL

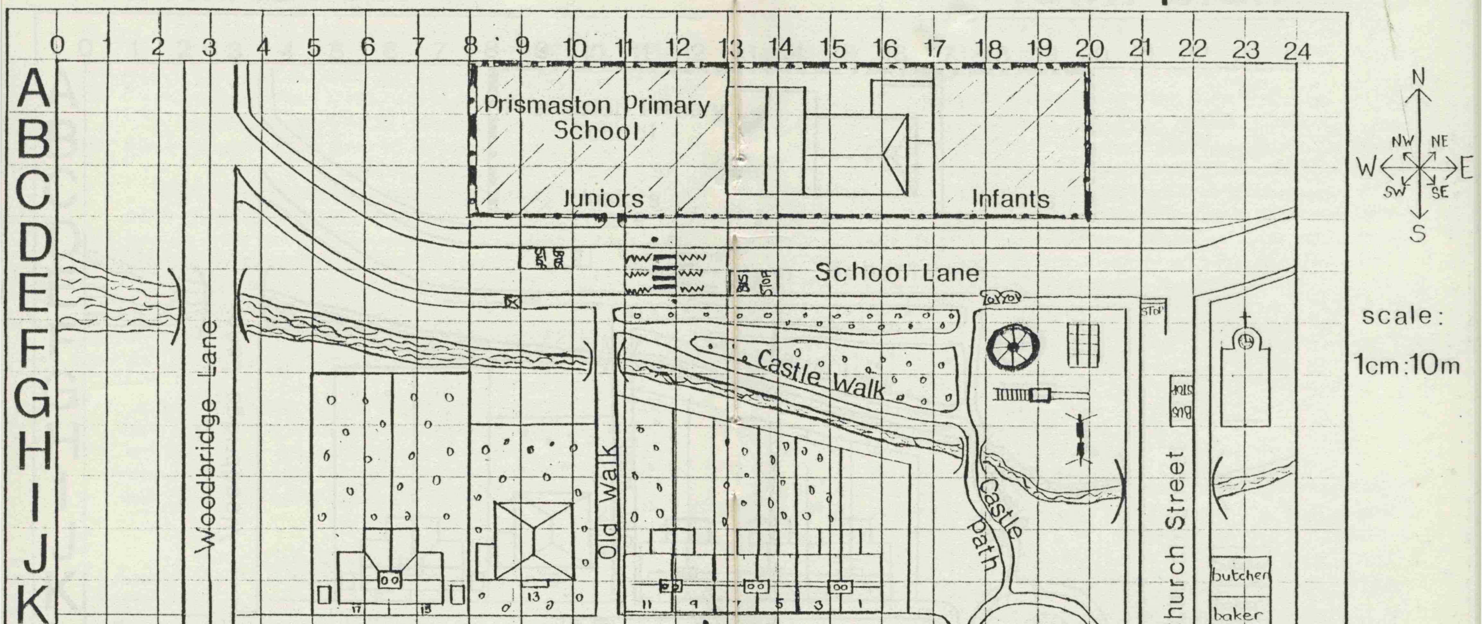
co If each 1cm on the plan means 10m on the ground, how long
? will the new wall be? (The gateway is 5m wide.)
map A: 295m B: 300m C: 120m D: 250m

Item 5 : ROAD MARKINGS FOR CHURCH STREET.

Double white lines to be painted down the middle of the road and double yellow lines down each side.

cp How far would the lines stretch if they were laid end to
? end?
map Who was right, Anen, Bakk, Ckek or Dxox
A: 1000m B: 600m C: 6km D: 10m

PRISMASTON town plan



A single line uses half a litre of paint per 100m.

cq How much WHITE paint will be needed?

A: 0.5 litres B: 1 litre

C: 2 litres D: 3 litres

cr How much paint will be needed altogether?

A: 6 litres B: 2 litres

c: 3 litres D: 12 litres

Item 6 : U.F.O.s flying over Prismaston.

The mayor refused to discuss this issue. He said that it would be a ridiculous waste of council time. Anyway, he was certain that there no such things as U.F.O.s or life anywhere else in the solar system.

The next Council Meeting will be on the first Friday in May.

cs What date will that be?

A: May 1st.

B: May 3rd.

C: May 4th.

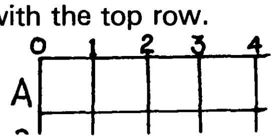
D: May 5th.

April					
Sunday		5	12	19	26
Monday		6	13	20	27
Tuesday		7	14	21	28
Wednesday	1	8	15	22	29
Thursday	2	9	16	23	30
Friday	3	10	17	24	
Saturday	4	11	18	25	

The Map

On Prismos we have a special system for finding things on maps. We draw a 'grid' of sqaures all over the map. We number the columns across the top of the map starting with number 0 for the first column from the left and carrying on 1,2,3,4....etc. The rows of squares are labelled A,B,C,D, and so on starting with the top row.

Like this:



So the top left corner of the map is square A0: the next square across the top is A1 and so on. We always put the letter before the figure.

Try to find square E8 on the map. It has a post-box in it.

Let's see if you can use our system. We are very proud of it.

ma The round-a-bout is in....

