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Two-sided copy of the:

**Guide to data available
at the ESRC Data Archive**

Social Statistics Research Unit

1970 British Cohort Study Ten-year Follow-up

Guide to data available at the ESRC Data Archive

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1970 British Cohort Study (BCS70)

Ten-year Follow-up

(Formerly known as the Child Health and Education Study, CHES)

A Guide to the BCS70 10-year Data

available at the

Economic and Social Research Council Data Archive

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Finally we would like to express appreciation to all the health visitors, teachers, school nurses, doctors and administrators involved in the collection of the 10-year data. None of this would have been possible without the magnificent co-operation of the cohort members and their parents.

Preface

This document is a guide to the 1970 British Cohort Study (BCS70) Ten-year Follow-up. It is designed to accompany the first deposit of data from this survey with the Economic and Social Research Council Data Archive, at the University of Essex. The documentation and data have been prepared by the Social Statistics Research Unit (SSRU) at City University which took over responsibility for BCS70 in 1991.

In Section 1, a short history is given of the whole longitudinal study. This is followed by a more detailed account of the ten-year survey begun in 1980. Section 2 provides an in-depth guide to using the 10-year data, outlining amongst other issues, the data cleaning policy, response bias and reliability of specific questions. In Section 3 and 4 the information manuals and annotated questionnaires are reproduced respectively. In Section 5, there are 4 appendices. The first gives a more detailed account of some of the topics touched on in the previous sections. It is in the form of an earlier Report to the Department for Education. The second and third appendices are summaries of topics available and list of publications. The fourth is a coding frame for accident aetiology.

Everyone is strongly advised to read Section 1 first, as the historical context facilitates a clearer interpretation of the data.

Summary of the Data Deposit

1970 Birth Cohort Study: 10-Year Follow-up (formerly known as Child Health and Education Study)

Principal Investigator	Neville Butler, Formerly Director BCS70; Director, International Centre for Child Studies.
Original Organisation Depositor	University of Bristol, Dept. of Child Health. John Bynner, Director, Social Statistics Research Unit, City University, EC1V OHB.
Documentation	Prepared at SSRU by Neville Butler, Sofia Despotidou and Peter Shepherd.
Acknowledgements	Fieldwork organisation: England and Wales Local Education Authority and Area Health Authority staff. Scotland Regional Council and Health Board staff. Field staff: Health Visitors, Teachers, School Nurses, Doctors. Cleaning and Editing at University of Bristol, Dept. of Child Health, and the Social Statistics Research Unit, City University.
Purpose	To review and evaluate mid-childhood (10 year) health, care, education, social and family environment throughout Great Britain, as experienced by the cohort of children born in the week 5-11 April 1970.
Variables	Five types of instruments were used: Self-Completion Questionnaires (Child, Parent, Teacher) Interview (Health Visitor/Parent) Medical Examination (School Doctor/Child) Tests (Teacher/Child) Measurement Scales: Rutter A Scale of child behaviour deviance; Conners Hyperactivity/Behaviour Scale; Neurodevelopment Scale; Lifeskills Scale; Expressive Language Scale; Reading Test, Mathematics Test, Verbal and Non-Verbal Reasoning Test, Picture Language Comprehension Test; Lawseq (Self-esteem Scale); Caraloc (Locus of Control Scale); Malaise Inventory (Mother).
Population	Children born 5-11 April 1970.
Sampling Procedures	An attempt was made to trace all children born 5-11 April 1970 through the co-operation of Local Education Authorities and Family Practitioner Committees (RCs and HBs in Scotland). 90% of the 1970 Cohort were traced and completed one or more survey documents.
Cases (target)	16,500
Cases (obtained)	14,875
Method of Data Collection	Oral interview, medical examination, school tests, self-completion questionnaires (child, mother, teacher).
Date of Data Collection	1980/81

SECTION 1

INTRODUCTION TO THE 1970 BRITISH COHORT STUDY, WITH PARTICULAR REFERENCE TO THE TEN-YEAR FOLLOW-UP

INTRODUCTION

1.1 Britain has a unique tradition in conducting longitudinal birth cohort studies. Three continuing studies have been embarked upon. These were in 1946 (National Survey of Health and Development, NSHD), in 1958 (National Child Development Study, NCDS), and in 1970 (the 1970 British Cohort Study, BCS70). Each was launched as a study of antenatal/postnatal service provision, and morbidity or perinatal mortality. All three studies collected information about almost all births occurring nationwide in a target week in 1946 (NSHD, n=13,687), in 1958 (NCDS, n=17,414), and in 1970 (BCS70, n=17,198) respectively. Each study has subsequently carried out multidisciplinary follow-up surveys (or sweeps) on health, education, family and social influences at various ages (Douglas, 1964; Douglas et al 1968; Wadsworth 1979, 1991; Butler and Bonham, 1963; Butler and Alberman, 1969; Davie et al, 1972; Fogelman, 1976, 1983; Ferri, 1993; Chamberlain et al, 1975, 1978; Osborn et al, 1984). The studies present individually and in combination an unprecedented opportunity to investigate the forces and patterns that have shaped and continue to shape the lives of three overlapping generations of people living in Great Britain.

1.2 This document is designed to accompany the deposit of data from the *BCS70 Ten-year Follow-up* with the Economic and Social Research Council Data Archive at the University of Essex. Because of the diverse and comprehensive nature of the follow-up, it has taken some time to assemble, collate, clean and document the 10-year data. In fact, the deposit of this data means that the Data Archive now holds data for the complete longitudinal record from birth to sixteen - data from the other BCS70 follow-ups having been deposited some time ago. Data from the 21-year sample survey and the 26-year Follow-up will be deposited in the near future.

1.3 The present section is in two parts. The first provides details of the background to BCS70 in general, and describes the availability of the data, and some of the publications arising from research using the BCS70 data. The second, focuses on the BCS70 Ten-year Follow-up in particular, providing details of the design and conduct of the survey, and the initial data preparation. Later sections provide a guide to using the 10-year data, and annotated copies of the survey instruments employed. An outline of additional data cleaning and documentation undertaken by the Social Statistics Research Unit (SSRU) is also included.

The documentation and data have been prepared by the Social Statistics Research Unit at City University, which is responsible for BCS70, as well as for NCDS.

BACKGROUND TO THE 1970 BRITISH COHORT STUDY

Outline of the Longitudinal Study

1.4 BCS70 began in 1970 when data were collected about the 17,198 babies born in England, Scotland, Wales and Northern Ireland in the week 5-11 April. At this time, the study was named the British Births Survey (BBS) and it was sponsored by the National Birthday Trust Fund, in association with the Royal College of Obstetricians and Gynaecologists. Since 1970, there have been four attempts to gather information from the full cohort - when they were aged 5, 10, 16 and 26 years.

1.5 As Table 1.1 shows, information has been obtained from a number of different sources, and by varying types of instrument. With each successive attempt, the scope of enquiry has broadened from a strictly medical focus at birth, to encompass physical and educational development at the age of five, and physical educational and social development at the age of ten. This wider and more comprehensive approach has been adopted subsequent to the Ten-year Follow-up, namely in the 16-year and 26-year sweeps.

1.6 In the birth survey, information was collected by means of a questionnaire completed by the midwife present at the birth, and supplementary information was obtained from clinical records. The five-year and ten-year follow-ups were carried out by the Department of Child Health, Bristol University and the survey at these times was named the Child Health and Education Study (CHES). On both occasions parents of the

cohort members were interviewed by Health Visitors, the children themselves undertook tests of ability, and the school health service gathered medical information on each child. This was supplemented at ten years by information gathered on a questionnaire completed by head and class teachers, and the children had completed a medical examination. In 1975 and 1980, the cohort was augmented by the inclusion of immigrants to Britain who were born in the target week in 1970. Subjects from Northern Ireland who had been included in the birth survey, were dropped from the study in all subsequent sweeps.

Table 1.1: BCS70 Follow-ups and sources of information 1970-1996

BBS (1970)	CHES (1975)	CHES (1980)	Youthscan (1986)	BCS70 (1996)
<i>Birth</i>	5	10	16	26
Mother	Parents	Parents	Parents	
	Test	School Tests	School Tests	
Medical	Medical	Medical	Medical	
		Subject	Subject	Subject
16,135 *	13,135	14,875	11,628	9,003*
98%**	80%	93%	72%	56%

Notes: * Achieved Sample - at least one survey instrument partially completed.
(The figure for the BBS comprises cohort members living in GB known to be alive at the end of one week).

** Per cent response.

1.7 In addition to the five major sweeps shown above, surveys of sub-samples were carried out in 1972, 1973, 1977 and 1991. In 1972 and 1973 the British Births Child Survey took as its subjects three sub-samples; all twins in the original cohort were included as were low birthweight and post-mature births. A random ten per cent sample of the original cohort acted as a control group. The South-West Region Survey, carried out at the age of 3 1/2 surveyed ninety five per cent of the cohort members who lived in the south west of England and Glamorgan, South Wales. These smaller scale surveys were undertaken in order to bridge what was a large gap in child development terms between birth and five years of age (when the next full sweep was planned). In 1977, an attempt was made to obtain details about those who had not responded in the five-year survey. A postal questionnaire was completed by parents of 1,917 of the non-responders. At age 21 a ten per cent sample survey consisting of 1,600 cases was carried out which focused on adult literacy and numeracy problems in young adults as well as investigating the transition from education to employment.

Availability of Data

1.8 Data for the *birth survey*, the *22-month* and *42-month sample surveys*, and the *five-year* and *sixteen-year* follow-ups are already lodged at the *ESRC Data Archive*, and are available to the research community for analysis.

1.9 Data for the *twenty-one-year* sample survey and the *twenty-six-year* follow-up data are currently being prepared by SSRU, and will be deposited with the *ESRC Data Archive* upon completion.

A fully documented database containing all BCS70 data, is now being prepared by SSRU and will be made available via the *ESRC Data Archive*. Until data are generally available in this way, it is possible to obtain data not already lodged with the *Data Archive* from the SSRU directly - see *paragraph 1.77* below for more details.

Some Examples of Published Material

1.10 Wide-ranging use has already been made of the data arising from the four full sweeps of BCS70. It is not within the scope of this document to review the literature, but it is useful when considering the background to the project to mention some key works. The birth sweep provided a valuable insight into the patterns at that time of obstetric and neonatal care in the United Kingdom (Chamberlain et al 1973, 1975). The birth and five-year findings relating to health were discussed in Butler, Golding and Howlett's (1986) *From Birth to Five: A Study of the Health and Behaviour of Britain's 5-Year Olds*, and general findings from the first two sweeps were also outlined in a book written by Osborn, Butler and Morris (1984). Chamberlain and Simpson (1979) also concentrated on the health data arising from the birth, 22 and 42 month surveys in their book *The Prevalence of Illness in Childhood*.

1.11 In addition to these general accounts of the findings of BCS70, a number of specific projects have been undertaken in a wide range of fields. In the area of health, investigations have ranged from vision problems (Atkinson and Butler, 1985; Stewart-Brown, 1986) to childhood accidents (Bijur, 1984; Wadsworth et al, 1983a), appendicitis (Barker et al, 1988), breast-feeding (Taylor et al, 1983a, 1984) teenage mothering (Taylor et al, 1983b; Wadsworth et al, 1983b) and much more. Special educational problems and needs have formed the scope of some of the research arising from the BCS70 data. For example, Haslum and Butler (1985) considered the special education needs of ten year olds, and Rodgers (1983) investigated the prevalence of reading retardation. Different forms of social behaviour and their influence on health and development have also been investigated. Rush and Cassano (1983) considered the influence of parental smoking on perinatal mortality; Haslum, Morris and Golding (1984) reported on the diets of Britain's ten year olds; Osborn (1984) considered maternal employment and depression and their influence on child behaviour; and Osborn and Morris (1982) investigated fathers' roles in child care. Osborn and Milbank (1987) showed the longer term value of pre-school education and day-care. A full bibliography of publications and reports arising from BCS70 is reproduced in Appendix 3.

1.12 The data already collected provide a remarkably rich research resource in a large number of areas. Future data collection by means of regular sweeps, and the adoption of an integrated approach to the design and analysis of this study with the 1958 cohort study (NCDS) will present exciting new possibilities and dimensions.

THE BCS70 TEN-YEAR FOLLOW-UP

Rationale and Overall Design

1.13 The *BCS70 Ten-year Follow-up* is the second full national follow-up of the 1970 cohort born in Great Britain 5-11 April 1970. The cohort has been surveyed comprehensively at birth, five, ten, 16 and 26 years, and samples were seen at 22 months, 42 months, seven and 21 years. The *BCS70 Ten-year Follow-up* was originally titled the *Child Health and Education Study* (CHES), but in 1991 the whole 1970 Cohort Study was renamed the British Cohort Study 1970 (BCS70) and the ten-year sweep became known as BCS70 Ten-year Follow-up.

Objectives of the Ten-year Follow-up

1.14 A number of considerations influenced the development of the survey instrumentation used for the BCS70 Ten-year Follow-up.

(a) **Educational Progress:** A major factor in this follow-up was to examine ten year old children's educational achievement and the ways in which it is influenced by other events. For this it was decided to give each cohort child a number of educational tests administered by the class teacher, and in particular reading, mathematics, language, and reasoning. Parents, Health Visitors and Head Teachers would report on the home and educational milieu in which the Study children were developing. Relationships would be studied between children's test performance and parental attitudes, teacher interest, home environment, and

also the 'ethos' of the school as a social and educational institution. Longitudinally the educational progress of this nationally representative sample of children could be evaluated in relation to a wide range of earlier developmental, educational, social and health factors recorded previously on the same cohort and in particular the effects of pre-school education and daycare.

(b) ***Education of Handicapped Children:*** The *Warnock Committee* had reported on the education of handicapped children and young people just before the *Ten-year follow-up* (Warnock, 1978). It estimated that as many as one in five of all children experienced learning difficulties which could interfere with the realisation of their full potential. This area had been under-researched due mainly to the difficulty in examining a representative childhood sample. The educational part of this ten year national Study was well situated to examine the school progress and needs, not only of handicapped children but of a whole population.

(c) ***Specific and Non-specific Learning Difficulties:*** Much-needed information could be provided about the prevalence of learning difficulties in mid-childhood. Educational tests were chosen with a wider range than usual in order to encompass the lower ranges. Evaluation could be made of the influence on children with learning problems of life events, stress or ill health - also the influence of their home and family circumstances. Children with specific reading and mathematical difficulties such as developmental dyslexia could be examined in relation to social, health and other educational factors. Specific questions were included to identify attention deficit and/or hyperactivity (ADHD). In addition children who could not be tested with the normal tests were to be evaluated using a wide range of special educational tests. It was also planned that the special tests should be administered to those children achieving below the fifth percentile for this age group in reading and mathematics.

(d) ***Health Hazards:*** The Health part of the Study was designed to measure their medical, social and family status at 10 years. In order to compare this with what had been found out at five years, this was to be obtained in a similar way to five years. An interview would be held with the parents, usually the mother, who was also to fill in a self-completion form describing their child's behaviour, life skills and activities. A medical examination by the school doctor would provide measures which could be related to the child's health at birth, at pre-school, and at infant and primary school.

(e) ***Special Health Study:*** Ten year children with impairments, disabilities or handicap, many of whom had already been identified at the five-year follow-up, were to be made the subjects of a special study of their use and their family's use of health and social services, though the results of this special study are not reported here.

(f) ***Longitudinal Element:*** This is of course above all a longitudinal study. It is worth repeating that the comprehensive nature of the data gathered from birth onwards enabled a study of the effects on the 10-year child's education, health and general progress, of perinatal problems, serious childhood illnesses and critical episodes in the family or social environment.

Tracing

1.15 The names and addresses for the *BCS70 Ten-year Follow-up* were obtained initially through *School Registers* on which a pupils sex, name, address and date of birth were recorded. Late in 1978, help for this was obtained from every *Local Education Authority* (LEA) in England and Wales and every *Regional Council* (RC) in Scotland. A supply of numbered and addressed school trace forms were sent to all LEAs and RCs throughout Britain. LEAs and RCs were asked to send these to the Head Teacher of each maintained primary (junior), middle school or special school within their boundaries. Each school was asked to provide the survey team with the name, address and exact date of birth of each child born 5-11 April 1970 and the name of parent(s) or guardian(s).

1.16 Information came to the survey team from these tracing forms over a six month period. From these forms an initial ten-year survey address file was compiled.

A second index was compiled from study records of the cohort children in England, Scotland and Wales who had taken part previously in the survey at birth, or at five-years (n=13,135), or 7-years (n=1,915).

From the two registers the survey team were able to match through their surname the children on the 10-year register with those who had taken part in one or more previous follow-ups. This matching process was a lengthy procedure and was made more difficult by change(s) of name or address which some of the children had experienced during their short lives. Matched children were allocated the same *Central Survey Number* as used on the birth or five-year file. For those who could not yet be matched, a new Central Survey Number was allocated and this was retained unless or until matching could be accomplished.

1.17 During the course of the survey the number of children traced was augmented in many areas by asking *Family Practitioner Committees* (FPCs) in England or *Health Boards* (HBs) in Scotland to notify the survey team of those 10-year old children in their area born 5-11 April 1970 who were on the list of an NHS General Practitioner. Other methods of updating addresses are described in the section on fieldwork in the *Health Pack* (see paragraph 1.35 below).

Methodology

1.18 The co-operation of Local Education Authorities (LEAs) and Regional Councils (RCs) was sought to trace the whereabouts of cohort children who were on their school registers. LEAs and RCs were also asked to appoint an *education co-ordinator* to receive and distribute an *Educational Pack* for completion in school, and return the packs for analysis. On the health side, Area Health Authorities (AHAs) and Scottish Health Boards (HBs) were asked to co-operate and to appoint a *health co-ordinator* (usually a doctor or nurse) with the remit to arrange for each study member a home interview and a medical examination. The vast majority of Education and Health Authorities agreed readily to join in as will be seen from the very high yield of completed questionnaires.

Co-operation from Official Bodies

1.19 Approval was obtained of among others, the Society of Chief Education Officers; the Association of Metropolitan Authorities; the Health Visitors Association; the Royal College of Nursing; the British Medical Association; the Scottish Medical Association; the National Union of Teachers and the Association of Head Teachers.