? A: F18 B: 18F C: E18 D: 19G

map

mb The Westgate zebra crossing is in...

? A: 12L B: D11 C: K12 D: L12

map Good. Now you know our system.

We think Ckek made some mistakes on the map.

mc School Lane telephone boxes SHOULD be on the corner of

? School Lane and Church Street in...

map A: E21 B: F20 C: E20 D: 21F

Sometimes we use decimals to pinpoint objects on the map. For example, if something is half way across column 3, row B, we would put B3.5, or, since the post-box in E8 is at the end of the column, it is at E8.9.

md The telephone box on Moat Road is at...

? A: P22 B: O22 C: P22.8 D: P22.3

map

me The Belisha Beacon outside 9, Westgate is at...

? A: K12.8 B: L12.7 C: M13.2 D: K12.2

map

Transport

ta We would like to know more about your transport system.

? What do you mean by 'transport'?

dictionary A: international athletics

* B: a large, busy harbour

C: a container lorry

D: the way people and materials are moved about from one place to another e.g. by ship, by car, by rail... etc.

Nicola, Sarah, Paul and Mark are all in the same class at Prismaston Primary School. Agents A, B, C and D went into the school one day to see what happens inside. (There are no schools on Prismos.) There were some charts on the classroom wall.
Can you help us understand them? There are copies in this file.

Look at the chart called
'HOW WE GET TO SCHOOL ON FINE DAYS'

tb How many children came by car?

? A: 6 B: 7 C: 3 D: 20

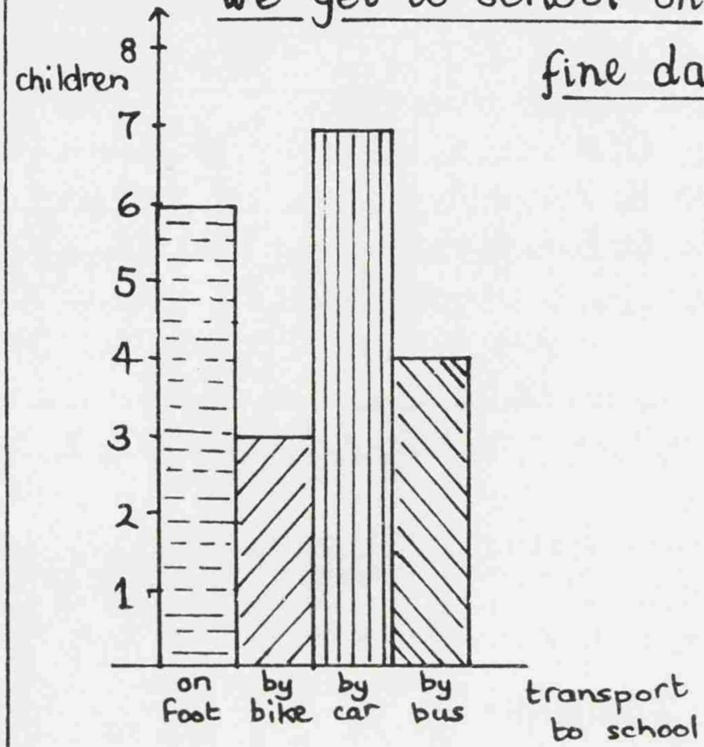
chart

tc How many children came by altogether?

? A: 18 B: 7 C: 24 D: 20

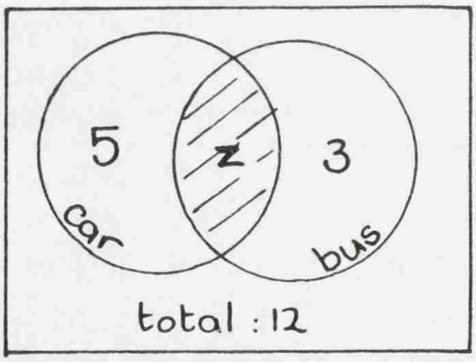
chart

A bar chart to show how we get to school on fine days



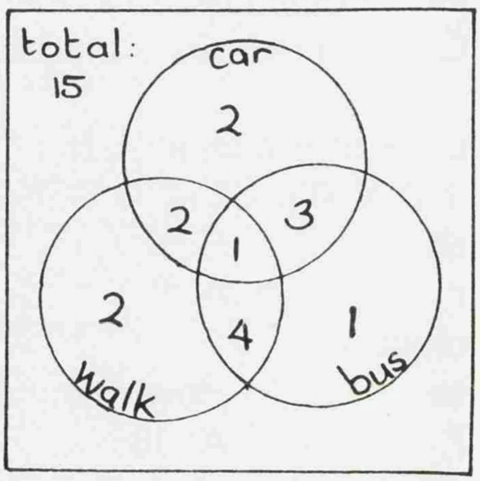
Class Transport Survey

Mark's group asked 12 children "How do you travel to school when it rains?" The shaded section, z, shows how many came part way by car and part way by bus.



Sarah's group asked 15 children. Their diagram has 3 sets; car ; walk ; bus

8 came in cars
9 came by bus
9 walked
} for at least part of the journey



Here is a summary table of the transport survey.

td What numbers should go in the spaces instead of x and y?

x = ... A: 2 B: 3 C: 6 D: 4

te y = ... A: 4 B: 7 C: 3 D: 5

on foot	6
by bike	x
by car	7
by bus	y
TOTAL	20

Look back at the diagrams of WET WEATHER TRANSPORT at Prismaston School. Mark asked 12 of his friends how they travelled on wet days. 5 came all the way to school by car, 3 came all the way by bus.

tg How many came part of the way by car and part by bus?

A: 12 B: 3 C: 4 D: 9

th so z =

A: 9 B: 7 C: 4 D: 12

Your Transport Survey

We would like to know whether the transport to school is the same at your school as at Prismaston.

Please do your own transport survey on 10 children (some girls, some boys and yourself).

There is a space for you to make a bar chart of your results in the code-book. It is on squared paper to help you.

We know what has to be done to make a chart but not the right order. Can you sort this out for us, please?

xa What is the right order for these stages?

i) Write down the person's answer.
ii) Decide what question to ask.
iii) Make a list of the 10 children you decide to ask (remember yourself).
iv) Ask each person on your list the question.

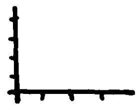
Possible orders:

a:	B:	C:	D:
i	iii	ii	iv
ii	ii	iii	iii
iii	i	iv	ii
iv	iv	i	i

xb What is the right order for these stages?

i) Make a summary table of how many walked, how many cycled etc.

ii) Rule out the bars on the chart.

iii) Put the labels on the axes (the 2 lines: )

iv) Shade or colour the bars in different colours.

Possible orders:

A	B	C	D
iii	iv	i	i
ii	iii	iii	ii
iv	ii	ii	iii
i	i	iv	iv

xc Which is the best question to ask?

A: How do you come to school?

B: How did you come to school today?

C: Did you come by car?

D: Did you walk to school?

xd Make your chart. Use the spaces in the code-book. Look at it carefully. Have you done everything?

xe: Choose the best title.

A: A chart to show who came by what.

B: A chart to show how 10 children travelled to school to-day.

C: A chart of how many people came to school.

D: A chart of transport.

Write the title you have chosen underneath your chart.

Now look at the Prismaston 'wet weather transport' charts.
You are going to make one now.
Look at YOUR list of how YOUR FRIENDS come to school.
Fill in the spaces in the code-book, with the answers to these questions.

xg: How many girls did you ask?

xh: How many children said they walk to your school?

xi: How many girls said they walk to your school?

xj: Can you put your results into the right sections of the diagram in the code-book?

The Transport Discussion

Whilst they were doing the transport charts, Paul, Mark, Sarah and Nicola began to argue about the best form of transport.
We have a transport problem on Prismos so Anen and its friends listened to the children. They couldn't follow all the arguments so they just wrote down what the children said.
The list of arguments is in this book. Can you see it?
They used the Prismon alphabet to 'number' the points.

a: Cars cause pollution.
b: Bicycles are dangerous and often in accidents.
c: It's too expensive on the bus.
d: Walking is too slow for long distances.
e: In the car you can stay warm and dry.
g: Bikes are unhealthy because you breathe in exhaust fumes.
i: Bus fares would come down if more people used buses.
k: The council could build cycle tracks to prevent accidents.
l: Walking gives you time to think about the day ahead.
m: Walking isn't much fun when it's raining.
n: Buses get stuck in the traffic.
o: Old people need the buses or they can't go far.
p: Cycling gets your circulation going so it is healthy.
q: When you are walking you have time to notice things.
r: You can park bikes anywhere. They take you door to door.
s: It's often difficult to park a car.
t: You can walk through fields or parks and breathe fresh air.
v: You can't walk 20 miles there and back in a day.
x: You need the car to do heavy shopping.
aa: It all depends on where you're going and why you're going.
bb: Bikes are quiet.
cc: Petrol is expensive.
dd: It's cheaper by car if all the family is going.

Please would you help us understand the discussion.
Here are the points A, B, C and D couldn't agree on.

da Which of these arguments is FOR walking?
A: a B: d C: q D: n

db Which of these arguments is AGAINST cars?
A: n B: e C: cc D: dd

dc If you were arguing AGAINST bikes, which points would you make.
A: c and i B: b and m
C: p and r D: b and g

dd If you were in favour of bikes, which argument would beat point 'b'?
A: e B: k C: x D: p

de Which point would be the best conclusion to the argument?
A: aa B: bb C: cc D: dd

At the Council meeting, the councillors used the same points as the children.
They divided them into groups called 'issues'. (Ckek thought the councillors had suddenly caught colds: They kept talking about, 'This issue...', and That issue...', but Ckek never takes things seriously. He can't spell either!)
The issues were things like... Health; Cost; Safety; etc.

dg Which of these supports the Health issue?
A: k B: g C: s D: p

Councillor Phil Terit was worried about air and noise pollution.

dh Which group of arguments would he use?
A: c,i,cc,dd B: d,l,q,v
C: a,g,t,bb D: b,g,p,t

Councillor Emma Chisthat is treasurer to the Council. She likes arguments about money.

di Which group of arguments would she use?
A: c,i,cc,dd B: d,l,q,v
C: a,g,t,bb D: b,g,p,t

Cllr. Chisthat told the council that the government would grant £8,725 towards a new traffic scheme. The scheme would cost £20,000 altogether.

dj How much would the council have to spend?
? A:£12,275 B:£11,275 C:£28,725 D:£1,225

Castles

Look in the Prismmem.
Find the section on castles and READ it very carefully.
LOOK closely at the drawings, too.