Informed Consent

1.20 A *Parental Pack* seeking informed consent and including explanatory letters to parents and cohort members was sent out early in 1980 to current addresses if already traced, or to last known address if so far untraced. AHA/HB and LEA/RC co-ordinators were supplied with Parental Packs to send on to any cohort members subsequently identified.

Survey Instruments

1.21 The *BCS70 Ten-year Follow-up* made use of some 15 separate survey documents, comprising manuals, assessments, self-completion questionnaires, interview schedules, and a medical examination record. Table 1.2 below identifies the survey documents, shows those for which data are deposited at the *ESRC Data Archive*, and specifies the number of cases for which data are available. Abbreviations used to identify survey instruments in parts of this documentation are also indicated.

1.22 The questionnaires were distributed as two packs known as the *Educational Pack* and the *Health Pack* because they were distributed by the Education and Health Authorities respectively. In terms of actual content matter there is a degree of overlap between the two packs but the terms 'Educational' and 'Health' are convenient summary labels.

1.23 The *Health Pack* was designed mainly by the Director - Professor Neville Butler - with help and advice from many quarters. Dr Walter Barker and Dr Mary Haslum were mainly responsible in designing and piloting the material in the *Educational Pack*. They were also responsible for the preparation of a *Special Education Pack* which was used in circumstances described below (see *paragraph 1.57*). Again this work was done in consultation with a number of specialists and experts (see *Acknowledgements*).

Table 1.2: BCS70 Ten-year survey instruments deposited with the ESRC Data Archive

	<i>Abbreviation</i>	<i>Number</i>	<i>Deposited</i>
<i>EDUCATIONAL PACK</i>			
Instruction Booklet for Educational Tests	dna	dna	dna
Pictorial Language Comprehension Test	PLCT	12,701	Yes
Friendly Maths Test 3	FMT	11,685	Yes
Shortened Edinburgh Reading Test	ERT	11,685	Yes
British Ability Scales	BAS	11,685	Yes
Educational Score Form	EDSCORE	12,805	Yes
Educational Questionnaire	EDQ	12,755	Yes
Pupil Question Form	PUPIL	12,699	Yes
<i>HEALTH PACK</i>			
Instruction Booklet on Nursing and Medical Aspects	dna	dna	dna
Maternal Self-Completion Form	MSCF	13,679	Yes
Parental Interview Form	PIF	13,869	Yes
Medical Examination Form	MEF	13,869	Yes
<i>SPECIAL EDUCATIONAL PACK</i>			
Instruction Booklet for Special Educational Tests	dna	dna	No
Special Test Booklet	STB	456	No
Special Teacher Questionnaire	STQ	456	No

Notes: dna = does not apply

1.24 Details of the development and administration of both the *Educational Pack* and the *Health Pack* are given separately below.

A EDUCATIONAL PACK

Contents of Educational Pack

1.25 The *Educational Pack* consisted of the *Pupil Question Form*, the *Educational Score Form*, the *Educational Questionnaire*, and four *test booklets*. Copies of each - annotated to indicate variable names - are to be found in *Section 4* below. The pack also contained an *instruction booklet*, and a copy of this is in *Section 3* below. An outline of the purpose and content of the questionnaires and test booklets is given below, together with details of the nature of the educational tests.

(a) **Pupil Question Form (PQF):** This was for self-completion by the cohort member at school under supervision. It contained two motivational tests: the *Locus of Control* and *Self-esteem* scales (see *paragraph 1.26 (g)* below). A personality inventory and questions on smoking, respiratory symptoms and basic nutritional data were also included.

(b) **Educational Test Booklets:** There were separate booklets used for the modified *Edinburgh Reading Test* (ERT), the *British Ability Scales* (BAS), the *Friendly Maths Test* (FMT), and the *Pictorial Language Comprehension Test* (PLCT). Responses to the PLCT were recorded on the *Educational Score Form* for data entry (by means of optical mark recognition, OMR). Responses to the other three tests were entered in the relevant test booklet, and the scoring was done later by trained coders. Further details of these tests are given in *paragraph 1.28* below, and also in *Appendix 1*.

(c) **Educational Score Form (EDSCORE):** This was administered by the class teacher in school. The teacher entered the response to the PLCT in the *Educational Score Form* for later machine processing, and then took the cohort member through four *Diagnostic Tests*, mainly concerned with assessing learning problems, and recorded their responses in this instrument. Further details of these tests are given below, and also in *Appendix 1*.

Finally, responses to a *Social Judgement Scale* were also recorded in this instrument.

(d) **Educational Questionnaire (EDQ):** This was completed by the class teacher and head teacher. Most of it was in OMR format for machine processing but there were 15 instances where numerical answers were necessary which were to be keyed in.

This instrument covered four areas: the child's educational status; social behaviour; developmental behaviour; and educational environment. *Educational status* included questions on special education or remedial treatment; it also examined the curriculum content and the teacher assessed the level of parental interest shown in the child's education. Questions on *social behaviour* dealt with school absence(s), and the child's relationships with peers. The child's *developmental behaviour* was assessed in a 53-item *Child Development Scale* (see *paragraph 1.28 (i)* below). The final items in this section asked for a teacher assessment of the child across two well known personality dimensions, namely introversion/extraversion and anxious/unworried.

Questions on the *educational environment* were also included in this instrument. They covered basic school data, and focused in particular on: class size; teacher-child ratio; and teacher input into the child's education; methods of encouragement and motivation; and the classroom and school ethos as judged by the teacher and head. A variety of questions on counselling and discipline were included. Other questions examined the nature of the school intake, in terms of academic, social and minority groupings. The social level of the school neighbourhood and the closeness to major traffic centres and thus to sources of pollution were also the subject of enquiry.

Nature of the Educational Tests

1.26 Educational Tests were chosen which reflected the respondents' innate qualities, acquired skills, and could be measured against home environment (in particular parental encouragement); and also the primary educational system. As in the previous study on the 1958 cohort (the *National Child Development Study*, NCDS), it was decided to aim at a fairly wide coverage of educational attainment, and to quantify the educational environment as far as possible. Full coverage of the curriculum would have required several days assessment of each child. Therefore, the goal had to be to concentrate mainly on areas considered important for later educational success and for employment potential.

1.27 It was decided to rely mainly on the children's reading, mathematics, cognitive ability, language comprehension and expression, diagnostic reading, motivation, and behavioural development. The *Educational Tests* were found on piloting to take approximately two and a half hours to complete, so it was recommended that the administration of these be done in two or three sessions.

1.28 The *Educational Tests* used are listed in Table 1.3. Further details of these tests are given below, and their rationale and composition is enlarged upon in *Appendix 1*.

Table 1.3: Tests in the Educational Pack

EDUCATIONAL TESTS ^a	DIAGNOSTIC TESTS ^c
British Abilities Scale (Modified) (BAS) <i>Non-verbal</i> - Recall of digits - Matrices <i>Verbal</i> - Word definitions - Word similarities	Diagnostic Reading Test Dictation (Writing and Spelling) and Copying (Writing) Naming Body Parts (Left - Right Test) Sequential recall of months of year
Shortened Edinburgh Reading Test (ERT)	SOCIAL JUDGEMENT SCALE ^c
Friendly Maths Test (FMT)	MOTIVATIONAL SCALES ^d Locus of Control (Caraloc) Self-esteem Scale (Lawseq)
Pictorial Language Comprehension Test (PLCT) ^b - <i>Vocabulary items</i> - <i>Sequencing items</i> - <i>Sentence comprehension items</i>	CHILD DEVELOPMENT SCALE ^e EXPRESSIVE LANGUAGE ^e

Notes

- a: Separate test booklets
- b: Responses were recorded in the *Educational Score Form*.
- c: Included in the *Educational Score Form*.
- d: Included in the *Pupil Questionnaire Form*.
- e: Included in the *Educational Questionnaire*.

(a) **Administration Instructions:** Instructions for teachers on administering tests and recording results were provided in a booklet entitled *Instruction Booklet for Educational Tests*, and details were also included on the relevant questionnaires.

(b) **British Ability Scales (BAS) (Self-completion):** This is a test of cognitive attainment measuring something akin to IQ (Elliot et al, 1978). After consultation with the designers of the test, two verbal and two non-verbal sub-scales were selected. Verbal sub-scales comprised word definitions (37 items) and word similarities (42 items). Non-verbal sub-scales comprised recall of digits (34 items) and matrices (28 items). Administration of the test had to be adapted so that it could be done by teachers. The scoring of this and the next two tests was carried out when the completed forms were returned to Survey Headquarters.

(c) **Shortened Edinburgh Reading Test (ERT) (Self-completion):** The *Edinburgh Reading Test* is a test of word recognition and the shortened version used in this study was made up of items extracted from the full Edinburgh Reading Test after consultation with its authors (Godfrey Thomson Unit, 1978). Items were carefully selected to cover a wide age range of ability from seven to thirteen years in a form suitable to straddle the ten-year cohort. Particular attention was paid to the lower limit to allow a score to be allocated for very poor readers. The shortened test contained 67 items which examined vocabulary, syntax, sequencing, comprehension and retention.

(d) **Friendly Maths Test (FMT):** The lack of a fully acceptable mathematics test appropriate for ten year olds led to the development of a special test for the *BCS70 Ten-year Follow-up*. This was done in

collaboration with Colin Appleton and John Kerley, specialists in primary mathematics. It was piloted in two halves in Bristol schools each on 400 children. It consisted of a total of 72 multiple choice questions and covered in essence the rules of arithmetic, number skills, fractions, measures in a variety of forms, algebra, geometry and statistics.

(e) **Pictorial Language Comprehension Test (PLCT):** Language comprehension is a crucial factor in a child's ability to understand school lessons. Outdated pictures and Americanised context rendered unsuitable the otherwise excellent common tests such as the *Peabody Picture Vocabulary Test* (Dunn 1959) or its English equivalent, *The English Picture Vocabulary Test* (Brimer & Dunn, 1962). A new test suitable for British ten year-olds was, therefore, devised for the *BCS70 Ten-year Follow-up* by linguistic specialists. It was piloted on 400 British ten year olds, after which item analysis was carried out. A final, shortened, version in the form of a test booklet covered vocabulary, sequence and sentence comprehension.

(f) **Diagnostic Tests:** A number of subsidiary educational measures were employed to meet the study's emphasis on learning difficulties. Four diagnostic measures were constructed all of which were included in the *Educational Score Form*. The first was a *word list* in which the child's attempts to read certain words would indicate particular perceptual difficulties; while a subsidiary part of this test recorded the child's attempts to pronounce certain nonsense words. Secondly *dictation and copying a sentence* were included from which it was possible to assemble a spelling score and make a handwriting assessment. A third measure required the child to *name body parts* with emphasis on laterality skills. The fourth diagnostic measure required the child to undertake a *sequential recall* task stating months of the year forward and backwards.

(g) **Social Judgement Scale:** This consisted of descriptions of eight different social situations which were read to the cohort member by the teacher, after which the child was invited to give a moral judgement. After replying, the child was invited to say why he/she had replied that way and the teacher wrote down the answer. Scoring was undertaken later by trained coders. The answers could be divided into the following categories - premoral judgement, expediency, rule-following, and rational consideration.

(h) **Motivational Scales (Lawseq/Caraloc):** Scales of *Self-esteem* and one of *Locus of Control* were introduced in order to provide motivation-related scales. These were specially selected to contribute to the explanation of educational performance. The first identifies children with low self-esteem. The second identifies children with a largely external locus of control, implying a fatalistic belief that there was little the child could do to alter his or her own level of attainment.

An existing *Self-esteem Scale (Lawseq)*, was used. This was devised by a former Chief Educational Psychologist of Somerset LEA (Lawrence 1973, 1978). It was piloted in two modes at the same time as the ERT, FMT and the Caraloc.

The *Locus of Control Scale (Caraloc)* comprised items selected from some well known tests of locus of control, to which several original research items were added (Gammage, 1975).

The Caraloc scale was piloted, together with the ERT, FMT, on a total of 800 children. The pilot results for individual items were entered in a multiple regression analysis, with the Edinburgh Reading and FMT scores as separate outcomes. Those items which yielded statistically significant and unique contributions to outcome variance were retained in the final instrument.

(i) **Child Developmental Scale:** Neurodevelopmental behaviour plays an important part in a school child's ability to interact with peers and to function successfully in society after leaving school. Assessment of such behaviour is difficult as it requires, in this case, teacher judgements on the basis of experience with the child.

The items for the scale were taken mainly from various existing measures, but also included questions suggested by specialists in different fields. The *Conners Teachers Hyperactivity Rating Scale* (Conners, 1969) and the *Rutter Teacher Behavioural Scale B* (Rutter, 1967) are the main sources. Other items were

taken from the *Swansea Assessment Battery* by courtesy of Professor Maurice Chazan. Minor linguistic amendments were made to make the Conners wording suitable for a British population.

Piloting on a larger number of items was carried out on 400 ten-year olds in Avon schools in 1979. This resulted in a reduction in the number of items after a number of meaningful behavioural dimensions were identified by factor analysis. These are indicative of the following types of behaviour: antisocial, inattentive, neurotic/anxious, clumsy, enuretic/encopretic, hyperkinetic, poor hand co-ordination and difficulty in getting dressed.

The final instrument used was a set of 53 items included in the developmental section of the *Educational Questionnaire* and answered by a teacher with knowledge of the child.

A further issue arose over the way in which these items were to be presented to respondents. Pilot experience was gained in the use of *analogue scales*. The results suggested that their wide range of possible scores would enable more sensitive measures to be obtained of the relevant behaviours, and that this would then facilitate analysis. Automated marking systems can yield up to 50 or even 100 points on analogue scales. More variance would be available for satisfactory interpretation compared with items having only three or four categories of measurement as with the Rutter or Conners Scales. This meant of course a further departure in scoring from the original scales. However, no other way could be found to make the different scales used by Rutter and Conners comparable. For a further discussion on the use of analogue scales in the BCS70 Ten-year follow-up, see *Appendix 1, page 64*.

(j) **Expressive Language:** Expressive language ability is a difficult area for assessment, and structured tests would have offered little comparability across ethnic or other cultural groups. Accordingly we thought it better to rely on a series of 13 items devised to obtain teacher's judgement on the child's expressive language. These fall into three groups: language development; articulation; and communication. They were completed on an analogue scale.

Data Collection

1.29 Details of the briefing and fieldwork associated with the *Educational Pack* are given below.

(a) **Briefing:** LEA (and RC) co-ordinators and field workers were invited to attend the same briefing meetings as for health and education authorities. One was held in each region at Regional Hospital Board Headquarters. In view of the many schools involved, more reliance had to be placed on written briefing documents (see *Instruction Booklet for Educational Tests* in *Section 3* below).

(b) **Fieldwork:** Each LEA (and RC) was asked to designate an *education co-ordinator* who would be responsible for arrangements for the 'Educational' part of the follow-up. Each co-ordinator was sent, at the end of 1979, a list of the names and addresses of all children known from the trace forms to live in, or to attend school within their Authority. Where matching had already been achieved, the central survey number was appended.

Co-ordinators were then responsible for distributing blank *Educational Pack(s)* for each cohort member in their LEA (RC). They were asked to write the names and address of the child and the school. These were then distributed to field workers in schools and special schools in their authority where a cohort member attended.

The *Educational Pack* contained detailed instructions for the field worker, usually the class teacher, on how to proceed with educational testing and with the supervision of the pupil self-completion form and with completing an *Educational Questionnaire* in conjunction with the head teacher.

The completed *Educational Packs* were returned by the field worker to the study co-ordinator who checked that questionnaires had been fully filled in. Completed *Educational Packs* were then sent on to Survey

Headquarters in batches. For independent schools the *Educational Packs* were mailed directly to head teachers for completion, and then returned to Survey Headquarters direct.

Close liaison was maintained with every LEA (RC) throughout the entire period of the fieldwork to ensure testing of cohort members whose names and addresses were newly discovered, or who had moved recently from another LEA or AHA. Each *education co-ordinator* was supplied with a list of co-ordinators in other LEAs (RCs), in order to take care of testing of cohort members with high geographic mobility. Special arrangements had to be made for children who went to school in one LEA and resided in another, particularly in the case of children attending residential special schools.

The *Educational Co-ordinators* in each area were asked to liaise with their health counterparts - and vice versa - to ensure that both the *Educational* and *Health Packs* was completed. This was especially important in 23 LEAs whose boundaries were non-coterminous with those of their AHAs counterparts. The vast majority of the educational packs were completed before the end of the summer term following their tenth birthday.

(c) **Refusals:** Care was taken to ensure that any refusals were logged. The address file was continually updated as new information on the children's names and addresses was received. Complete refusals were rare but 8.0-8.7 per cent did not complete the *Education Pack*, and 6.8-8.1 per cent some or all of the *Health Pack* (see *paragraph 1.69* below).

Data Processing of the Educational Pack

1.30 There were two main parts to the educational coding which was carried out by trained coders. The first involved work on the questions where data entry was by means of *optical mark recognition (OMR)* - these questions made up the whole of the *Pupil Self-completion* questionnaire, and the majority of the *Educational Score Form* and the *Educational Questionnaire*. The second involved checking and scoring a major part of the educational test material.

1.31 The first duty of the coders involved translation for OMR processing of the text information written on the front cover of the three questionnaires, including: numeric identifiers; child's central survey number; twin codes; sex; AHA, LEA and school information. The coders then went through each questionnaire to check and correct where possible any errors in recording of responses.

1.32 The other task for the coders was to check and compile where necessary scores of the three separate educational tests: the *Edinburgh Reading Test*, the *Friendly Maths Test* and the four subsections of the *British Ability Scales*. Dictation tasks and sentence copying results were scrutinised and codes used to measure handwriting. Likewise a spelling score was compiled.

Coders were given written instructions on all relevant aspects of scoring and coding of the test material. The coding itself was carried out in pencil on specially designed coding sheets. For the word definitions and similarities tests in the *British Ability Scales*, examples were given of acceptable responses and rules provided for coding 'borderline' answers.

In scoring verbal tests, a response was not to be scored zero solely because of grammatical or pronunciation error. The coders were instructed that, in virtually all tests, it was important that the content of the response and not its form should be scored.

Similarly, in a test requiring a child to draw a response, as in matrices, the child was not penalised for clumsy or crude drawing providing that the essential features of the response were present.

1.33 Some parts of the educational coding required considerable *qualitative judgements*. These included the scoring of the *Word Definitions* and the *Similarities Tests* of the *British Ability Scales* which required decisions about acceptable responses. Equally difficult was the coding of samples of handwriting for form and slope, as was also the scoring of answers on the items of the *Social Judgement Scale*. Considerable

efforts were made with all tests to ensure coder consistency and stability. Reliability was monitored carefully throughout and results fed back to the coders. During the training period, attention was concentrated on informing the coders about discrepancies between themselves (coding consistency) and differences over time (coding stability). Regular checks on the educational tests scored by the coders were carried out by the Educational Research Officer on a 5 per cent random sample. In this way seventy two packs of educational tests were coded and recoded. Disagreement between the codes assigned and the check from the records were however relatively infrequent. Table 1.4 summarises the proportion where the retest check did not confirm the original code allocated.

Table 1.4: Test - Retest disagreement on the educational tests scored by coders

Educational Test	Original code not confirmed
i Shortened Edinburgh Reading Test	1.44%
ii Friendly Maths Test	0.80%
British Attitude Scales:	
iii - <i>Recall of Digits</i>	0.83%
iv - <i>Word Definitions</i>	4.76%
v - <i>Word Similarities</i>	1.97%
vi - <i>Matrices</i>	2.37%

In those tests which involved straightforward scoring (i to iii) the reliability was very good indeed. The higher disagreement values for *Word Definition* and to a lesser degree for *Similarities* and *Matrices*, reflect the difficulty the coders had in making subjective judgements about the 'appropriateness' of a response.

B HEALTH PACK

Contents of Health Pack

1.34 The **Health Pack** consisted of three survey instruments: the *Parental Interview*, which was filled in by either of the parents or next of kin of the cohort; the *Medical Examination Form*, filled in from the child's medical records and during the child's medical examination; and the *Maternal Self-completion Form* that was filled in by the mother of the cohort member. Annotated copies of each are to be found in *Section 4* below. The pack also contained an *instruction booklet*, and a copy of this is available in *Section 3* below. An outline of the purpose and content of the questionnaires is given below. It should be noted that though this pack is termed 'Health', it also contains a large quantity of environmental and social questions.

(a) **Parental Interview Form:** This sought information on the child's health and home background, social experience, hospital admissions, accidents and a number of factors concerning the health, environment and experiences of the child and the family. The information was gathered through an interview with the mother of the child, or if she was not available, with someone who had knowledge on the child's health and development. Questions asked for this part of the study included: composition of household; details of older and younger siblings; family dynamics; single-parent and in-care situations; ethnicity; nature and dates of hospital admissions, out-patient attendance, operations and accidents since the five-year follow up; asthma and epilepsy; medical, dental, psychiatric and behavioural histories; current health problems; specific fevers; medical causes of school absence; disabilities and handicaps; parents' educational achievement, highest

qualification(s); occupation and social class of mother and father; type and tenure of housing; home amenities; crowding; family finances; benefits: income; family ill-health; family and cohort members respiratory illnesses; smoking habits.

(b) **Medical Examination Form:** This was completed by the *Community Medical Officer* and *School Nurse*. There were three sections. The first included enquiries about child's use of health services; school medical examinations; screening tests; past and present disabilities and handicaps; and any provision made for special education. The second, consisted of the history and details of the child's past/present illnesses; tests of near and distant vision; assessments of hearing and speech; and the administration of several motor co-ordination tests; as well as the findings of a systemic medical examination. Also, an assessment was made by a medical officer of current and future medical needs. The third section consisted of a *Sweep Audiogram*.

(c) **Maternal Self-completion Form:** This contained questions about the child's health and behaviour, the child's activities at home and at school, the child's life skills, and the mother's health. Items from the *Rutter Parental 'A' Scale of Behaviour Disorder* (Rutter, 1970), and the *Conner's Hyperactivity Scale* (Conners, 1969) were included, and a list of common activities by child alone and together as a family; parent-school contact; parental aspirations for child; maternal rating of 53 common skills and activities of child; mother's own *Malaise Inventory* (Rutter et al, 1970); and finally, help given for mother with household activities.

Data collection

1.35 Details of the briefing and fieldwork associated with the *Health Pack* are given below.

(a) **Briefing:** Fourteen regional briefing sessions were arranged throughout Britain in December 1979 to explain the background to the Study, and the nature of the fieldwork. These briefings were attended by specialists in Community Medicine (Child Health), Community Physicians and Area Nurses (Child Health), Clinical Medical Officers (Child Health), Area and District Nursing Officers (Child Health), and Community Medicine Specialists (Scotland). Representatives from Local Education Authorities and teachers were also invited.

(b) **Fieldwork:** Fieldwork arrangements for the *Health Packs* were similar in many ways to those for the *Educational Packs*. Area Health Authorities (AHAs) and Health Boards (HBs) agreed to be responsible for the distribution and for completion by field staff of a *Health Pack* for each survey child identified within their Authority; and later for their retrieval, checking for completeness and ultimately return to the survey team. In some areas, a health administrator was designated as *Health Co-ordinator* for this exercise, and in others it was a member of the community nursing and/or medical staff.

A list was sent in December 1979 to each *Health Co-ordinator* of names and addresses of the ten year cohort members already identified by their corresponding Local Education Authority (LEA) through the schools tracing exercise (see *paragraph 1.15* above). The central survey number was included where matching had been accomplished with an earlier sweep. This list was continually updated as and when further cohort children were identified by the survey team or AHAs (HBs). Updating came from several sources. Some children were discovered by AHAs or by health visitors, from health or screening records. Others were identified by the Family Practitioner Committees, some of whom were able to supply, in confidence, the dates of birth, names and addresses of all cohort children who were registered with general practitioners under the NHS. Further updates resulted from a list supplied by the survey team to AHAs (and to LEAs) of the names and last known address of untraced cohort members who were known to have been seen within their Authority at five or seven years. In this way, it was possible to maximise the number of cohort children eligible to receive a *Health Pack*.

Early in 1980, an appropriate number of *Health Packs* were dispatched to each AHA health co-ordinator. The co-ordinator was asked to put on each pack the name and address of the survey child and central survey number where known. An extra supply of *Health Packs* was sent to cover newly discovered children.

Health Packs were passed on by *Health Co-ordinators* to the appropriate field staff. This was usually a local *Health Visitor* or a *Clinical Medical Officer*. The Health Visitor visited the parent(s) at home for completion of a *Parental Interview Form*. A *Maternal Self-Completion Form* was left for the mother to fill in, and this was forwarded to or collected by the Health Visitor. An appointment was made for the child to attend for a *Medical Examination* and *Audiometry*. This was conducted usually by a *Community Medical Officer* either at a Child Health Clinic or at School. The Health Visitor or School Nurse respectively was usually present, and sometimes completed the initial section on medical history and did the measurements and vision testing. For full details on the method of completion of the *Health Pack*, the reader is referred to the *Instruction Booklet on Nursing and Medical Aspects* in *Section 3* below, and to the instructions written on the questionnaires.

During the course of the fieldwork, a continuing effort was made in each area through both *Health* and *Education Co-ordinators* to ensure that both a *Health* and *Education Pack* was completed for each child. Where necessary, the field staff enquired reason(s) for non-completion. The procedure for ensuring completion of packs in the case of recent inward and outward transfers from or to another AHA is the same as with the *Educational Pack* (see *paragraph 1.29* above).

Health returns

1.36 On receipt at study headquarters each *Health Pack* was checked for completeness and was filed under the Area Health Authority in which the child resided. Wherever feasible, matching was achieved with the corresponding *Educational Pack*. Unmatched *Health Packs* were given a unique *Ten-year Survey Number*, but if matched later they were reassigned the same *Central Survey Number* as had been given in an earlier follow-up.

1.37 The returns for the health side of the study were very satisfactory for a complex national study for which most of the organisation and fieldwork was voluntary. *Parental Interview Forms* were returned for 13,869 children. *Medical Examination Forms* were returned for 13,869; and *Maternal Self-completion Forms* were received for 13,679 children.

Data processing of the Health Pack

1.38 Before data entry was undertaken, a number of checking, cleaning and editing procedures were carried out.

1.39 The three health questionnaires had been designed as punching documents so that key-punch operators punched directly from the forms. Validity checks were introduced at the time of data input in order to reduce the amount of work necessary at the editing and checking stage. Diagnostic flags were introduced to identify pre-defined errors, such as 'illegal' multiple answers, out of range numerical values or inconsistent answers within and between questions. Such errors were flagged for later correction and provided a useful way of checking how well individual questions were answered.

Coding of Health Packs

1.40 Before this operation was undertaken, the survey team carried out careful and stringent checking procedures on the raw data; medically coded all diagnoses, drugs and accidents; and allocated occupation codes for mothers' and fathers' employment using the *OPCS Classification of Occupations* (OPCS, 1970, 1980). The checking and coding of the health forms was divided between medical and social coders. Medical coders examined all the health information in the *Medical Examination Form* (MEF) and the

Parental Interview Form (PIF). Social coders checked all other information in the PIF and the *Maternal Self-completion Form (MSCF)*.

Medical Coding

1.41 A team of trained medical coders undertook the important task of coding the medical questions in the PIF and the whole of the MEF. All medical diagnoses were coded, as were operations, drugs (medications) and accidents. Coding instructions were assembled by the survey team, aided by outside experts where necessary. Frames for the coding of diagnoses, operations, drugs (medications), and accidents were finalised in the last half of 1980 and the coding and editing work occupied the whole of 1981.

1.42 Each medical coder was given two months intensive training with the added assistance of the *Oxford Regional Health Authority*. Stringent checks were imposed on intra- and inter-coder reliability. Throughout the coding procedure, the medical coders were supervised by an experienced Medical Research Officer with a specialist medical qualification, who was also able to select appropriate codes for unusual or incomplete diagnoses.

(a) **Diagnoses:** The chosen format was the *International Classification of Diseases 9th revision (ICD9)*, to which an extra (5th) digit was added when necessary from the *Cardiff/British Paediatric Association (BPA) Supplement* to the ICD (World Health Organisation, 1977; British Paediatric Association, 1979). Other modifications were needed to cover the fact that the data ranged from non-specific to very detailed information which needed to be shortened without losing useful information. Two other systems were considered but not adopted. These were the *US SNOMED* (College of American Pathologists, 1980), and a coding system used in the Study when the children were five years old. Neither was wholly appropriate for adapting what was sometimes lay terminology of mild mid-childhood illness. Any researcher wishing to use these data is advised to contact the BCS70 User Support Group for further information.

(b) **Operations and procedures:** The *OPCS Classification of Surgical Operations and Procedures* (OPCS, 1975) was found suitable with some modifications on ten year-olds. Those minor procedures *eg:* blood tests, X-rays, which were not represented in the *OPCS Classification* were given a series of codes identifiable by letter 'P' as prefix. The questions in which OPCS operation codes were used were all in the *Parental Interview Form* (questions B13, 16, 18, 22 and E3). Any researcher wishing to use these data is advised to contact the BCS70 User Support Group for further information.

(c) **Drugs (medications):** A coding system specially created by the *Oxford Record Linkage Group* was kindly made available for use in coding medications. The coders worked from an alphabetical list of proprietary and real drug names. A numerical listing of codes with suitable translation(s) was supplied and a programme with which to convert proprietary drug codes to real drug codes. Additional codes were used for some non-specific but useful responses, *eg:* 'antibiotic', 'vitamins', 'inhaled preparations for asthma', and 'rectal preparations for constipation'. The items were alphanumeric and five characters in length. The questions in which drug codes were used are all in the *Parental Interview Form*, (questions B7G, B8H and B23 - see annotated questionnaires in *Section 4* below). Any researcher wishing to use these data should contact the BCS70 User Support Group for further information.

(d) **Accidents:** Two systems previously used in British Birth Cohort Studies were considered for coding the accident data. These were the *1946 Cohort accident coding system*, and the *external cause codes* in the *ICD9*. Both systems had the disadvantage that only one aetiological factor was permitted per accident. If for example a child on a bicycle collided with a car, the accident had to be classified as a road traffic accident and the bicycle would be lost as an aetiological factor. This would have wasted information gathered in the *Parental Interview Form* (see question B18 in the annotated questionnaire in *Section 4* below).

To avoid such waste, an *ad hoc* coding system was designed and used for the *BCS70 Ten-year Follow-up*. The actual accident codes were assembled from a list of accidents taken from the first 1,000 *Health Packs*. In this system up to six aetiological categories could be allocated to any one accident. There were detailed sections on vehicular accidents, playground accidents, and other likely causes *eg:* pets, skate-boards, roller skates, guns, darts, etc. Codes were introduced to identify the people involved if these were specified; for example, if a child was hit by his brother the latter was specified; if say a child and his brother had been

fighting together, both were included. The system used proved satisfactory and comparatively easy to use (see *Appendix 4*).

(e) **Textual information:** Some questions (mainly in the PIF and MEF questionnaires) required written responses. This text was handled in different ways. At its most simple, a numeric 'flag' was entered to indicate the presence of text on the relevant part of the questionnaire. Occasionally, a further numeric code was added to show whether the response was considered important by the coder. Where the text was a response to 'other, please specify...' questions, answers were coded back into the existing precodes, or additional codes assigned. The latter were usually decided after scrutinising the first 500 answers.

Written responses to the more important questions were keyed in as alphanumeric 'text strings', with a fixed (maximum) length of 30, 80 or 90 characters. These text strings are commonly held in the data file next to any numeric data relating to the same questions, and within the sequence of numeric and alphanumeric data which mirrors the order of questions.

In the PIF and MEF there are a large number of questions which can require a written answer. However, for any one child, only some of these questions will be answered. Rather than reserve space for a large number of alphanumeric variables to hold available text, a smaller number of 'text pools' were created. Each text pool may hold 'text strings' relating to different questions for different children, and has three elements: a 'pointer' indicates the question number to which the text relates; the 'text string' (usually a maximum of 30 characters); and an 'ICD' code based on the text.

Because of the need to limit the length of text strings, longer items of text had to be edited by the coders to 30 characters and occasionally to 80 or 90 characters. The principles of text editing were:

- i. Enter all text as stated unless it exceeds the specified maximum of 30, 80 or 90 characters.
- ii. If more than above abbreviate and underline key words.
- iii. If still more than specified maximum drop irrelevant text.

The art of text editing took some time for the coders to acquire. Standard abbreviations, as used by the Social Coders, were tried but proved too cumbersome for the medical data; however, in spite of the somewhat "trial and error" approach printouts of text strings on the first 1,000 children showed considerable ingenuity and remarkable comprehensibility and there was little need to modify this later.

It is important to note that the aim was to retain as much as possible of the detail recorded in the written answers. Thus, where the same medical condition was named in response to more than one question, there will be more than one text pool with entries which are identical except for their pointers. However, if the same health problem was described in two different ways in answer to two different questions, this problem could be given two ICD codes (eg: a child with learning difficulties may be described as 'educationally subnormal' in answer to one question, and as having 'problems with learning' in response to another).

A match between text and ICD code was maintained wherever possible. However, coders were instructed to enter the 'most appropriate' diagnosis code for the child so that if, for example, the condition 'Down's Syndrome' was reported in the 'Summary of Conditions and Conclusions' section of the *Medical Examination Form* (questions B35-B37), the appropriate ICD code would be included in each text pool relating to all relevant questions. Some discrepancy between text and ICD code may therefore be found.

Further details of the textual information are given in *paragraph 2.33* below.

Validation of medical diagnoses

1.43 The health part of the study gathered similar information from several sources. The first was from a *health visitor* after an interview with the parent(s); the second directly from *the mother* herself; and a third from an *examining doctor* either from a medical examination or from School and/or Community Medical Records. The information on these forms was to some degree therefore self-validating.

1.44 Subsequent validation was done by writing to Hospitals, General Practitioners or Health Clinics to confirm certain details of the medical diagnoses or impairments. For example, letters were sent to the appropriate Medical Records Officer (MRO) at each hospital where BCS70 children had attended, or been treated. The MROs were asked to provide information from hospital notes (after obtaining any necessary permission from the consultant(s) concerned). Prior approval for access to such medical records had been obtained from the parents of cohort members at the time of the Parental Interview.

Reliability of medical coding

1.45 During the initial period of medical coding, considerable checking and correction of the allocation of medical codes and text editing was undertaken by the Medical Research Officer. This was in order to ensure that the instructions were understood by the coders and coding standards maintained. Formal reliability checks were carried out on a 5 per cent random sample.

1.46 The action of every coder was listed, for example in assigning a code or editing a passage of text. These checks recorded errors of omission and mistakes. Coder's reliability was estimated as the:

Number of actions accomplished / Number of actions which should have been accomplished

A mean error rate was calculated for every coder and for all questions after each check in order to identify which coders were in difficulty, and weak areas in the coding. Three hours of each week were spent by each coder on these reliability checks. Individual coder error rates ranged from 0.8 to 3.8 per cent with an average of 2 per cent.

Accuracy in assigning medical diagnostic codes was checked on a 10 per cent sample from a printout of ICD codes assigned and their accompanying text. An overall error rate was found of 2.6 per cent.

Social coding

1.47 A team of social coders was assembled. Their job was to check and edit all information on the *Maternal Self-completion Form* (MSCF) and on the *Parental Interview Form* (PIF) - except Sections B (Medical History) and E (Family Health) - see annotated questionnaires in *Section 4* below. Social coders first checked and coded the front pages of the MSCF/PIF.

1.48 The *Maternal Self-completion Form* required relatively little coding. Some questions contained 'other, please specify...' categories which were either assigned separate codes or edited back into one of the precodes. The coders also compared the names and identifiers on the front page of the MSCF with the PIF and MEF. The analogue scales used in the MSCF are discussed elsewhere (see *paragraph 1.28 (g)* above). The precise measurement of the responses to each item in the analogue scale was done mechanically by the data processors. There was initially concern that some of the responses aggregated into particular response patterns. For example, a number of respondents appeared to mark only the extreme ends of the scale; others used the ends and the middle; and some appeared to drift gently inwards or outwards on successive lines. It was decided to take the precaution of asking the coders to identify these apparently different response patterns and a 'pattern code' was assigned for each of the analogue scales in the MSCF.