The problem is this; on Prismos we have no such thing as a castle. All our buildings are designed to welcome others, but castles seem to do just the opposite: Anen, Bakk, Ckek and Dxox were fascinated by them. It seems that each new kind of castle is even less welcoming than the last:
Could you help Anen, Bakk, Chek and Dxox to understand more about castles?

na Who invaded England in 1066?
? A: William the Conqueror B: King Harold
* C: the English D: the Vikings

nb Who built the castles?
? A: the English B: the attackers
* C: the French Soldiers D: William the Conqueror

nc What were the first castles made of?
? A: stone B: earth and timber
* C: plaster D: bricks and mortar

nd Which of these ideas is correct?
? A: There is a palisade in the ditch round the castle.
* B: The palisade goes round the gatehouse.
C: The palisade only goes round the bailey.
D: The keep and the bailey are surrounded by a palisade.

nf How do you think the English people felt about the
? French invaders?
* A: They were very pleased to see them.
B: They hated them enough to fight against them.
C: They quite liked them.
D: They ignored them.

ng How many basic designs of castle are described in the
? Prismmem?
* A: one B: thirteen C: three D: eleven

nh Which reason IS USED in the Prismmem to explain the
? making of moats around 12th. century castles?
* A: The soldiers needed rowing practice.
B: The moat provided drinking water for the soldiers.
C: The moats prevented attackers tunnelling into the castle.
D: The moat kept disease away from the castle.

ni One of the rings of defence around the keep of a
? concentric castle is the...........
* A: ditch B: moat
C: gate-house D: stables

nj The motte and bailey castle and the 12th. century castle
? are alike in all these ways EXCEPT one. Which one?
* A: Both have a drawbridge.
B: Both have a bailey.
C: Both have a gate-house.
D: Both have a moat.

nk The 12th. century castle and the concentric castle are
? alike in all these ways EXCEPT one. Which one?
* A: Both have a drawbridge.
B: Both have towers in the walls.
C: Both have a central keep.
D: Both have a moat.

nl Which kind of castle could be built in the shortest time?
? A: the motte and bailey castle
* B: cannot decide which castle
C: the 12th. century castle
D: the concentric castle

nm After the 14th. century, hardly any new castles were
? built because ....
* nm Which idea CANNOT fill the space?
A: there was peace; nobody had battles anymore.
B: it could take 8,9 or even 40 years to build a castle.
C: castles were too expensive to build.
D: the battles began to be fought away from the castle, out in the fields.

History in Prismaston

We are very interested in what you call 'history'. On Prismos, very little has changed in the last thousand years. In your world there seem to have been many changes. Anen, Bakk, Ckek and Dxox have been studying Prismaston's history. Would you see if their Prismaston TIME-LINE (in the Prismmem) makes sense?

ta Which of these buildings was built at an earlier date
? than the others?
time-line A: first church
* B: Prismaston School
C: motte and bailey castle
D: new church

tb When did this happen?
? A: 1066
* B: 1310
C: 1725
D: 1552

tc A,B,C and D forgot to write down EXACTLY when the school was built.
?
* Look carefully at the time-line to see if you can tell.
Here are their guesses. Who was right?
A: 1870 B: 1820 C: 1900 D: 1890

td Which is the right order in time for these events?
? Put the earliest first, the latest, last.
* i Queen's visit
ii Prismon landing
iii 100 deaths
A: i - ii - iii B: iii - i - ii
C: ii - iii - i D: iii - ii - i

tf What is the most likely explanation of the 100 deaths in
? 1349?
* A: a train crash B: an earthquake
C: the Black Death D: The Great Plague

tg Nicola found this coin on Castle Hill. One figure was
? worn out so she could only make out 1 76.
* Our agents think they know the missing figure.
Who is right?

A: 1876 B: 1976

C: 1776 d: 1676

Something about us

Would you like to know something about us? LISTEN very carefully to your teacher who is going to read a description of one of us. The people of Prismos are called Prismons.

Wait until your teacher has read about us twice.

We have had many Prismons studying your world and to check whether you have seen one of us without knowing it, we want you to try to draw a Prismon. Another day, you could even make a model of one.

When you have finished your drawing, PRETEND that you are going to make a model. You can write at the side of your drawing what materials you would use for your model.

Find the space in the middle of your code-book for your drawing.

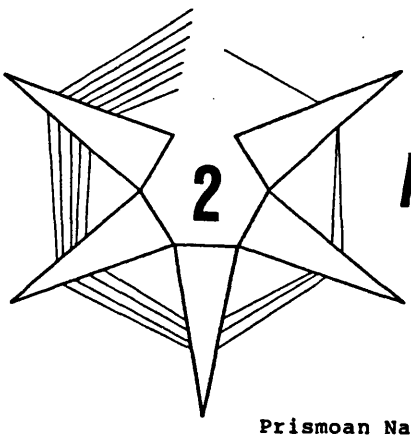
Agents Picture Gallery

There is one last, but very important task for you. On Prismos we have a picture gallery of ALL our agents. We have not got a picture of you yet.