1.49 In the PIF particular attention was paid to the editing of questions on the child's place of birth and changes of name and/or address in the first ten years of life. The next important section concerned persons

in the household and family, separations, changes in parental figures and ethnicity. Questionnaires were examined where children were reported as not having lived with both natural parents since birth.

1.50 The total number of adults and children under 16 resident in the household were entered. Reasons for temporary absence from the household were also coded. Codes were assigned to reason(s) given for changes in parent figures. Reason(s) given for being in care were coded and details of the agencies concerned were entered in an 'institution/in care referral file'.

1.51 The education and occupation of the parents, receipt of benefits and income was scrutinised and corrections made where necessary. Where 'other educational qualifications' were specified, a directory of qualifications was consulted to assign them to the appropriate categories (Local Authorities Conditions of Service Advisory Board, 1975). The parents' current employment status required particular care. Values were assigned to 'other reason(s) for not being in paid work' eg: retired, in prison, ill health. Other sections of the PIF were checked to confirm whether a parental figure was present or absent. The 'other employment situation' category in this question was reserved for foster parents.

Occupational codes: Coding of the parent'(s)' occupation and type of industry was the most complex task encountered in the *BCS70 Ten-year Follow-up*. Codes were assigned to the job description for both parents using the 1970 and 1980 *OPCS Classification of Occupations* (OPCS, 1970, 1980). Some groups of jobs encountered shared the same social class value, making it possible in some cases to derive social class values where the job belonged to a group even if there was insufficient information to allocate an Occupational Group (OUG). Coders assigned social class values to British service personnel using the *Hall-Jones Scale of Occupational Prestige*, the same scale as used for the *BCS70 Five-year Follow-up* (Hall and Jones, 1950).

The *Standard Industrial Classification* (CSO, 1981) was used to assign codes to the type of industry in which the parents worked. The coders also edited the text which described the parental occupation and industry. This text was keyed and used to check the assignment of occupation, social class and type of industry codes.

1.52 Finally, codes were assigned as to whether the parent(s) did or did not give permission for access to the child's medical records.

Reliability of social and social class coding

1.53 A number of methods were used to assess reliability of the social coding. The first was used to monitor coder reliability throughout the seven month period of social coding.

1.54 The objective was to identify coder errors and to provide the coders with feedback about their performance. A checklist was made from which the completeness of all coding procedures was tested on a random 5 per cent sample. The checklist itemised all the coding procedures needed, and recorded if these had been completed. Rates of coder error were based on the number of errors *vis a vis* the number of coding operations actually required in the particular forms. In the first 8,700 coding operations, there were 89 errors, giving an error rate of 1 per cent.

1.55 A reliability check was made every two weeks on a random 2 per cent sample in the case of the more complex occupational and industrial coding. This occupational coding check was carried out by the Social Research Officer who examined whether occupational codes had been assigned and also checked the accuracy of the coders' allocation of occupation/industry codes, socio-economic and social class groups. Any errors identified were fed back to the coder. The error rate identified by this method of checking was approximately 5 per cent. This was higher than was the case for other coding procedures and was ascribed to the greater complexity of the coding task.

1.56 When the social coding was completed, an even more extensive check of the reliability of occupational coding was undertaken by examining in 1,300 *Parental Interview Forms* (PIFs) the extent to

which coder errors occurred and whether these led to the assignment of incorrect social class categories. Where an assigned occupation code was found to be incorrect, social class values derived from the incorrect occupation codes were compared with the corrected one. Information from this check is shown in Table 1.5 which gives details of the errors using the 1970 and 1980 occupational classifications separately for fathers and mothers. Table 1.5 shows error rates were slightly higher for the more complex fathers' occupations. This was similar to that reported by the Social Research Officer. Only 3.2 per cent of the paternal and 1.4 per cent of the maternal social class codes resulted directly from an original misallocation of an occupational code. Many of these social class coding errors were identified and remedied in the social class editing process.

Table 1.5: Reliability of Occupational and Social Class Coding using 1970 and 1980 Classifications

	Fathers		Mothers	
	1980 %	1970 %	1980 %	1970 %
Correct occupational codes	93.8	93.8	95.8	95.8
Incorrect occupational codes, wrong social class	3.1	3.3	1.5	1.3
Incorrect occupational codes, correct social class	3.1	2.9	2.7	2.8
<i>n (100%)</i>	<i>1300</i>	<i>1300</i>	<i>1300</i>	<i>1300</i>

C SPECIAL EDUCATIONAL PACK (Not deposited on this occasion)

1.57 Underlying the development of educational instruments was an awareness of the special needs of the child suffering from certain forms of disability, whether this be educational, mental, physical or behavioural. Clearly this must be a key focus of attention within the overall ambit of surveying the entire cohort. This made the task of selecting the instruments necessary and onerous. There was a need to introduce sub-scales within the instruments that would yield more interesting and meaningful information than could be obtained from simpler tests (with conceptually homogeneous scales of items).

1.58 This assessment of the educational attainment of children with disabilities posed many problems because of the heterogeneity of the disabilities. Presentation of the tests had to be modified in the case of partially sighted and blind children, for children with severe hearing loss, and those children identified as having severe motor/locomotor disabilities many of whom had accompanying severe hand-eye co-ordination problems.

1.59 As expected, children with severe or moderately severe learning disabilities (formerly ESN(S) and most ESN(M) children) were unable to attempt most of the tests carried out on the main cohort and needed a *Special Educational Pack*. The assessment of the educational attainment of such children was given much thought and a variety of special instruments were developed or adapted, and incorporated in a special pack.

1.60 One particular concern on the educational side of the *BCS70 Ten-year Follow-up* was to gather information on educational attainment on children who were unlikely to be able to complete the educational attainment tests administered at ten years. Teachers were given the option of electing to ask for a *Special Educational Pack* with easier tests for any child for whom they considered the standard testing too hard.

1.61 The other criteria for selecting children for the receipt of *Special Educational Packs* included children who had completed the ordinary pack but had scored in the bottom 5 per cent on the *Edinburgh Reading Test* and/or the *Friendly Maths Test*. All children receiving *Special Educational Treatment (SET)* were also sent a *Special Educational Pack*.

1.62 Each *Special Educational Pack* contained the standard educational test material which teachers were asked to try with the child in order to know where the child fitted within the lower end of the distributions of the standard pack test scores.

Contents of the *Special Educational Pack* were:

- (a) an *Instruction Booklet for Special Educational Tests*
- (b) the *Thackray Reading Readiness Profile* (1974) of which the *visual discrimination* and *auditory discrimination* tests were used
- (c) the *Young Group Maths Test* (1980)
- (d) a *Special Test Booklet* for the teacher to administer at school, which combined tests of conservation, matching classification and seriation
- (e) the *Human Figure Drawing Test* (Harris, 1963) and
- (f) a *Copying Designs Test*, both of which had been used in the five-year follow-up.

A *Special Teacher Questionnaire* contained check lists for completion by the teacher on the children's vision, hearing, manual dexterity and discrimination. This questionnaire also asked teachers to describe the study child and contained questions on the provision of remedial services. It was aimed in this way to collect some educational attainment information on every child in the survey no matter how severe their educational difficulties appeared to be.

1.63 The *Special Education Pack* testing took place between February and July, 1981, Directors of LEAs, Principal Educational Psychologists and LEA Study Co-ordinators were kept informed that the special testing was taking place. *Special Educational Packs* were dispatched directly to the appropriate school(s). Some 456 *Special Educational Packs* were completed and returned. These data will be made available after further cleaning and documenting. In the meantime, users interested in using these data should contact the User Support Group.

D SPECIAL STUDY OF KNOWLEDGE AND USE OF SERVICES AMONG 'IMPAIRED' CHILDREN (Not deposited on this occasion)

1.64 A subsidiary study on 10-year children with physical or mental handicap or severe learning problems was carried out by the *Social Policy Research Unit* at the University of York and funded by the Joseph Rowntree Memorial Trust. The objective was to investigate the knowledge and use of services by the families of such ten year children suffering from a long-standing illness, impairment or disability which was likely to result in some interference with their daily life at home or at school.

1.65 'Impaired' children had first to be identified from the information collected during the main year survey. There was insufficient time to provide a computer screen of the health study data to identify these children, so it became a manual task. Two clerical assistants examined every health form which was returned to identify children with potentially handicapping conditions. The criteria used for this identification process were as follows:

- (a) ***Partial sight/Blindness***
 - (i) ***Distant vision:*** All children who scored 6/36 or worse on the Snellen test with better eye (uncorrected) except where 'corrected' vision (i.e. wearing glasses or contact lenses) was 6/12 or better in better eye.
 - (ii) ***Near Vision:*** All children who scored 24 or worse on the Sheridan-Gardiner test in better eye (uncorrected), except where the corrected vision was 9 or better in better eye.
- (b) ***Poor hearing/Deafness:*** Any child who had 35db or more hearing loss on at least two frequencies in better ear.
- (c) ***Cardiovascular abnormalities:*** Any child with a cardiac condition such as to limit to exercise tolerance. Effectively this meant cyanotic congenital heart disease, congestive cardiac failure or pulmonary hypertension, but not asymptomatic or surgically corrected congenital heart disease.
- (d) ***Musculoskeletal disorders:*** Any child with marked limb deformity, chronic arthropathy, muscular dystrophy or condition of comparable severity.
- (e) ***Neurological disorders:*** Any child with cerebral palsy, meningomyelocele, hydrocephalus, microcephaly or paraplegia.
- (f) ***Cancer:*** Any child with malignant neoplasm still under treatment or under observation because of the likelihood of a relapse.
- (g) ***Epilepsy:*** Any child who had one or more episodes of unconsciousness since the age of five due to epilepsy, or those with two or more symptomatic convulsions in the same period.
- (h) ***Facial disfigurement:*** Any child with disfiguring facial condition.
- (i) ***Speech difficulties:*** Any child whose speech was assessed as containing 'many unintelligible words' or who stammered or stuttered moderately or severely.
- (j) ***Asthma:*** Any child away from school for asthma alone for more than one week in the past year or for more than a month for asthma and some other condition.
- (k) ***Encopresis:*** Any child soiling most of the week or always.
- (l) ***Enuresis:*** Any child wetting in the day time all or most of the week, or wetting the bed every night.
- (m) ***Educational difficulties:*** Any child ascertained as requiring special education for intellectual or emotional reasons on Form SE2 or 4HP.
- (n) ***School absence:*** Any child who had missed more than three months of school in the past year for a medical reason.
- (o) ***Other specific morbidity:*** This includes diabetes, coeliac disease and cystic fibrosis.

1.66 Some difficulty was experienced in deciding which of the potentially mildly handicapped children should be investigated even after the above criteria were followed. So records of children who appeared to match the above criteria were subsequently examined by the Principal Investigator and the Medical Research Officer. A few were excluded where the parents were unlikely to think the study child had anything wrong with him/her. Interviewers visited each family and completed a questionnaire concerning knowledge and use of services, a copy of which is available from the BCS70 User Support Group on request.

1.67 The results of this special investigation are not reported here but the bibliography gives several references (Cooke et al, 1984, 1986; Hirst & Cooke, 1988).

Response to the Survey

1.68 Details of the response to the survey are given in Table 1.6 below. It can be seen that the overall response appears satisfactorily high - data are available for some 14,875 cohort members. However, Table 1.6 also reveals differential response to the many elements of the survey.

Table 1.6 Questionnaire completion rates

	<i>Abbreviation</i>	<i>Number</i>
<i>EDUCATIONAL PACK</i>		
Pictorial Language Comprehension Test	PLCT	12,701
Friendly Maths Test	FMT	11,719
Shortened Edinburgh Reading Test	ERT	11,719
British Ability Scales	BAS	11,719
Educational Score Form	EDSCORE	12,903
Educational Questionnaire	EDQ	12,755
Pupil Question Form	PUPIL	12,699
<i>HEALTH PACK</i>		
Maternal Self-Completion Form	MSCF	13,869
Parental Interview Form	PIF	13,869
Medical Examination Form	MEF	13,869

Reasons for non-response

1.69 In order to explore the reasons for non-response, the survey team looked in depth at two random 10 per cent samples of children - the first selected from those with last names beginning with the letters A-K, and the second from those with last names beginning L-Z. As Table 1.7 shows, there was little difference between the two samples. For the *Education Pack* the non-response rate was 8.7 and 8.0 per cent in the A-K and L-Z samples respectively. For the *Health Pack* the comparable rates were 8.1 and 6.8 per cent. The parental refusal rate was slightly higher for the *Health Pack* (6.4 and 5.8 per cent) than for the *Education Pack* (5.0 and 4.8 per cent). Some of this was because LEAs (RCs) tended to send out the packs earlier to avoid school holidays. Many children had received their (lengthy) educational tests by the time contact was made by the Health Authority, and a few parents wrote to withdraw their child from the study before the health part of the survey could be carried out.

Table 1.7 Reasons for non-response to the BCS70 Ten-year Follow-up in 10 per cent samples

	Surnames A-K		Surnames L-Z	
	Health Pack %	Educational Pack %	Health Pack %	Educational Pack %
Parental absolute refusal- no further contact	2.7	2.0	2.5	2.3
Parental refusal for one part of the study	3.7	3.0	3.3	2.5
Area Health Authority refusal	-	-	0.2	-
Teacher refusal	-	3.0	-	2.4
Emigrated	1.0	0.7	0.6	0.6
Died	-	-	0.1	0.1
Packs lost in post	0.7	-	0.1	0.1
All non-response	8.1	8.7	6.8	8.0

Response bias

1.70 The total number of ten year-olds on whom some study information was obtained was 14,875, which formed 93 per cent of the 16,000 estimated to be eligible at sixteen years. The completion rate of individual questionnaires was lower, and this predictably involved the Educational Packs more than the Health Packs, as shown in Table 1.6 above.

1.71 The differential response revealed in Table 1.6 suggests that the sample of individuals for whom data is available may be biased in some way. Fortunately, one advantage of longitudinal studies, such as BCS70, is that because nearly all of those cohort members who missed all or part of one follow-up will have data from earlier surveys, it is possible to check for response bias by comparing the attained sample at any follow-up to the target sample (eg: the birth sweep). The 96 - 98 per cent completion rate of the BCS70 birth data facilitates these analyses, as definitive information relating to the base population is available, and it is therefore possible to assess the representativeness of subsequent response. Where necessary corrective weighting factors can be applied in order to offset any biases resulting from attrition in the form of non-response, mortality or emigration.

1.72 The representativeness of the BCS70 Ten-year Follow-up has been tested in this way by comparing the achieved sample of cohort members with the 1970 birth survey and the 1975 follow-up. These comparisons have been extensive, and are based on the distribution of variables selected from the earlier BCS70 follow-ups. The variables chosen relate to a number of areas, including: birth circumstances; parental education; social and economic circumstances; the family and relationships; housing and household; and health.

1.73 Table 1.8 summarises some of the comparisons made. It contrasts the characteristics of the *target sample* - live births in Britain in the 1970 birth survey, and those with data at the 1975 follow-up - and those of the *achieved sample* for the 1980 follow-up. The absolute difference between the target and achieved samples, and the percentage bias are also reported for each variable, indicating the extent of the difference between the cohort and the sample. For this table, percentage bias is calculated as follows:

$$((\text{Percent in the achieved sample} - \text{Percent in the target population}) / \text{Percent in the target population}) \times 100$$

A negative percentage bias indicates under-representation in the 1980 follow-up, and a positive percentage bias shows over-representation. When looking at the contrasts for variables taken from the 1975 follow-up it is important to remember that target percentage will itself reflect differential response to this survey.

Table 1.8: Response bias - comparison with the 1970 Birth Survey and 1975 Follow-up

	<i>Target %</i>	<i>Achieved %</i>	<i>Difference</i>	<i>Bias %</i>
Male respondents	51.8	51.6	-0.2	-3.9
1970 Birth Survey				
Mother born outside Britain	10.1	8.1	-2.7	-25.00
Father born outside Britain	11.4	8.8	-2.6	-22.81
Mother completed education aged less than 15 years	6.4	6.0	-0.4	-6.25
Father completed education aged less than 15 years	7.9	7.6	-0.3	-3.80
Teenage mother	9.8	9.2	-0.6	-6.12
Single mother	5.6	4.2	-1.4	-25.00
Premarital conception	8.2	8.3	+0.1	+1.22
Twin	2.1	2.0	-0.1	-4.76
Father's social class - Manual	64.6	65.7	+1.1	+1.70
Father unemployed	3.3	3.1	-0.2	-6.06
1975 Follow-up				
Child's ethnic group - West Indian	1.2	1.1	-0.1	-8.33
Parents have no educational qualifications	40.1	39.7	-0.4	-1.00
Mother aged over 40 years at child's birth	2.3	2.2	-0.1	-4.35
Child living with both natural parents	90.4	90.9	+0.5	+0.55
Mother and child ever separated for one month or more	5.0	4.8	-0.2	-4.00
Fathers' social class - Manual	64.9	64.8	-0.1	-0.15
Weighed under 5lbs at birth	6.8	6.8	0.0	0.00
No congenital abnormality	93.0	92.9	-0.1	-0.11
No disability	93.3	93.5	+0.2	+0.21
Family has moved 3 or more times since 1970	10.1	9.7	-0.4	-3.96
Accommodation is crowded (>1 person/room)	18.0	17.6	-0.4	-2.22
Accommodation is rented privately	6.1	5.9	-0.2	-3.28
Social rating of neighbourhood - Poor	8.1	7.8	-0.3	-3.70

Notes:

Target % = Percent in BCS70.

Difference = Achieved% - Target%

Achieved % = Percent in achieved sample.

Bias % = ((Achieved % - Target %) / Target %) x 100

1.74 The analysis provides an important, and generally encouraging, insight into differential response. Absolute differences between the target and the achieved sample are, on the whole, small and this is reflected in many of the figures for absolute difference and percentage bias. However, small absolute differences can result in a relatively large figure for percentage bias where the percentage in the sampled population is small. Levels of statistical significance are not reported, but it should be noted that, in samples of this size, tests of statistical significance are sensitive to very small differences. In general, the achieved sample does not differ greatly from the sampled population.

1.75 Overall, it appears that men, those born outside Britain, and those with minority ethnic background are slightly under-represented in the BCS70 Ten-year Follow-up. This also holds for those born to single mothers, teenage and older mothers, and unemployed fathers; as well as for those whose parents left school at an early age.

Perhaps not surprisingly, this picture is similar to that emerging from the analyses of differential response to other BCS70 follow-ups, and also for other longitudinal studies - such as the National Child Development Study, which is based on a week's births in 1958 - and other surveys.

Sample sizes

1.76 The differential response to the many survey instruments, revealed in Table 1.6 above, may have an important impact on the sample of cases available for complex analyses which draw on data from different elements of the survey. In these circumstances, the effect of any differential response is multiplicative, and can lead to a marked reduction in the size of the sample available for analysis. This is especially the case where complete information on all relevant variables is required.

Further Information on BCS70

1.77 For more information about the BCS70 Ten-year Follow-up contact the BCS70 User Support Group by post, telephone, fax, or email as shown below:

Post:	BCS70 User Support Group	Tel:	(0171) 477-8484
	Social Statistics Research Unit		
	City University	Fax:	(0171) 477-8583
	Northampton Square		
	London	Email:	bc70@ssru.city.ac.uk
	EC1V 0HB		

User Support Group

1.78 The *BCS70 User Support Group* provides advice and guidance on the use of BCS70 data; produces documentation; collates and disseminates information on uses of the data, publications, and other developments; produces and distributes a newsletter and working papers; provides access to non-computerised BCS70 data; collects additional information; and services the User Group.

User Group

1.79 The *BCS70 User Group* is open to all users of BCS70 data. It provides opportunities for users to get together to explore developments, problems, and other issues of mutual interest. Ad hoc "Updates" on BCS70 data and developments are circulated to members.

Membership is free on application to the User Support Group.

Acquiring BCS70 Data for Research

1.80 As noted above, data sets containing the birth, 22-month, 42-month, 5-year, 10-year and 16-year data are already lodged at the ESRC Data Archive, and are available to the research community for analysis. Data sets for the 21-year sample survey and 26-year follow-up are currently being prepared by SSRU, and will be deposited with the ESRC Data Archive upon completion.

1.81 A fully documented longitudinal database, which will contain all BCS70 data, is also being prepared by SSRU and, when complete, a copy will also be made available via the ESRC Data Archive. Until data are generally available in this way, it is possible to obtain data not already lodged with the Data Archive from the SSRU directly (see *paragraph 1.77* above). In the meantime, longitudinal datasets may be created by researchers by merging data from the individual follow-ups already held in the ESRC Data Archive (see

paragraph 2.8 below).

The ESRC Data Archive may be contacted by post, telephone, fax, or email as shown below:

Post:	ESRC Data Archive University of Essex Colchester CO4 3SQ	Tel: (01206) 872001	Fax: (01206) 872003	Email: archive@essex.ac.uk
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1.82 Details of the publications cited in this section are given below. A full list of publications arising from BCS70 is given in *Appendix 3*.

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SECTION 2

USING THE 10-YEAR DATA

INTRODUCTION

Survey Instruments

2.1 As mentioned in Section 1, the *BCS70 Ten-year Follow-up* made use of some 15 separate survey documents, comprising manuals, assessments, self-completion questionnaires, interview schedules, and a medical examination record. An introduction to the development and use of these documents has been outlined in *Section 1*. A copy of the information manuals and the questionnaires are reproduced in Sections 3 and 4 respectively.

2.2 This section is designed to assist users of the data by describing:

- Linkage of *BCS70 Ten-year Follow-up* data to data from previous sweeps.
- The more important elements of data cleaning that have been undertaken by SSRU, including the coding of missing values. An outline of the coding and data cleaning undertaken immediately after the *BCS70 Ten-year Follow-up* is given in *Section 1*.
- An introduction to using the Interactive Data Dictionary.

Table 2.1 BCS70 Ten-year Data deposits with the ESRC Data Archive

	<i>Abbreviation</i>	<i>Number</i>	<i>Deposited</i>
<i>EDUCATIONAL PACK</i>			
Instruction Booklet for Educational Tests	dna	dna	dna
Pictorial Language Comprehension Test	PLCT	12,701	Yes
Friendly Maths Test	FMT	11,685	Yes
Shortened Edinburgh Reading Test	ERT	11,685	Yes
British Ability Scales	BAS	11,685	Yes
Educational Score Form	EDSCORE	12,805	Yes
Educational Questionnaire	EDQ	12,755	Yes
Pupil Question Form	PUPIL	12,699	Yes
<i>HEALTH PACK</i>			
Instruction Booklet on Nursing and Medical Aspects	dna	dna	dna
Maternal Self-Completion Form	MSCF	13,679	Yes
Parental Interview Form	PIF	13,869	Yes
Medical Examination Form	MEF	13,869	Yes
<i>SPECIAL EDUCATIONAL PACK</i>			
Instruction Booklet for Special Educational Tests	dna	dna	No
Special Test Booklet	STB	456	No
Special Teacher Questionnaire	STQ	456	No

Notes: dna = does not apply

2.3 Table 2.1 above indicates which BCS70 10-year data are deposited at the *ESRC Data Archive*, and which are to be deposited in the future. All of the 10-year questionnaires have been deposited at the Archive during the first deposit of data.

Text variables

2.4 For the most part, BCS70 10-year data is numeric. Although some questions required written answers, this information has often been transformed to numeric form by 'coding' based on widely used coding frames (eg: the Registrar General's *Classification of Occupations*, the *International Classification of Diseases*, etc), or those based on samples of survey answers. Nevertheless, some *text variables* remain in the data. These variables hold the text (sometimes in abbreviated form) of the answer given. They are identified by an asterisk (*) on the annotated questionnaires in *Section 4*, and further information on text variables is given below.

Text flags: These variables indicate that additional information was written on the questionnaire, but has not been coded, or included as a text variable.

Text strings: These variables hold the text of the entry on the questionnaire. As noted in *paragraph 1.42 (a)* above, this entry may have been abbreviated/summarised at the time of keying.

Text pool identifiers: These variables indicate that additional information was written on the questionnaire, and that this information is stored as a *text string* in a *text pool*. There are 20 *text pools* associated with the *Parental Interview Form* (variables PENT1... to PENT20...), and 18 associated with the *Medical Examination Form* (variables MENT1... to MENT18...). The value of any *text pool identifier* indicates the number of the *text pool* in which the text is stored. Thus, if the *text pool identifier* has the value '2', the relevant text is stored in *text pool 2*. If the *text pool identifier* has the value of '0', there is no text available for the question concerned.

Text pools: These hold *text strings* from a number of different questions - mainly those concerned with health-related topics. As already noted, there are a number of *text pools* associated with the *Parental Interview Form* and the *Medical Examination Form*. Each text pool has three component variables:

1. The *text pool entry pointer* which identifies the question (*ie*: the question number) from which the string is taken.
2. The *text pool entry ICD* which gives the coding for the condition (based on the *International Classification of Diseases*).
3. The *text pool entry text string* which holds the text of the entry on the questionnaire. Again, this entry may have been abbreviated/summarised at the time of keying.

2.5 Further details of these different types of *text variables* are given in Tables 2.3 and 2.4 below.

Variable names

2.6 The *variable names* for the survey instruments in the *Educational Pack*, and the *Maternal Self-completion Form* are the same as those on the SPSS datasets transferred to SSRU in 1991. For the *Parental Interview Form* and the *Medical Examination Form*, they are based on the incomplete coding frames and data definitions transferred at the same time. Generally, *variable names* for these two survey instruments are based on question numbers - with the prefix 'ME...' added for the *Medical Examination Form* (eg: for the latter, question A2 has the variable name 'MEA2'; question B7 is 'MEB7', etc).

2.7 There are exceptions. On occasion, users will find variable names in the form of mnemonics - eg: 'Area Health Authority' has the variable name 'AHA10'.

LONGITUDINAL LINKAGE TO EARLIER DATASETS

2.8 The unique case identifier included with the BCS70 10-year data is given by the combination of two variables - CHESNO and TC10. Both these variables should be used in matching or sorting files. For example, the appropriate SPSS code for sorting cases and linking datasets would appear as follows:

```
sort cases by CHESNO TC10

match files file=filename1/
           file=filename2/
           by=CHESNO TC10
```

2.9 The variable CHESNO records a birth event, while TC10 notes whether the birth event was a singleton or multiple birth. The population for the 1970 British Cohort Study is everyone living in Great Britain and born between 5-11th April 1970¹. This population has grown between sweeps through immigration and these new cohort members were recruited for the follow-ups at ages 5, 10 and 16 years. As a result there are new serial numbers appearing with each sweep. For each sweep following the birth survey, the new members to the study were given new CHESNO values, and these cases will have no linkage to earlier datasets. For the *BCS70 Ten-year Follow-up*, the new members to the study were given CHESNO values in the 60,000s or 70,000s and these cases will have no linkage to birth or 5-year data. (New study members at 5-years were given CHESNO values in the 30,000s and 70,000s, and those new at the 16-year survey values in the 80,000s and 90,000s).

2.10 Although 10-year data may normally be matched to other BCS70 data by using CHESNO and TC10 in combination as described above, users may encounter BCS70 datasets where these two variables have already been combined to form a single unique identifier named KEY, as follows:

$$\text{KEY} = (\text{CHESNO} \times 10) + \text{TC10}$$

2.11 In order to match the 10-year data with any BCS70 dataset where KEY is the unique identifier it is necessary to create this variable in the 10-year dataset by combining CHESNO and TC10 as indicated above. Alternatively, users may partition the variable KEY in the second dataset into 2 variables - CHESNO and TC10. For example, in SPSS this would be achieved by the following commands:

```
compute CHESNO=trunc(KEY/10)
compute TC10=mod(KEY,CHESNO)
```

2.12 Users encountering problems in linking BCS70 datasets should contact the BCS70 User Support Group.

¹The birth sweep covered the United Kingdom, but subsequent sweeps excluded Northern Ireland.

Table 2.3: Text variables for the Parental Interview Form

Text flags:

A3.2 Institution specified

Text pool identifiers:

B1.2 Vision problem text pool identifier
B3.2 Hearing problem text pool identifier
B4.5 Surg aid/med appl text pool identifier
B7.13 Description wheezing text pool ident 1
B7.14 Description wheezing text pool ident 2
B7.15 Description wheezing text pool ident 3
B8.8 Other cause convulsion text pool identifier
B8.9 1st attack description, text pool ident 1
B8.10 1st attack description, text pool ident 2
B8.11 1st attack description, text pool ident 3
B8.12 Subs attack description, text pool ident1
B8.13 Subs attack description, text pool ident2
B8.14 Subs attack description, text pool ident3
B9.2 Congenital abnormality 1 text pool ident
B9.3 Congenital abnormality 2 text pool ident
B9.4 Congenital abnormality 3 text pool ident
B9.5 Congenital abnormality 4 text pool ident
B13.11 Other operation 1 text pool identifier
B13.14 Other operation 2 text pool identifier
B13.17 Other operation 3 text pool identifier
B13.20 Other operation 4 text pool identifier
B15.2 Description of reaction text pool id 1
B15.3 Description of reaction text pool id 2
B15.4 Description of reaction text pool id 3
B19.2 Any other illness text pool id 1
B19.3 Any other illness text pool id 2
B19.4 Any other illness text pool id 3
B21.4 Reason seen by GP text pool identifier
B21.5 Reason seen by HV text pool identifier
B21.6 Reason seen by social worker text pool id
B22.2 Reason missed school 1, text pool id
B22.3 Reason missed school 2, text pool id
B22.4 Reason missed school 3, text pool id
B24.2 Disability diagnosis, text pool id 1
B24.3 Disability diagnosis, text pool id 2
B24.4 Disability diagnosis, text pool id 3
E4.3 Early pregnancy drink, text pool ident 1
E4.4 Early pregnancy drink, text pool ident 2

Text pool entry pointers:

PENT1.1 Text pool entry 1 pointer
PENT2.1 Text pool entry 2 pointer
PENT3.1 Text pool entry 3 pointer
PENT4.1 Text pool entry 4 pointer
continued.

Table 2.3: continued

PENT5.1	Text pool entry 5 pointer
PENT6.1	Text pool entry 6 pointer
PENT7.1	Text pool entry 7 pointer
PENT8.1	Text pool entry 8 pointer
PENT9.1	Text pool entry 9 pointer
PENT10.1	Text pool entry 10 pointer
PENT11.1	Text pool entry 11 pointer
PENT12.1	Text pool entry 12 pointer
PENT13.1	Text pool entry 13 pointer
PENT14.1	Text pool entry 14 pointer
PENT15.1	Text pool entry 15 pointer
PENT16.1	Text pool entry 16 pointer
PENT17.1	Text pool entry 17 pointer
PENT18.1	Text pool entry 18 pointer
PENT19.1	Text pool entry 19 pointer
PENT20.1	Text pool entry 20 pointer

Text pool entry ICD:

PENT1.2	Text pool entry 1 ICD code
PENT2.2	Text pool entry 2 ICD code
PENT3.2	Text pool entry 3 ICD code
PENT4.2	Text pool entry 4 ICD code
PENT5.2	Text pool entry 5 ICD code
PENT6.2	Text pool entry 6 ICD code
PENT7.2	Text pool entry 7 ICD code
PENT8.2	Text pool entry 8 ICD code
PENT9.2	Text pool entry 9 ICD code
PENT10.2	Text pool entry 10 ICD code
PENT11.2	Text pool entry 11 ICD code
PENT12.2	Text pool entry 12 ICD code
PENT13.2	Text pool entry 13 ICD code
PENT14.2	Text pool entry 14 ICD code
PENT15.2	Text pool entry 15 ICD code
PENT16.2	Text pool entry 16 ICD code
PENT17.2	Text pool entry 17 ICD code
PENT18.2	Text pool entry 18 ICD code
PENT19.2	Text pool entry 19 ICD code
PENT20.2	Text pool entry 20 ICD code

Text pool entry text strings:

PENT1.3	Text pool entry 1 text string 30 chars
PENT2.3	Text pool entry 2 text string 30 chars
PENT3.3	Text pool entry 3 text string 30 chars
PENT4.3	Text pool entry 4 text string 30 chars
PENT5.3	Text pool entry 5 text string 30 chars
PENT6.3	Text pool entry 6 text string 30 chars
PENT7.3	Text pool entry 7 text string 30 chars
PENT8.3	Text pool entry 8 text string 30 chars
PENT9.3	Text pool entry 9 text string 30 chars

continued..

Table 2.3: continued

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PENT10.3	Text pool entry 10 text string 30 chars
PENT11.3	Text pool entry 11 text string 30 chars
PENT12.3	Text pool entry 12 text string 30 chars
PENT13.3	Text pool entry 13 text string 30 chars
PENT14.3	Text pool entry 14 text string 30 chars
PENT15.3	Text pool entry 15 text string 30 chars
PENT16.3	Text pool entry 16 text string 30 chars
PENT17.3	Text pool entry 17 text string 30 chars
PENT18.3	Text pool entry 18 text string 30 chars
PENT19.3	Text pool entry 19 text string 30 chars
PENT20.3	Text pool entry 20 text string 30 chars

Table 2.4: Text variables for the Medical Examination Form

Text flags:

MEA3.9	Text for extra info on school med exams
MEA4.40	Text for extra info on screening tests
MEA6.4	Text for extra info on emot/bahav prob
MEA7.20	Text for extra info on illness defect
MEA8.1	Text flag relevant disability/handicap
MEA9.43	Extra info on attending clinics etc
MEA13.2	Text flag of school name and address
MEB1.2	Text flag other place medical took place
MEB7.2	Text flag other chart used dist vision
MEB7.4	Text flag comment dist vision test R eye
MEB7.6	Text flag comment dist vision test L eye
MEB7.8	Text flag comment dist vis retest R eye
MEB7.10	Text flag comment dist vis retest L eye
MEB8.2	Text flag comment near vision test R eye
MEB8.4	Text flag comment near vision test L eye
MEB8.6	Text flag comment near vis retest R eye
MEB8.8	Text flag comment near vis retest L eye
MEB11.2	Text flag, reason unable to assess
MEB14.10	Text flag reason unable to test speech
MEB15.2	Text flag reason unable to assess speech
MEB19.3	Text flag other type scales used
MEB19.4	Text flag reason unable to weigh
MEB22.8	Text flag surgical/operative scars
MEB22.15	Text flag pathological heart murmur
MEB22.17	Text flag undescended, ectopic testis
MEB22.19	Text flag any other pathology
MEB25.2	Text flag comments on palm patern
MEB27.9	Text flag other response dominant eye
MEB31.9	Text flag comments standing on one leg
MEB32.2	Text flag comments walking backwards
MEB32.3	Text flag reason coordination test omitted
MEB33.2	Text flag comments why unable assess coordination
MEB35.20	Text flag comments health/educ defect
BACK2M	Text flag further answers back page
BACK3M	Text flag comments by SCM back page

Text strings:

MEA7.3A	1st illness defect text string 30 chars (a)
MEA7.3B	1st illness defect text string 30 chars (b)
MEA7.6	2nd illness defect text string 30 chars
MEA7.9A	3rd illness defect text string 30 chars (a)
MEA7.9B	3rd illness defect text string 30 chars (b)
MEA7.12	4th illness defect text string 30 chars
MEA7.15A	5th illness defect text string 30 chars (a)
MEA7.15B	5th illness defect text string 30 chars (b)
MEA7.18	6th illness defect text string 30 chars
MEB35.2	Health, educ. defect 1, 30 chars text string

continued...