Please draw a good picture of yourself on the empty page after your drawing of a Prismon. REMEMBER to put your EARTH name AND your PRISMOAN name underneath your picture.

That completes the datachecks. Thank you for all your hard work!

Prismaston Data Collection 2



Agent's Code-book

Prismoan Name: ☐☐☐☐

Agent's Name:...

Agent's Class:...

Agent's School:...

☐☐☐ ☐☐ 19 ☐☐ ☐☐ ☐☐☐☐ ☐

SECRETSECRETSECRETSECRETSECRETSECRETSECRETSECRETSECRETSECRETSECRETSECRETS

Tr - T reads : Th - T hints : Tx - T explains : Tm - T says miss out

Examples

time-box [:] or 11 12 1 10 2 9 • 3 8 4 7 6 5

ea	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
eb	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box [:] or 11 12 1 10 2 9 • 3 8 4 7 6 5

Alphabets

time-box [:] or 11 12 1 10 2 9 • 3 8 4 7 6 5

aa	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
ab	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box [:] or 11 12 1 10 2 9 • 3 8 4 7 6 5

The Town Plan

time-box [:] or 11 12 1 10 2 9 • 3 8 4 7 6 5

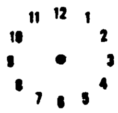
mx	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
mv	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box [:] or 11 12 1 10 2 9 • 3 8 4 7 6 5

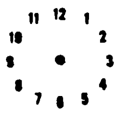
p - plan : * - Prismmem/ book : a - apparatus : f - friend

Tr - T reads : Th - T hints : Tx - T explains : Tm - T says miss out

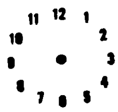
Houses

time-box $\boxed{\;:\;}$ or 

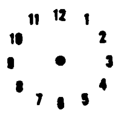
ha	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
hb	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
hc	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
hd	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box $\boxed{\;:\;}$ or 

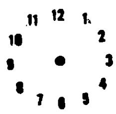
Territories

time-box $\boxed{\;:\;}$ or 

ga	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
gb	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
gc	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
gd	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box $\boxed{\;:\;}$ or 

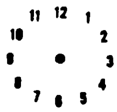
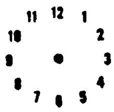
Prismaston Council Meeting

time-box $\boxed{\;:\;}$ or 

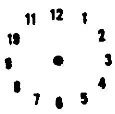
cm	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
cn	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
co	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

p - plan : * - Prismmem/ book : a - apparatus : f - friend

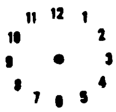
Tr - T reads : Th - T hints : Tx - T explains : Tm - T says miss out

stop? [:]  restart? [:] 

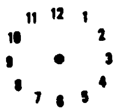
cp	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
cq	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
cr	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
cs	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box [:] or 

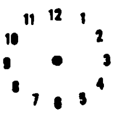
The Map

time-box [:] or 

ma	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
mb	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
mc	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
md	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
me	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box [:] or 

Transport

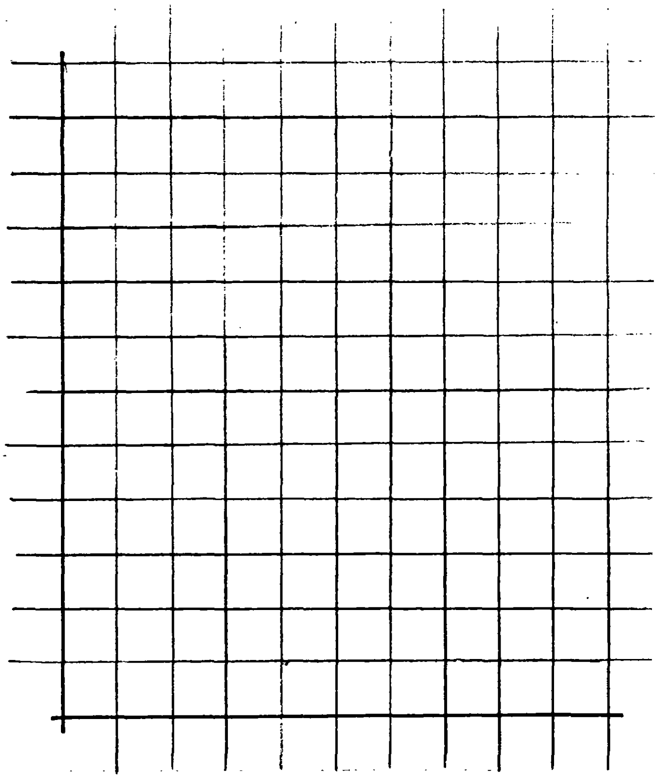
time-box [:] or 

ta	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
tb	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
tc	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
td	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

p - plan : * - Prismmem/ book : a - apparatus : f - friend

YOUR TRANSPORT SURVEY

	Agent	Transport
1	......	....
2	......	....
3	......	....
4	......	....
5	......	....
6	......	....
7	......	....
8	......	....
9	......	....
10	......	....