Table 2.4: continued

MEB35.5A	Health, educ. defect 2, 30 chars text string (a)
MEB35.5B	Health, educ. defect 2, 30 chars text string (b)
MEB35.8	Health, educ. defect 3, 30 chars text string
MB35.11A	Health, educ. defect 4, 30 chars text string (a)
MB35.11B	Problem 4, 30 chars text string (B)
MEB35.14	Problem 5, 30 chars text string
MB35.17A	Problem 6, 30 chars text string (A)
MB35.17B	Problem 6, 30 chars text string (B)
MEB36.3A	Undiagnosed problem 1, 45 chars text string (A)
MEB36.3B	Undiagnosed problem 1, 45 chars text string (B)
MEB36.5	Undiagnosed problem 2, 45 chars text string
MEB36.7A	Undiagnosed problem 3, 45 chars text string (A)
MEB36.7B	Undiagnosed problem 3, 45 chars text string (B)
MEB37.6A	Ongoing problem 1,45 chars text string (A)
MEB37.6B	Ongoing problem 1,45 chars text string (B)
MEB37.8	Ongoing problem 2,45 chars text string
MB37.10A	Ongoing problem 3,45 chars text string (A)
MB37.10B	Ongoing problem 3,45 chars text string (B)

Text pool identifiers:

MEA8.2	Disability/handicap, text pool ident 1
MEA8.3	Disability/handicap, text pool ident 2
MEA8.4	Disability/handicap, text pool ident 3
MEB4.91	Other illness/disability text pool ident 1
MEB4.92	Other illness/disability text pool ident 2
MEB10.2	Abnormal eye condition text pool ident 1
MEB10.3	Abnormal eye condition text pool ident 2
MEB12.13	Current hearing loss text pool ident 1
MEB12.14	Current hearing loss text pool ident 2
MEB21.2	Abn. medical findings (a) text pool id
MEB21.4	Abn. medical findings (b) text pool id
MEB21.6	Abn. medical findings (c) text pool id
MEB21.8	Abn. medical findings (d) text pool id
MEB21.10	Abn. medical findings (e) text pool id
MEB21.12	Abn. medical findings (f) text pool id
MEB21.14	Abn. medical findings (g) text pool id
MEB21.16	Abn. medical findings (h) text pool id
MEB21.18	Abn. medical findings (i) text pool id
MEB21.20	Abn. medical findings (j) text pool id
MEB21.22	Abn. medical findings (k) text pool id
MEB21.24	Abn. medical findings (l) text pool id
MEB21.26	Abn. medical findings (m) text pool id
MEB21.28	Abn. medical findings (n) text pool id
MEB21.30	Abn. medical findings (o) text pool id
MEB21.31	Abn. medical findings (p) text pool id
MEB23.2	Disfiguring condition text pool identifier 1
MEB23.3	Disfiguring condition text pool identifier 2
MEB24.2	Congenital abnormality 1, text pool id
MEB24.3	Congenital abnormality 2, text pool id
MEB24.4	Congenital abnormality 3, text pool id

continued...

Table 2.4: continued

MEB24.5 Congenital abnormality 4, text pool id

Text pool entry pointers:

MENT1.1	Text pool entry 1 pointer
MENT2.1	Text pool entry 2 pointer
MENT3.1	Text pool entry 3 pointer
MENT4.1	Text pool entry 4 pointer
MENT5.1	Text pool entry 5 pointer
MENT6.1	Text pool entry 6 pointer
MENT7.1	Text pool entry 7 pointer
MENT8.1	Text pool entry 8 pointer
MENT9.1	Text pool entry 9 pointer
MENT10.1	Text pool entry 10 pointer
MENT11.1	Text pool entry 11 pointer
MENT12.1	Text pool entry 12 pointer
MENT13.1	Text pool entry 13 pointer
MENT14.1	Text pool entry 14 pointer
MENT15.1	Text pool entry 15 pointer
MENT16.1	Text pool entry 16 pointer
MENT17.1	Text pool entry 17 pointer
MENT18.1	Text pool entry 18 pointer

Text pool entry ICD:

MENT1.2	Text pool entry 1 ICD code
MENT2.2	Text pool entry 2 ICD code
MENT3.2	Text pool entry 3 ICD code
MENT4.2	Text pool entry 4 ICD code
MENT5.2	Text pool entry 5 ICD code
MENT6.2	Text pool entry 6 ICD code
MENT7.2	Text pool entry 7 ICD code
MENT8.2	Text pool entry 8 ICD code
MENT9.2	Text pool entry 9 ICD code
MENT10.2	Text pool entry 10 ICD code
MENT11.2	Text pool entry 11 ICD code
MENT12.2	Text pool entry 12 ICD code
MENT13.2	Text pool entry 13 ICD code
MENT14.2	Text pool entry 14 ICD code
MENT15.2	Text pool entry 15 ICD code
MENT16.2	Text pool entry 16 ICD code
MENT17.2	Text pool entry 17 ICD code
MENT18.2	Text pool entry 18 ICD code

Text pool entry text strings:

MENT1.3	Text pool entry 1 30 chars text string
MENT2.3	Text pool entry 2 30 chars text string
MENT4.3	Text pool entry 4 30 chars text string
MENT3.3	Text pool entry 3 30 chars text string
MENT5.3	Text pool entry 5 30 chars text string

continued...

Table 2.4: continued

MENT6.3	Text pool entry 6 30 chars text string
MENT7.3	Text pool entry 7 30 chars text string
MENT8.3	Text pool entry 8 30 chars text string
MENT9.3	Text pool entry 9 30 chars text string
MENT10.3	Text pool entry 10 30 chars text string
MENT11.3	Text pool entry 11 30 chars text string
MENT12.3	Text pool entry 12 30 chars text string
MENT13.3	Text pool entry 13 30 chars text string
MENT14.3	Text pool entry 14 30 chars text string
MENT15.3	Text pool entry 15 30 chars text string
MENT16.3	Text pool entry 16 30 chars text string
MENT17.3	Text pool entry 17 30 chars text string
MENT18.3	Text pool entry 18 30 chars text string

CLEANING OF THE BCS70 10-YEAR DATA BY SSRU

2.13 The cleaning of data undertaken by the original survey team is outlined in *Section 1* above. The *Social Statistics Research Unit*, City University (SSRU) assumed responsibility for the 1970 cohort in 1991, and in preparing the data for deposit with the ESRC Data Archive, has carried out additional checking and updating. This work has focused, mainly, on the *Parental Interview Form* and the *Medical Examination Form*. SPSS datasets were supplied to SSRU for all survey instruments, except the last two named, for which only raw data, and some provisional and incomplete data definitions were available. Considerable effort has, therefore, been devoted to establishing SPSS datasets which are compatible with those already available for the other survey instruments. Subsequently, much time has been spent resolving issues relating to the validity, range and consistency of the data; and improving the treatment of missing data.

2.14 The opportunity has also been taken to update the labelling of data for all BCS70 10-year survey instruments and to correct a small number of errors in the case identifiers (see *paragraph 2.8* above).

2.15 Further details of the work undertaken are given below.

Creation of SPSS datasets for the Parental Interview Form and the Medical Examination Form

2.16 Cleaned and edited SPSS system files for the *Educational Pack* and for the *Maternal Self-completion Form* were supplied to SSRU in 1991. Raw data were supplied for the *Parental Interview Form* and the *Medical Examination Form*. The original coding frames, and provisional data definitions were also available for the latter, but were not complete, so the first stage of the work required the gathering together of all available relevant information from BCS70 records and individuals who had been involved with the preparation and conduct of the follow-up. Suitable data definition files were then constructed and the raw data read in to create initial SPSS system files.

Overall data cleaning policy

2.17 This section outlines firstly the overall cleaning policy applied to the 10-year dataset, secondly the differential coding of the missing values and finally points relevant to specific questionnaires including issues of reliability.

2.18 Following the creation of the initial SPSS datasets, extensive checks of data validity, range and consistency were carried out. To be valid the value for any data item for any case must be *numeric* (a number, 0-9, etc) or *alphanumeric* (text, A-Z/a-z, etc) as specified in the questionnaire/coding frame/data definition. To be *within range*, the value for any data item for any case must be within the range of values specified in the questionnaire/coding frame/data definition. To be *consistent* the value of any data item for any case must conform to the filter structure of the survey instrument.

2.19 The data for the *Parental Interview Form* and the *Medical Examination Form* have been cleaned through computer editing, using checks for validity, range, and consistency derived from the questionnaires/coding frames/data definitions as outlined above. Due to limited resources and record storage problems, it has often been impossible at this stage to check 'errors' against the original questionnaires themselves. As a result, the 'errors' have been 'corrected' according to the rules outlined in Table 2.2 below. Thus, the identification of 'errors' was followed by a check of the raw data to identify data entry problems. For 'errors' of range and consistency, this was followed by review of the editing rules. Consistency 'errors' were investigated further by back-checking the consistency of the primary filter, and updating this if necessary. Where updates to the edit and/or values had been made, the edit was re-run to check that the 'corrections' had been correctly applied and no new 'errors' introduced. Where no correction could be identified, the 'error' value was set to missing. All edits were iterated until no 'errors' were identified.

2.20 It is important to stress that this procedure differs in one important aspect from that adopted for the cleaning of the BCS70 16-year data which was recently deposited with the ESRC Data Archive. For this dataset *forward coding* was employed to 'correct' filter 'errors'. With *forward coding*, if the primary question is answered in a way that does not lead on to the subsidiary questions then any responses in the subsidiary sections are set to a missing value. For example, if the question is 'Have you ever been to hospital?' then only those that have ticked 'Yes' will be included in the subsidiary questions on 'date', 'reason', etc for admittance to hospital. With an interview based questionnaire, this is obviously what would happen during the interview. However, with self-completion questionnaires, sometimes respondents change their minds when they see the subsidiary questions without changing the answer to the primary question and with forward coding these subsidiary answers are lost.

2.21 For the 10-year data, the filter was checked both *forward* and *backward* in order to ensure that the loss of data was kept to a minimum.

2.22 The alphanumeric (text) data have not been edited in any way and therefore there may be a few cases appearing in the text material that are not in the numeric variable. It should be noted that the number of answers lost through forward coding is very small.

2.23 If a question asks for the respondent to tick all that apply, then blanks are not necessarily indicative of missing data. In the *Health Pack*, only positive responses to such questions are coded. Any 'no response' or 'not applicable' was left blank (missing) making it impossible to distinguish between those to whom the response did not apply, and those who failed to answer the question or questionnaire. In the *Educational Pack*, coding for such multiple response questions distinguishes between those who replied 'Yes' or 'No', and those who didn't complete the question or questionnaire.

Table 2.2: Outline of ‘correction’ rules adopted for editing the 10-year data

Type of ‘error’	Priority	‘Correction’ rules
Not valid	1	Check and correct any obvious data format problem (eg: left/right-shifted data)
	2	Set to missing
Out of range	1	Check and correct any obvious data format problem (eg: left/right-shifted data)
	2	Check if range appropriate, and modify and re-run edit if necessary
	3	Set to missing
Not consistent	1	Check and correct any obvious data format problem (eg: left/right-shifted data)
	2	Check filter structure, and modify and re-run edit if necessary
	3	Check and update value of primary filter if necessary and re-run edit
	4	Set to missing

Missing values

2.24 In the BCS70 10-year data supplied to SSRU in 1991, missing data were handled in a variety of ways. As part of the work to check and update this data, efforts have been made to standardise the allocation of missing values. Also, during the course of checking, it was sometimes necessary to allocate new missing values to meet the specific needs of individual variables. As a result, there are a relatively large number of missing value codes which may be allocated to any one variable. In practice, users should find that only a small number have been used for most variables.

2.25 The standard missing value codes are as follows:

- 1 Not applicable
- 2 Not known
- 3 Not stated
- 4 More than 1 answer
- 5 Other answer
- 6 No questionnaire
- 7 Too many to count
- 8 Out of range
- 9 No code available

2.26 It is important to note that these codes are not always consistent with those allocated to other BCS70 datasets relating to the birth, 5, 10, 16, and 26 year surveys. It is hoped that missing value codes will be rationalised when all BCS70 data are set up as a single database.

Cleaning issues on individual questionnaires

Measurement in the Medical Examination Form

2.27 The *Medical Examination Form* records a number of physical measurements taken during the course of the medical examination, including: pulse rate at the start (MEB5) and end (MEB34) of the examination; height (MEB17.1/17.2); head circumference (MEB18.1/18.2); weight (MEB19.1/19.2); and blood pressure

(MEB20.1 and MEB20.2). Each has been checked for validity, range and consistency as outline above. However, there were particular problems with the data for height, weight, and head circumference; and with that for the 'depth of cuff' used in the measurement of blood pressure. These arise because the values for these variables were recorded as either metric (*eg*: metres, centimetres, kilograms) or imperial (*eg*: feet and inches, stones and pounds) measurements - the choice was left to the person conducting the medical examination, and will reflect their preference/available equipment. During the coding operation described above (see *paragraph 1.41* above), the medical coders translated all imperial measurements into metric, thus giving two quite different distributions for each of these measures - one metric recorded as metric, and the other metric derived from imperial.

2.28 For convenience, the data deposited with the ESRC Data Archive has only a single variable for each of these measures - height, weight, head circumference, and depth of cuff. These variables have been created by combining information from the two original distributions. In most cases this is straightforward, because only one measure is (as expected) available: the metric recorded as metric; or the metric derived from imperial. Contrary to expectation, however, in some cases both measures are available. For these cases, the value selected is the metric derived from imperial - this seemed logical since Britain was using mainly the imperial measures in 1980. Where neither measure was available, the value of the appropriate variable has been set to missing.

2.29 Following the creation of these new variables for height, weight, head circumference, and depth of cuff, additional range checks were carried out, and further updates applied to the data where necessary. For example, the new height and weight distributions were compared to a standard growth assessment chart for girls and boys. Height and weight values lying outside the range for children aged 10-11 years were re-assigned to a missing value.

Additional SSRU cleaning of the Educational Pack and the Maternal Self-completion Form

2.30 Although SSRU data cleaning has concentrated on the Parental Interview and the Medical Examination Forms, the datasets derived from the survey instruments in the *Educational Pack*, and the *Maternal Self-completion Form* have also been subject to additional checking. Data for these survey instruments had already been subject to comprehensive checking and updating prior to their transfer to SSRU.

Checks for validity, range and consistency

2.31 Checks for validity and range had already been completed, prior to the transfer of the data to SSRU. Filter questions are relatively rare in these instruments and had also been checked. However, additional checks for consistency by SSRU revealed some problems with filters. These were resolved with the combination of forward and backward coding employed for the Parental Interview and Medical Examination data (see *paragraph 2.17* above).

Variable and value labels

2.32 Review of the SPSS datasets transferred to SSRU suggested that a number of variable and/or value labels had been omitted, or were misleading or wrong. A complete check was therefore made, and labelling corrected or added.

CONFIDENTIAL TEXT VARIABLES

2.33 Those variables which would lead to the identification of a cohort member or their family have been removed from the dataset. These confidential variables include first and last names, addresses including postcodes, National Health Service number, and school addresses.

INTERACTIVE DATA DICTIONARY

2.34 In order to help users find their way about the *BCS70 Ten-year Follow-up*, SSRU has prepared an *Interactive Data Dictionary* as guide to the contents of the SPSS data. This is based on the *ideaList* Information Retrieval System, and is distributed, free of charge on floppy disk.

Disk contents

2.35 There are two *Interactive Data Dictionary* disks. Together they hold four files:

- BCS10_V1.ZIP - the *Data Dictionary* in "compressed" form.
- PKUNZIP.EXE - software to "uncompress" the *Data Dictionary*.
- BCS10MAN - this document is in ASCII format.
- READ.ME - notes on how to load the data base on your PC.

YOU MAY COPY THESE DISKS AS MANY TIMES AS YOU WISH.

IMPORTANT

Further details of the *Interactive Data Dictionary* are given below. Please read these carefully before attempting to load/use this software. If you have any problems or queries, please contact the BCS70 User Support Group (see next page for full contact information).

Loading the *Interactive Data Dictionary* from disk

2.36 To load this documentation on your PC, follow the instructions given below. What you should enter on your keyboard is shown in *italics*. (See also file "READ.ME").

1. Create a directory called "\bcs70dd" on your hard disk
eg: *mkdir bcs70dd*
2. Make this your current working directory
eg: *cd bcs70dd*
3. Put *Data Dictionary* Disk #1 in your floppy drive (eg: drive a:)
4. Uncompress and copy the *Data Dictionary* to your hard disk :

eg: *a:pkunzip bcs10_v1 c:*

Follow the instructions which appear on the screen, and the files which comprise the *Data Dictionary* will be copied to your hard disk.

NB: The uncompressed *Data Dictionary* will occupy some 24,200,000 bytes.

5. To use the *Data Dictionary* you must be in the "bcs70dd" directory. To start the *Data Dictionary*, enter: *bcs10*

6. We suggest you keep the floppy disks as a back-up!
7. Please advise the *BCS70 User Support Group* of any queries or problems via email - bcs70@ssru.city.ac.uk (see below for full contact information).

Guide to using the Interactive Data Dictionary

2.37 A brief guide to using the *Interactive Data Dictionary* is given below.

Starting the Data Dictionary

Type *bcs10* (within the "bcs70dd" directory) to start the application.