Title: ______________________________

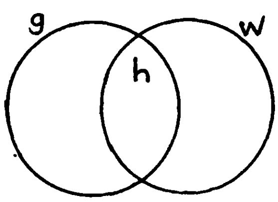
____

xg: girls: ____ = g

xh: children who walked .... ____ = w

xi: girls who walked .... ____ = h

xj: Fill in the diagram:

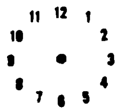
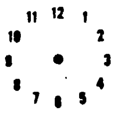


My drawing of a PRISMON   by   Earth Name:........................

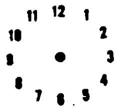
AGENTS' PICTURE GALLERY: AGENT: ☐☐☐☐ (Prismoan name)

We need a picture of you for our Agents' Picture Gallery. Draw the best picture you can in case we have to identify you at a later date.

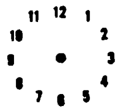
Tr - T reads : Th - T hints : Tx - T explains : Tm - T says miss out

stop? [:]  restart? [:] 

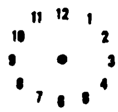
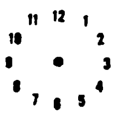
te	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
tg	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
th	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box [:] or 

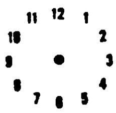
Your Transport Survey

time-box [:] or 

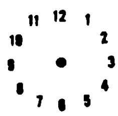
xa	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
xb	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
xc	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
xd	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
xe	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

stop? [:]  restart? [:] 

xg	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
xh	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
xi	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
xj	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box [:] or 

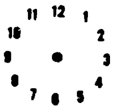
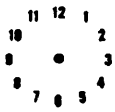
The Transport Discussion

time-box [:] or 

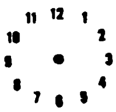
p - plan : * - Prismmem/ book : a - apparatus : f - friend

Tr - T reads : Th - T hints : Tx - T explains : Tm - T says miss out

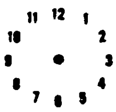
da	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
db	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
dc	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
dd	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
de	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

stop? :  restart? : 

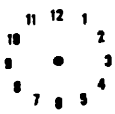
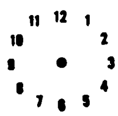
dg	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
dh	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
di	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
dj	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box : or 

Castles

time-box : or 

na	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
nb	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
nc	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
nd	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

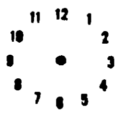
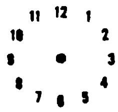
stop? :  restart? : 

nf	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
ng	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
nh	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

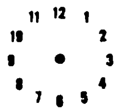
p - plan : * - Prismmem/ book : a - apparatus : f - friend

Tr - T reads : Th - T hints : Tx - T explains : Tm - T says miss out

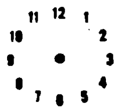
ni	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

stop? [:]  restart? [:] 

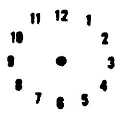
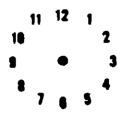
nj	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
nk	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
nl	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
nm	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box [:] or 

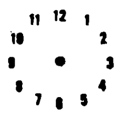
History in Prismaston

time-box [:] or 

ta	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
tb	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
tc	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

stop? [:]  restart? [:] 

td	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
tf	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm
tg	A	B	C	D	p	*	a	f	Tr	Th	Tx	Tm

time-box [:] or 

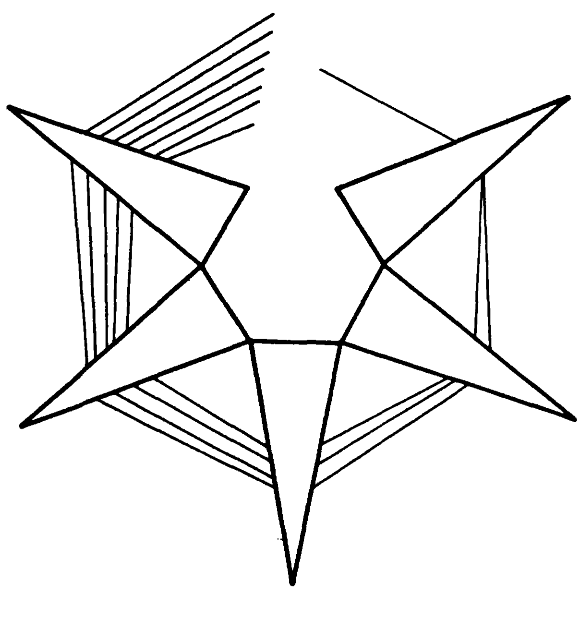
p - plan : * - Prismmem/ book : a - apparatus : f - friend

Something about us

1) Listen to your teacher very carefully and then draw your idea of a Prismon across the centre pages of this book.

2) We need a drawing of you for our Agents' Picture Gallery so please would you draw the best picture you can of yourself on the page after the centre page.