You will be presented with an opening screen offering a number of options:

```

1970 BRITISH COHORT STUDY (BCS70)
  B C S 7 0   T E N - Y E A R   F O L L O W - U P   (CHES)
Interactive Data Dictionary - Guide to Variables on the SPSS Data Set
  Using the "ideaList" Information Retrieval System
  VERSION 1.0 (NB: May contain errors)
(c) SSRU (this "ideaList" application)/Blackwell ("ideaList" software)
-----
YOUR NEXT MOVE... To access [!...] place cursor on "!" and press F9.
Press F10 to backtrack.  F1, F5, Alt, F, X refer to function keys, etc.

About BCS70      = [!BCS]      About the SPSS Data = [!SPS]
About "ideaList" = [!IDL]      Help from "ideaList" = F1
Search for...    = F5          Exit                  = Alt F X
-----
You are advised to always consult BCS70 survey instruments and other
documentation before selecting variables or interpreting analyses.
-----
BCS70 User Support Group          Contact:
Social Statistics Research Unit    Telephone: (0171) 477-8489
City University                   Fax       : (0171) 477-8583
Northampton Square                Email    : bcs70@ssru.city.ac.uk
LONDON EC1 OHB

```

Conventions

- | | |
|-------------------------|---|
| F1, F5, etc | Refer to the function keys |
| Alt, F, X | Refer to the Alt, F and X keys |
| -, + | Refer to the - and + keys on the numeric keypad |
| [!BCS], [!IDL], etc | Are cross references providing access to additional information. To activate these, place the cursor on the ! of the appropriate [!...] entry and press the F9 key. Press the F10 to return to the page where you pressed the F9 key. |
| <i>Cursor movement:</i> | Simply use the arrow/PgUp/PgDn/Home/End keys in the normal manner. |

About BCS70 - [!BCS]

A brief overview of BCS70 is presented in a series of screens. The contents of these screens are shown below:

Screen #1:

```
Opening Screen = F10           Next Screen = +/-           Exit = Alt F X
(F10, +, -, Alt, F, X refer to function, numeric keys, etc.)
-----
About BCS70:  BCS70 - A Brief Summary (Screen 1 of 2)
-----
The 1970 British Cohort Study (BCS70) is a continuing, multi-disciplinary
longitudinal study which takes as its subjects all those living in Great
Britain who were born between 5 and 11 April, 1970.

BCS70 began with the collection of data about the births and families of
babies born in England, Scotland, Wales and Northern Ireland. At the time
the study was named the British Births Survey (BBS). The National Birthday
Trust Fund and the Royal College of Obstetricians and Gynaecologists
sponsored this study. Since 1970 further studies were conducted in 1975,
1980 and 1986. The scope of the enquiry changed from a strictly medical
focus at birth to encompass physical, and educational development at the
age of five, and physical, educational and social development at the ages
of ten and sixteen. The chart on the next screen indicates the sources of
data.

Additional information may be accessed via the menu bar at the top of this
next screen.
```

Use the + or - keys on the numeric keypad to access the second page.

Screen #2:

```
[+/-] = Next Screen      [!Open] = Opening Screen    [!BBS] = About BBS
[!CHES] = About CHES     [!YSC] = About Youthscan    [Alt FX] = Exit
-----
Chart:1970 British Cohort Study (Screen 2 of 2)
-----
The 1970 British Cohort Study
-----
BBS      CHES      CHES      Youthscan  BCS70
(1970)   (1975)   (1980)   (1986)    (1996)
Birth    5         10       16        26

Mother   Parents  Parents  Parents
          Tests   School   School
          Medical Medical  Medical
          Subject Subject  Subject
          Subject

16,135*  13,135   14,875   11,628    9,003
-----
* Achieved Sample - at least one survey instrument partly completed
```

Further information about BCS70 - [!BBS], [!CHES], [!YCS]

Additional information about the birth survey and subsequent follow-ups which comprise BCS70 may be found by using the cross references which give access to summaries of the British Births Survey ([!BBS]), the Child Health and Education Study ([!CHES]), and Youthscan ([!YCS]).

Each of these entries may also contain further cross references to additional background details.

Remember, to follow a cross reference, place the cursor on the ! of the appropriate [...] entry and press the F9 key. Press the F10 to return to the page where you pressed the F9 key.

About the SPSS Data Set - [!SPS]

Again there are two screens.

Screen #1:

```
Opening Screen = [!Open]                Next Screen = +/-
Search for... = F5                      Exit = Alt F X
(To access [...] place cursor on "!" and press F9. Press F10 to backtrack)
-----
BCS70: 1980 Follow-up (CHES) - SPSS Data - INTRODUCTION: Page 1 of 2
-----
INTRODUCTION

Data gathered during the 1986 Follow-up of the 1970 British Cohort Study
(BCS70) are available for secondary analysis via the Economic and Social
Research Council Data Archive at the University of Essex.

Data were supplied to the Archive as SPSS data sets, and this "Interactive
Data Dictionary" is designed to:

* Describe the nature and content of the SPSS data sets.
* Help you find the location of variables of interest.

It has been derived directly from information generated using SPSS, and from
the other documentation prepared to accompany the data deposit.

You are advised to always consult BCS70 survey instruments and other
documentation before selecting variables or interpreting analyses.
```

Use the + or - keys on the numeric keypad to access the second page.

This provides a series of cross references providing access to a wide range of information about the data collection and preparation, and other background information.

Remember, to follow a cross reference, place the cursor on the ! of the appropriate [...] entry and press the F9 key. Press the F10 to return to the page where you pressed the F9 key.

Screen #2:

```
Press the F10 key to return to previous page
-----
BCS70: 1980 Follow-up (CHES) - SPSS Data - INTRODUCTION: Page 2 of 2
-----
For more information about any of the topics listed below, place cursor on
the ! of the appropriate [...] entry in the right hand column and press the
F9 key. To return to this page, press the F10 key.

Survey instruments                [!Intruments]
Data deposited at the ESRC Data Archive [!Deposit]
Text material                     [!Text]
Variable names                   [!Names]
Longitudinal linkage              [!Linkage]
Data cleaning                     [!Cleaning]
Missing values                    [!Missing]
Response bias                     [!Bias]
Confidential data                 [!Confidential]
Further information                [!Info]
Acquiring BCS70 data for research   [!Acquiring]
```

About ideaList - [!IDL]

An introduction to using the ideaList software is presented in a series of 6 screens. Use the + and/or- keys on the numeric keypad to browse these screens.

The contents of these screens are reproduced below.

Screen #1:

```
Opening Screen = [!Open] Next Screen = +/- Search for... = F5 Exit = Alt F X
(To access [!...] place cursor on "!" and press F9. Press F10 to backtrack.
F5, F9, F10, +, -, Alt, F, X refer to function, numeric keys, etc.)
-----
"ideaList": A Brief Guide - (Screen 1 of 6)
-----
NB:           Please read what follows carefully before proceeding

Purpose:      To provide information about variables on the BCS70 SPSS Data

Conventions:  F1, Alt, Enter, etc below refer to F1, Alt,
              Enter, keys on your keyboard

              + and - below refer to + (plus) and - (minus) keys on
              the NUMERIC (rightmost) keypad

              [!...] require you to place the cursor on "!" and press F9
              F10 takes you back to your previous position

              F1 will provide "ideaList" help screens
```

Screen #2:

```
Opening Screen = [!Open] Next Screen = +/- Search for... = F5 Exit = Alt F X
(To access [!...] place cursor on "!" and press F9. Press F10 to backtrack.
F5, F9, F10, +, -, Alt, F, X refer to function, numeric keys, etc.)
-----
"ideaList": A Brief Guide - (Screen 2 of 6)
-----
Search:       To SEARCH = F5 (or Alt S and select from drop down menu)
              Enter {string} Enter to search for all examples of
              {string} in BCS70 DATA SET variable names/records/variable
              labels, OR
              F1 to display INDEX (names/records/labels are FULLY
              indexed)

              NB: You may BROWSE index using Cursor or letters/numbers
              until desired string is highlighted
              Pressing Return will select records containing the string

Hit List:     Selected records are known as a HIT LIST
              To BROADEN search = F6 (or Alt S and select from menu)
              To NARROW search = F7 (or Alt S and select from menu)
              To EXCLUDE from search = F8 (or Alt S and select from menu)
```

Screen #3:

Opening Screen = [!Open] Next Screen = +/- Search for... = F5 Exit = Alt F X
(To access [!...] place cursor on "!" and press F9. Press F10 to backtrack.
F5, F9, F10, +, -, Alt, F, X refer to function, numeric keys, etc.)

"ideaList": A Brief Guide - (Screen 3 of 6)

Viewing: To VIEW records selected by SEARCH command (ie: the HIT List):

Move FORWARD/BACKWARD through records = + or - keys

For an OVERVIEW of ALL selected records = Alt V and select "Overview" from menu. F1 will reveal list for browsing

Dropping

Records: To DROP one or more records from the HIT LIST = Alt R
Using this menu you may MARK and DROP selected/all records in the HIT LIST

Screen #4:

Opening Screen = [!Open] Next Screen = +/- Search for... = F5 Exit = Alt F X
(To access [!...] place cursor on "!" and press F9. Press F10 to backtrack.
F5, F9, F10, +, -, Alt, F, X refer to function, numeric keys, etc.)

"ideaList": A Brief Guide - (Screen 4 of 6)

Printing To PRINT a copy of the records on a HIT LIST = Alt X
Using this menu you may choose WHAT to "export" and to WHERE
YOU SHOULD NOT CHOOSE "Export All"
YOU ARE ADVISED TO CHOOSE "Export to File"

NB: To achieve "Export":

Alt X and select "Export to File" (This is pre-selected)
Alt F and name export format file
Name destination file (your choice)

Quiting: To leave Idealist = Alt F X

NB: Press and hold down ALT, and then press F followed by X

Screen #5:

Opening Screen = [!Open] Next Screen = +/- Search for... = F5 Exit = Alt F X
(To access [!...] place cursor on "!" and press F9. Press F10 to backtrack.
F5, F9, F10, +, -, Alt, F, X refer to function, numeric keys, etc.)

"ideaList": A Brief Guide - (Screen 5 of 6)

Cross references These provide links to additional information, and are
[!...] indicated by the following: [!text]

To access, place cursor over the ! (or anywhere between the square braces) and press the F9 key. To return to the page (screen) from where you followed the cross reference.

NB: In other software, cross references are sometimes known as "hypertext links".

Screen #6:

```
Opening Screen = [!Open] Next Screen = +/- Search for... = F5 Exit = Alt F X
(To access [!...] place cursor on "!" and press F9. Press F10 to backtrack.
F5, F9, F10, +, -, Alt, F, X refer to function, numeric keys, etc.)
-----
"ideaList": A Brief Guide - (Screen 6 of 6)
-----
Variable entries: The format of the variable descriptions is summarised below.
-----
MENU:          A guide to available options
-----
SURVEY:        Survey during which the data were gathered
-----
INSTRUMENT:    The questionnaire, etc used to gather the data
-----
VARIABLE:      SPSS "Variable name" and "Variable label" as on the data set
-----
VALUES:        Frequency distribution, including any SPSS "Value labels"
                NB: (1) Where a variable has very many values descriptive
                    statistics are provided.
                    (2) No distribution information is provided for:
                        (a) Case identifiers;
                        (b) Alphanumeric variables holding the text.
-----
NOTE:          Comments on the nature and/or utility of the variable, etc.
```

Please note that the comments of the nature/utility of variables (NOTE field of Screen #6 above) may also contain cross references to additional information.

SECTION 3

BCS70 TEN-YEAR FOLLOW-UP INFORMATION MANUALS

NB: With the exception of page 3.2, the page numbers in this section are those of the original documents.

BCS70 TEN-YEAR FOLLOW-UP INFORMATION MANUALS

3.1 The survey documents reproduced in this section were designed to help teachers, nurses and doctors to administer tests and record results.

They documents are:

- *Instruction Booklet for Educational Tests*
- *Instruction Booklet on Nursing and Medical Aspects of 10 year follow-up*
- *Instruction Booklet for Special Educational Tests*

NB: The page numbers in the remainder of this section are those of the original documents.

SECTION 4

BCS70 TEN-YEAR FOLLOW-UP ANNOTATED QUESTIONNAIRES

NB: With the exception of page 4.2, the page numbers in this section are those of the original documents.

BCS70 TEN-YEAR FOLLOW-UP ANNOTATED QUESTIONNAIRES

4.1 The survey instruments used during the *BCS70 Ten-year Follow-up* are reproduced in this section. Each has been annotated to indicate the names of the variables allocated to each item of data.

The survey instruments are:

EDUCATIONAL PACK

- *Pupil Question Form*
- *Educational Questionnaire*
- *Educational Score Form*
- *The Shortened Edinburgh Reading Test*
- *British Ability Scales*
- *Friendly Maths Test*

HEALTH PACK

- *Parental Interview Form*
- *Medical Examination Form*
- *Maternal Self-Completion Form*

SPECIAL EDUCATIONAL PACK (not annotated)

- *Special Test Booklet*
- (The Special Test Booklet also refers the cohorts to the
- Young's Group Mathematics Test and
- Thackray Reading Readiness Profiles)
- *Special Teacher Questionnaire*

NB: The page numbers in the remainder of this section are those of the original documents.

SECTION 5

APPENDICES

APPENDIX 1: Report to the Department of Education and Science (DES) and Notes on Usage

APPENDIX 2: Summary of Information Collected at Birth, 5, 10, 16 and 26 years.

APPENDIX 3: Publications and Reports.

APPENDIX 4: Coding of Accident Aetiology

APPENDIX 1

Report to the Department of Education and Science and Notes on Usage

NB: With the exception of page 5.3, the page numbers shown are those of the original documents.

CHILD HEALTH AND EDUCATION STUDY

**First Report to the
Department of Education and Science
on the 10 year follow-up**

**Department of Child Health
University of Bristol**

October, 1982

CHILD HEALTH AND EDUCATION STUDY

10 YEAR FOLLOW-UP

We wish to acknowledge the contribution of the Area Health Authorities and Local Education Authorities throughout England, Scotland and Wales to this study. We should like to thank all the Directors of Education, specialists in Community Medicine (Child Health), Community Physicians and Area Nurses (Child Health) for their help and cooperation. In particular we must thank all the head teachers, teachers and administrators, clinical medical officers, school nurses and health visitors who gave their time and energy to carry out the fieldwork of the study during a period of considerable staff shortages. We thank the parents and the children themselves for their participation in this research.

The 10 year follow-up study was funded by grants from:

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Joseph Rowntree Memorial Trust

Department of Education and Science

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Development, USA: Grant No 5R01HD13347

Manpower Services Commission

We wish to express our thanks to the Chairman and Members of the DHSS Steering Committee and DES Advisory Committee who have given so much helpful advice and support to the study throughout the past four years.

Professor Ron Davie	Chairman and Scientific Advisor (DHSS)
Professor Margot Jeffreys	Scientific Advisor (DHSS)
Mr Malcolm Stone	Scientific Advisor (DES)
Mr John Bagley	DES Research Manager 1978-80
Miss Margaret D'Armenia	DES Research Manager 1980-82
Dr Michael Barnett	DHSS Research Manager 1978-80
Dr Doreen Rothman	DHSS Research Manager 1980-82
Mr Robin Guthrie	Joseph Rowntree Memorial Trust
Mr Richard Myers	DHSS

The team responsible for this Report consisted of the following people:

Professor Neville R Butler	Director
Dr Mary N Haslum	Senior Research Officer
Mr Walter Barker	Educational Consultant
Mr Anthony C Morris	Statistician and Computer Scientist

We wish to acknowledge the considerable work of Miss Pamela J Lyons, Coding Supervisor on the study and of Mrs Christine Porter who acted as Survey Administrator; the work of Mr Bryan Rodgers and Mr Nigel Moss, Educational Research Assistants on the study, and the work of Mr Richard Anderson on the regression analyses presented in Section 4 of this Report.

We wish to acknowledge the work of the clerical staff on the study. Although many of them were with us for only short periods, their contribution to the preparation of the data was essential.

We must also acknowledge the work of the secretarial staff who have worked on the study during the past four years. Without their work the study could not have been carried out nor the Reports produced. We thank particularly Miss Jane Tily and Mrs Sheila Taylor for their assistance with this Report.

We should like to thank our colleagues in the Department of Child Health for the advice and support they have given us throughout this study, particularly Mr Brian C Howlett. We should also like to thank Dr David Rush of the University of Columbia.

First Report to the Department of Education and Science
on the 10 year follow up of
the Child Health and Education Study

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1.0 Introduction

The Child Health and Education Study is a national cohort study of all the children born between 5th and 11th April, 1970 in England, Scotland and Wales. The fieldwork of the 10 year follow-up Study took place between March 1980 and October 1981 during the children's tenth and eleventh years as they ended their primary school education.

They received extensive educational testing, a school medical examination, their parents were interviewed to obtain information about the children's medical histories and home and family background and head teachers and class teachers provided information about the children's schools.

This was the second time all the CHES children had been followed up. The first follow up was carried out in 1975 when the children were aged 4½ to 5 years as they ended the preschool period.

The study is the third national cohort study and it began, like its predecessors, the National Survey of Health and Development⁽²⁾ and the National Child Development Study⁽³⁾ as a birth survey.

There were twelve years between the cohort studies and in spite of the fluctuations in the birth rate in the intervening years the number of births occurring between the 1958 (16,750 survivors at the end of the first month) and 1970 survey weeks (16,728) were remarkably similar. The possibilities for examination of health related learning difficulties, use of services and changes in social and educational influences on children over the post World War II years to the present day are numerous.

The original remit of the 10 year follow-up study was threefold: to carry out wide ranging examinations of the influence of social, school, familial and medical factors on educational performance; to examine the educational attainment of children with specific learning difficulties, to examine the educational performance of severely handicapped children. In 1981 it was agreed that a First Report should be submitted on a sample of the national data to expedite analyses; 8,836 children formed the

sample. The national data now covers 12,901 children and additional information from special testing of 5 percent of the lowest scores on the reading and mathematics tests is available for 464 children.

The 1944 Act referred to children who suffered a disability of mind or body. This approach was based on a medical model of disease and the assessment of such 'disabilities' were made the responsibility of medical practitioners. Circular 2/75 (DES, 1975) recommended that the assessment of children with such disabilities should have a psychological as well as an educational and medical input.

The 1981 Education Act states that a child has special educational needs 'if he has a learning difficulty which calls for special educational provision to be made for him.' Wedell⁽²⁾ has argued that the circularity of this definition reveals an important aspect of the definition namely that the concept of special need is a relative one. It is relative to the nature and degree of the child's problem and the extent to which the child's environment may aggravate the problem or help to compensate for it. The new definition of special need implies that to understand a child's needs we must always take account of the way in which he interacts with his home, his school and his wider environment.

The focus of interest in the study by the Department of Education and Science has altered with the implementation of the new Education Act and this is reflected in this Report, which considers the educational performance of children with speech and communication difficulties, children with reading and mathematics difficulties, children who are underachieving in reading and mathematics.

An initial examination of the behaviour problems of these groups of children is also made but there is so much rich and interesting information on behaviour difficulties provided by the parents and school doctors that we cannot do justice to this area of enquiry until we have linked the health and educational aspects of the study.