YOU HAVE NOW COMPLETED ALL THE DATACHECKS. A PRILLION THANKS FOR YOUR HARD WORK. YOU HAVE BEEN A MOST VALUABLE AGENT. GOOD-BYE!



Description of a Prismon 1st. & 2nd. year version

(For teachers' eyes only!) This description is to be read to the class about a week after the introductory session. It should be read in the way you would read a story to the class; it is a LISTENING EXERCISE. It should be read twice.

SOMETHING ABOUT US : What does a Prismon look like?

This information is strictly secret . That is why we cannot let everyone have a copy. As good agents do, so you must listen for every detail.

To begin with, we're much smaller than you. Fullgrown Prismons as we're called , are only a bit bigger than your handspan. Baby Prismons, called Prisbis are a third of that size.

We're all based on threes and sixes whereas you are based on twos and fives. For example, you have two eyes, two ears, two arms, two legs and your fingers and toes are in bunches of five. Prismons have three eyes, three ears, three legs and so on, and we have SIX fingers on each hand and SIX toes on each foot. AND we have useful toes, not like your funny little things.

We have two main parts. A head, which is the shape of a cylinder (toilet roll shape) and a body which is the shape of a triangular prism.......or, in other words, the same shape as a certain kind of chocolate packet, but shorter. Our heads and bodies can be fat or thin. A friend of mine has a thin b dy and a very large head. I'm afraid it has to spend a lot of time sitting down and it hates walking.

Now here are the details, so pay attention.

We have trree eyes which can move all the way round the tops of our heads so we can get a good look round. We have three ears which are evenly spaced around our heads. Our ears do not move but they do have ear-lids for when we want a bit of peace. I have found these very useful at some school dinners! Instead of a nose, we have three nostrils which pop out of the tops of our heads.

We have one hexagon shaped mouth each. If you're a real chatterbox you would have a large mouth but a quiet Prismon would have a tiny one.

Our arms and legs grow out of the points of the triangles that the top and bottom of our bodies. Our arms are long and curly and our legs are straight and stick out at an angle so that we don't fall over.

Our fingers are quite interesting. Most of them are long and pointed but we can grow special fingertips. For example, my friend has three paint-brush tips and I have a screw-driver end on one finger. It just depends on what you're interested in. Most of us have at least one pencil end. Our toes are the sane but shorter.

(continued overleaf)

Finally, what are we made of?

That's a secret I'm afraid. In fact, it's THE secret of our success. You see we can change not only our colour, but also our texture, or what we feel like to touch. So, if we're hiding in a baby's room we can be all soft and cuddly, in a church we can be dark and grainy, like wood, and in a science cupboard we can be hard and metallic!

I wonder if you'll begin to notice us now. We'll have to practise keeping extra-specially still!

That's all I can tell you. Cheerio!

Description of a Prismon 3rd. & 4th. year version

(For teachers' eyes only!) This description is to be read to the class about a week after the Introductory session. It should be read twice and it forms a LISTENING EXERCISE.

SOME INFORMATION ABOUT US : What does a Prismon look like?

(This information is strictly secret. That is why we cannot let everyone have a copy. As good agents do, you must listen for every detail.)

The people of Prismos are called Prismons. Although we have had agents visiting your world for hundreds of years, we hope you have never seen one of us us. We practise keeping very still and humans usually ignore us. They regard us as bits of old equipment that they have forgotten how to use. Sometimes people try to tidy us up by throwing us in the bin, but more often than not, we are tidied into 'Science Resource Cupboards' along with the clocks, batteries and magnets. Magnets, by the way, play havoc with our digestive systems! Dxox had tum tummy-ache for a week after a spell in a Science Resource Cupboard!

Anyway, you want to know what we look like, don't you? We are much smaller than you and we come in three sizes. The size depends on our age. Baby Prismons, called Prisbis, are exactly one prismetre in length, that is exactly SIX centimetres. The middle-sized Prismons are two prismetres tall and full grown Prismons are three prismetres tall. I expect you can work out how tall that is in centimetres....

Now for the details, so pay attention.

We are all based on threes and sixes, whereas you humans are based on twos and fives. For example, you have two eyes, two legs, two feet each with five toes and two hands, each with five fingers. What is more, you expect to have all your limbs from the day you are born!

We Prismons are different. A full grown Prismon has three arms, three legs, three eyes, three nostrils and three ears. Furthermore, we have six fingers on each hand and six toes on each foot. AND our toes are useful, unlike your funny little things!

Another big difference is that a new-born Prisbi has no arms or legs, just a head and a body. The limbs grow later. The head is fully formed.
Here is a description of it.

A Prismon's head is cylindrical. The top of its head is a flat circle which can have a large or small diameter. Right on the tops of our heads and in the middle of the circle are three triangles. These are our nostril shutters. The shutters are to keep out the rain and have been especially useful in your climate! When its dry and something smells good, our nostrils pop out on stalks.

(continued overleaf)

We have three eyes which are on the top edge of the cylinder and can move all the way around it so we can have our eyes spaced out evenly to get a panoramic view or we can put all three close together to get a really good look at something. We do not have eyelids like you but we DO have three ears each with an EARLID in case we want a bit of peace! Our ears are evenly spaced out around the midline of our heads.

We have one hexagonal mouth each. Its size gives away how talkative we are. A real chatterbox would have a large mouth but a quiet Prismon's mouth could be very small.

What about our bodies?
They are the shape of triangular prisms or, in other words, the same shape as a certain kind if chocolate packet. The triangular surfaces are at the top and bottom and they can be large or small, so we can have fat or thin Prismons.

Our arms and legs grow from the points of the triangles at the top and bottom of the prism. Each arm has six fingers, as you know, but we can develop special fingertips for specific jobs. It all depends on our interests. Artists of often grow a few bristle-ended fingers (or toes) to paint with; mechanics grow screw-driver and spanner fingertips and most of us grow a set including a knife, a fork, a few pencil ends and a spoon. The remaining fingers are long, thin and conical. Our toes are just like our fingers and can also grow a variety of tips.

What do you think we are made of?
I'm afraid that that's a secret. In fact it's THE secret of our success. You see we can change, not only our colour, but also our texture to suit our task or to blend into the background. That's why you have probably never noticed one of us. In a playroom we can be all soft and cuddly but in a Science cupboard, where we frequently have to hide, we can turn hard and metallic.

I wonder if you'll begin to notice us now. We'll have to stay extra-specially still. And that's all I can say.

Cheerio!

THE PRISMASTON FILE

Teachers' Notes

The instructions for use of the Prismaston File are contained in the first six pages of the pupils' "datacheck" booklets. The introductory session should consist of teacher and class working through these instructions. The first session will, therefore be hard work, requiring prolonged concentration particularly from first years. It is hoped that the "game" of "Secret Agent Training" course will sustain many children through the instructions but it is hoped that teachers will add questions.... what is evidence?; what are facts?; etc. and will pay special attention to children likely to get lost! If the class teacher can play up the part of Prismons' accomplice and agents' trainer, so much the better!

After the introductory section, when the children are invited to begin datachecking for themselves, there is a short section called "Alphabets". Although some children will easily answer these questions, they are intended as a practice at using the answer codes for both pupils and teacher. If time allows it should be the last part of the introductory session which will take about one hour.

The instructions are intended to be worked through as a class lesson, but the teachers who piloted the File tried also introducing it to smaller groups, particularly with the younger children. One teacher grouped the children together on the carpet with their books, and sent them to their tables to try the examples, regrouping them afterwards to show them the Clue-codes and the Prismmem. This class was in an open plan area ill-suited to class teaching.

Although the instructions seem complicated at first, and the first sessions a bit difficult if all the children are doing their Prismaston work together, they quickly become independent, particularly if the notion that teachers' ideas are not required is stressed! This was found to be very effective in encouraging children to READ the information for themselves rather than being too reliant on the teacher.

The following notes are additional to the instructions and cover comments and tips from the teachers who tried out the File for us.

Target Completion Date: although a fortnight is suggested, there is no rigid time limit; some children will finish the books very quickly, others will need longer than a fortngiht, or extra sessions within that time. Three weeks should be ample for all the children. We hope that most children WILL complete the whole thing, however.

These notes are long and prescriptive for the sake of completeness. The Prismaston File is, however, intended to be flexible and teachers are asked to run the project in a way typical of the usual class routine.

Extra Notes to Accompany The Prismaston File

1 The first five boxes on the code-book are for the pupil's code number which is on the computer list of test results. Your classroom observer may have already given you a list of names and numbers but you can obtain the number from him or her if you need them.

2 Do the drawing of a Prismon after the children have had the File for about one week. The drawing for the Agents Picture Gallery need not be part of the same session.

3 Although a theme runs through the File, there is no need to stick to the order of the sections. The answer books, or "code-books", make it easy to see which sections have not been done.

4 A few children thought that they had to tick a clue-code for every item. This is obviously unnecessary, but please make sure that no-one is doing this. On the other hand, some children forgot to tick clue-codes; reminders to tick 'p' if they use picture clues will be useful.

5 It is suggested that some one to one discussion between agents may be useful occasionally. The amount of consultation between agents that is permitted will vary from class to class. The children must be reminded not to broadcast their ideas but to speak them very quietly. It is hoped, however, that "The Transport Discussion" in the 3rd. and 4th. year version will be discussed and that it may spark some debate in the class.

6 Time-boxes: please encourage those who can to express the time digitally as this is obviously more accurate than drawing clock hands can be. We are sorry that the clocks have turned out to be rather small.

The time-boxes in the middle of sections are to cater for stoppages such as play-times, overnight etc. and to allow short sessions to be timed. If a child stops at an item which is not immediately before a clock, this does not matter, he or she should simply fill in the next time-box. If they have to stop in a section without extra time-boxes, they could perhaps write the time at the side.

7 Encourage the children to use the Prismmem (and to tick *) if necessary. Remind them of its contents and that they are welcome to use other reference books to find definitions etc.

8 Remind the class to READ the "story" sections so as not to miss information. (Some children tend to skip from datacheck to datacheck and soon need help.) Please check up on the children's progress through the File every few days.

Finally, thank you for undertaking the project. We hope that your class will find The Prismaston File both enjoyable and informative.