The Report of the Committee of Enquiry into the Education of Handicapped Children and Young People (Warnock Report⁽¹⁾) was published in 1978 and it was recognised that the fieldwork of the 10 year study would take place during a time when we might begin to detect the transition towards some of the recommendations of the Warnock Report which would be implemented in the new Education Acts. Children with special educational needs would have been ascertained, however, under the provisions of the 1944 Education Act.

The last section of the Report contains an analysis of the educational information on all the children. Characteristics of the school, the curriculum and the class a child attends and of the child himself are examined for their power to predict educational attainment in reading and mathematics.

In addition, a detailed study is made of the information extracted from analyses of the Child Behaviour Scale completed by the teachers. Particular attention is given to the hypothesised existence of a syndrome of 'hyperactivity'. The Report concludes with a consideration of possible directions for future work.

2.00 Organisation of the 10 Year Survey

2.10 Introduction

The fieldwork of the ten year follow-up study of the Child Health and Education Study involved a massive nationwide exercise covering England, Scotland and Wales. Over 16,000 children born between 5th and 11th April, 1970 were involved.

2.10.1 Area Nurses (Child Health) and Specialists in Community Medicine (Child Health) Join the Study

The plans for the fieldwork of the Study were laid at a meeting between the Bristol team and the Regional Conveners of the Association of Specialists in Community Medicine (Child Health) in June 1978 and at a meeting with representatives of the Association of Area Nurses (Child Health) in December 1978.

It was essential to the Study that health visitors should interview the children's parents to collect medical and social histories. The specialists in Community Medicine (Child Health) (SCMs) suggested that the only feasible way for children with disabilities to be identified accurately would be for each child in the cohort to receive a medical examination. As the Study children averaged less than one child per school the SCMs felt that a medical examination for all children might be a reasonable proposition especially if the medical examinations could be spread over a long period of time. The Association of SCMs agreed to form a working party to advise on the contents of a medical examination.

The working party recommended that the medical examination should include tests of vision, speech and hearing, a brief but standardised physical examination and tests of motor co-ordination. They also recommended that a developmental assessment should be made of each child, and agreed that a behavioural assessment should be made and social and medical histories should be recorded where possible.

The SCMs and Area Nurses for Lancashire, Derbyshire, Devonshire and Gloucestershire agreed to pilot the Study forms in their Area Health Authorities.

2.10.11

Format of the Survey Agreed

The recommendations of the working party were ratified by the DHSS Steering Committee. It was agreed that:

- 1 A medical examination would be carried out on every child in the cohort. It would be designed to identify the disorders, impairments and disabilities present in the children. Measurements would be taken of height, weight, head circumference, blood pressure, visual acuity and hearing (sweep audiometry). Tests of laterality and motor co-ordination would be included. Emphasis would be placed on the doctor's summary of current defects and disorders. Special sections would be included to cover upper and lower respiratory tract disorders and convulsive disorders.

- 2 School nurses and health visitors would be invited to complete a parental interview to obtain children's medical history which would cover the occurrence of common childhood conditions and questions with special emphasis on respiratory and convulsive disorders. Information on hospital inpatient and outpatient attendances and accidents would be sought together with information about any diagnosis ever made of a disorder, impairment or defect. Parents would be asked to assess any disability present in the children. Information on the social history of the children would also be collected. This would consist of details of family composition, parental figures, parental education, occupation and income; housing and type of tenure.

- 3 A Maternal Self-Completion Form would be devised which could be completed by the mothers. It would contain items from the Rutter (Parental) Scale of Behaviour Disorder and the Connor's Hyperactivity Scale, a section on the child at home and at school, a children's skills scale, a description of the type of neighbourhood, family possessions, help available for the mother and the role of the father in the family.

2.10.iii

British Medical Association and Local Medical Committees, Unions
and Teaching Associations Informed, Directors of Education contacted

The British Medical Association and the Scottish Medical Association expressed their continuing support for the Child Health and Education Study. All Local Medical Committees were sent information about the Study, including a copy of a letter for the General Practitioners of the Study children which would be forwarded by Area Health Authorities.

The relevant teaching unions and teaching associations were informed about the Study and lent their support.

All Directors of Education in England, Scotland and Wales were sent information about the aims of the research and were invited to take part in the survey.

2.11 Preparation for the Fieldwork

2.11.1 Merging of Existing Indices

CHES held a manual index of the cohort children who had taken part in the 5 year follow-up, the 7 year follow-up when an additional 1,917 children were traced, and an index of children from the British Births Study who had not been traced either during the 5 or 7 year follow-ups. These three manual indexes were merged. A computer file and printout of this 5 year address file was produced which linked all known living children in the cohort.

The cohort children are 'flagged' with the Office of Population Census and Surveys and we are informed automatically when one of our children dies or emigrates. This ensures that we cannot make the mistake of attempting to interview the parents of a child who had died.

2.11.ii Schools Trace

In the first week of December 1978, sequentially numbered schools trace forms were sent to every local authority and independant primary or middle school in Great Britain accompanied by a letter to the Head Teacher asking for details of any children on their school register who was born between 5th and 11th April, 1970. The schools provided the name, address, date of birth, of the children and the name of the parent or guardian. The information from the trace forms was keyed onto magnetic tape to form a 10 year address file. The trace took six months to complete.

2.11.iii Merging the 5 and 10 Year Address File

The 5 and 10 Year address computer files were merged using matching prodedures on the children's surnames; 8,260 children were matched at the first attempt, the children on the 10 year file receiving the Central Survey Number from the 5 year file which, in fact, had been allocated at the time of the birth survey. This left 6,449 children from the 10 year file to be matched against 8,908 children from the 5 year file.

This matching was carried out manually. It was a lengthy procedure which was hindered by the number of name changes which some of the children had experienced during their short lives.

There were 15,000 children of whose existence we were aware from the 5 year address file who were not found in the schools trace. A special effort was made to retrace these children by writing to the Area Health Authorities concerned and to the children's last known addresses. Nearly all these children were subsequently traced, or accounted for, that is, we knew either where they were currently living or that they had emigrated.

2.11.iv Parental Permission

In November 1979 we wrote to the parents of every child to invite them and their children to take part in the 10 year follow-up study. Any refusals we received were noted and the 10 year file was continually updated as new information on the children's names and addresses was received.

2.11.v Briefing Sessions

All the specialists in Community Medicine (Child Health), Community Physicians and Area Nurses (Child Health) in England, Scotland and Wales were invited to take part in the Study. Fourteen regional briefing sessions were arranged throughout the country in December 1979 and Medical Officers (Child Health), Area and District Nursing Officers, Specialists in Community Medicine (Child Health) and Community Medicine Specialists (Scotland) and by representatives from Local Education Authorities. Personnel from the Child Health and Education Study attended each session to describe the Study and the fieldwork involved.

The meetings were well attended and often twice the number of people expected were present. Study co-ordinators were appointed by each Area Health Authority and Local Education Authority to be responsible for the dispatch, receipt and return of forms.

2.11.vi Financial Assistance for Some Authorities

Some health authorities indicated they would need financial assistance to employ nursing or medical personnel to carry out parental interviews or medical examinations. These included Ealing, Hammersmith and

Hounslow, City and East London, Birmingham. Some authorities expressed anxiety about medical, nursing costs and administrative costs such as postal charges for the return of the survey material. The health authorities went to considerable trouble and made very great efforts to ensure that the fieldwork was carried out with as many children as possible.

Most Area Nurses (Child Health) decided to arrange for the Parental Interview Form to be completed by health visitors at home before a child received the Medical Examination. Some decided to ask the school nurse to conduct the Parental Interview at the time of the Medical Examination in the school or clinic.

The Local Education Authorities undertook to mail the educational survey forms to all schools in their authorities except the independent schools. Study material for children in independent schools was mailed directly from CHES.

Special arrangements had to be made for the administration of the health side of the study for children who attended independent schools. Where an independent school had its own private school medical officer CHES liaised directly with him over the arrangements for the medical examination.

Some children went to school in one health or education authority and resided in another. This was particularly the case for children attending residential special schools. The study co-ordinators were asked to liaise with each other to ensure that all the survey forms were completed for such children.

All health authorities received letters about the Study for dispatch to the Study children's General Practitioners if they wished.

2.11.vii Lists of Children sent to the Authorities

Area Health Authority and Local Education Authority co-ordinators were sent lists of the children and their addresses resident in their authorities at the end of 1979. The arrival of these lists approximately coincided with the regional briefing sessions described elsewhere (2.12.v) and was followed by the Survey material in early 1980.

From the time of the dispatch of the address lists, the authorities were kept continually updated of any new children who were found or of children who moved from one authority to another. It became essential that the study co-ordinators for the Area Health Authorities and Local Education Authorities not only communicated with us but also with each other as the mobility of the study children during this period was high. Difficulties also arose as 23 Area Health Authorities and Local Education Authorities are non-coterminous, but the study co-ordinators were very effective in ensuring that both the health and educational parts of the survey were carried out with the children. We were anxious to test the children at the end of the primary school period but quite a number of our children moved schools at the end of the Summer term 1980 without having taken part in the survey and so were followed up at their new schools.

2.20

Design and Piloting of Education Survey Material

The survey material for the educational side of the Study was designed and developed in Bristol. Considerable efforts were made to find suitable published tests for the task in hand but we were anxious to have tests which had long tails at the low achievement end.

With the help of colleagues at the University of Bristol and the Godfrey Thompson Unit in Edinburgh, we developed and piloted a shortened version of the Edinburgh Reading Test which is now about to be published by Hodder and Stoughton Limited as an alternative version of the test. With the help of Dr Angela Hobsbaum at the Institute of Education, University of London, and Mrs Francis Canning, an Educational Psychologist, we developed a new picture language test which avoided the 'americanisms' of the English Picture Vocabulary Test⁽¹⁾ and provided a pictorial language comprehension test, a pictorial test of sequencing and of recognising sentences. A word recognition test and a dictation task were provided by Dr Uta Frith of the MRC Developmental Psychology Unit in London. We developed a 'Friendly Maths Test' with the help of mathematics specialists and colleagues as no appropriate alternative test was available. This was piloted, item analysed and repiloted on 400 children in Avon.

With the assistance of Dr Colin Elliott the senior author of the British Ability Scales, we modified the administration of the Word Definitions, Word Similarities Matrices and Recall of Digits test for use by the teachers who were given clear instructions what to do but were not asked or permitted to score the tests. Professor Tim Miles of the University of Bangor provided a Naming Body Parts Test and a recall of months of the year test which he has used extensively with dyslexic children. Dr Philip Gamage of the University of Bristol provided the Caraloc test of Locus of Control or Motivation which he has developed over the past few years and Denis Lawrence, Chief Educational Psychologist for Somerset, provided the Lawsec Test of Self Esteem.

In addition to the attainment tests an Educational Questionnaire and Pupil Question Form were designed and tested with Bristol teachers and school children. The Educational Questionnaire covered questions on the curriculum, the provision of remedial help, the school and the class teacher's approach to and philosophy of teaching. It also contained a behaviour inventory which included items from the Rutter A Scale⁽²⁾ and the Connor's Scale of Hyperactivity⁽³⁾ which the teachers completed to describe a study child's behaviour in school. The Pupil Question Form contained the Caraloc and the Lawsec just mentioned, and questions on diet, and smoking and coughing. The form was designed to be completed by the children themselves.

The Educational Questionnaire, Pupil Question Form and Educational Score Form were designed to be optically mark read as our pilot studies showed that most teachers and children would make the response of a horizontal pencil line within a 5 mm lozenge with the necessary degree of accuracy. These forms were therefore printed in non-carbon ink, hence their bright colours of orange, brown and scarlet (Appendix A).

The Reading and BAS Tests were printed by the publishers concerned and the Maths Test and Pictorial Language Test were printed by the University of Bristol Printers. These tests were subsequently scored by trained coders.

Children's educational achievement is influenced by many factors. Relationships have been found between children's academic performance and parental attitudes (Plowden 1967), parental and teacher interest (Douglas, Ross & Simpson, 1968), home environment (Davie, Butler & Goldstein, 1972), and more recently, the 'ethos' of the school as a social institution (Rutter, Maughan, Mortimer & Ouston, 1979).

The children of the CHES cohort are particularly suitable for an investigation of the concomitants and antecedents of poor academic performance as they form a nationally representative sample studied at birth, at the end of the pre-school years when they were 5 years old, and at the age of 10 as they ended their primary school education. For each child in the study there exists a life history documented by medical and social information both of the child and its parents, and also the results of developmental testing at the age of 5.

As well as investigating groups of children with specific reading or number difficulties it was clearly necessary to make a special effort to assess the educational characteristics and environment of the children with physical, mental, emotional and other disabilities. The Warnock Committee 1978, set up to report on special educational needs in childhood, estimated that as many as 1 in 5 of all children have learning difficulties at some time in their young lives - difficulties which could interfere with the realisation of their full potential in adult life. This is an area which has been under-researched in the past, due mainly to the difficulty in identifying a representative childhood sample. Within the overall aim of assessing all 10-year-old children and evaluating their total environment, educational measures are clearly of major importance. These measures reflect the qualities and skills which have developed in the children, the nature of their home environments, the degree of parental encouragement and, not least of all, the contribution of the educational system over the years the children have been at school. In the tradition of past surveys, both in Britain, the United States and elsewhere, it was decided to aim at a fairly comprehensive coverage of educational attainment and to try to quantify descriptions of the educational environment as far as this was possible.

2.21 Areas of Interest

Ideally it would be desirable to assess each area of the curriculum, both in terms of attainment and the input of the school itself. This would

have been a major exercise, requiring several days assessment for each child. A more practical goal was the assessment of the areas generally regarded as crucial to later educational development and employment potential. Following discussions with educationists, it was decided to focus on reading, mathematics, language, cognitive attainment, motivation, particular skills related to disability, and child behaviours; a wide range of measures and questions about the school were included to elicit features in the teaching and administrative environment of the school which were thought to contribute to performance.

2.22

Development of Instruments

A preliminary study of the available assessment instruments showed that the great majority had been constructed many years ago; in some cases publishers suggested instruments which had been created 20 and 30 years previously. In the situation where a considerable investment of government and institutional funds was being made to enable the CHES survey to be undertaken, it did not seem desirable to adhere to tests and measures which were no longer wholly appropriate to the British educational and psychological environment at the start of 1980.

Examination of individual instruments and discussions with educational specialists and psychologists in different fields of interest indicated widespread dissatisfaction with many of these instruments. In cases where instruments were regarded as suitable, the limited age range of some of them suggested that both ceiling and floor effects would operate to reduce the number within the cohort who would attain usable scores. It was therefore decided to embark on a wide-ranging series of discussions within each field to bring to light the latest thinking and then to appoint specialists in these fields to prepare the necessary tests.

The goal was the creation of a set of educational tests which would take about 2½ hours to complete within the suggested two or three testing sessions; and a comprehensive educational questionnaire which would take 1 - 1½ hours for completion by the school head and the child's class teacher.

Underlying the development of each instrument was an awareness that the child suffering from any form of disability, whether it was educational, mental, physical or behavioural, was a key focus of attention within the overall ambit of surveying the entire cohort. This made the task of developing new instruments more onerous, but it also led to a concentration

on sub-scales within the instruments that would yield more interesting and meaningful information than could be obtained from simpler tests with conceptually homogeneous scales of items.

2.23 Testing Children with Disabilities

The assessment of the educational attainment of children with disabilities provides many problems because of the heterogeneity of the disabilities. Test presentation was modified differently for the partially sighted and blind children, for the children with severe hearing loss, and for those children identified in the 1975 study as having motor/locomotor disabilities with accompanying severe hand-eye co-ordination problems. It was found, as expected, that ESN(S) and ESN(M) children were unable to attempt some of the tests carried out on the main cohort. The assessment of the educational attainment of all these children was, however, given much thought and a variety of special instruments were developed or adapted for incorporation in a special pack.

2.24 Major Instruments

The major instruments developed for this study are described below.

2.24.1 Reading test

There is a general concensus among British reading specialists that the set of four Edinburgh Reading Tests, 1978, covering all attainment levels ranging from the school beginner to the advanced secondary school reader, is a modern and effective measure of reading, with built-in sub-scales to identify skills in each of the main areas of reading competence. The Tests were commissioned by the Educational Institute of Scotland and the Scottish Education Department: Stage 1 covers ages 7:0 to 9:0; Stage 2 covers ages 8:6 to 10:6, Stage 3, ages 10:0 to 12:6, and Stage 4, ages 12:0 upwards.

The difficulty with these Tests was that each one covered a limited age range; a further problem, mentioned by many teachers who had administered the test, was that each test level took over an hour to administer.

A member of the CHES team visited the Godfrey Thompson Unit for Academic Assessment in Edinburgh to discuss proposals for creating a shortened form of the instrument. Agreement was reached and the task of selecting items from all four levels of the test was undertaken by Dr. Philip Gamage, Reader in Education at the School of Education, University of Bristol.

Table 2. 1. Diagnostic grid for Shortened Edinburgh Reading Test

Number of items: 14 groups, containing a total of 75 items

Test range: items taken from all four stages of the Edinburgh Reading Test

Age range: The test will provide a score over the full range of reading from initial reading up to a reading level equivalent of about 15

Ability distribution: Four groups of items (19 points) test the bottom of the reading range; one group (7 points) tests the top of the range; seven groups (49 points) cover the middle of the range.

Diagnostic coverage:

Conceptual area assessed	Increasing level of difficulty (horizontally) →		
	Beginning readers	Middle readers	Top readers
Vocabulary	p.1 (5)	p.4a (5)	p.8 (9)
Syntax	p.2a (5)		
Sequence	p.2b (4)	p.9 (10)	
Comprehension	p.3 (5)	p.4b (4)	p.5 (5) p.10 (8) p.11 (7)
Retention	pp.6-7 (8)		

The preliminary selection was circulated to 12 Primary school heads in Bristol for their comments. This formed the basis for a further reduction in the number of items. At this stage the items were divided into two separate tests and these tests were administered to a sample of 400 9, 10 and 11-year-old children in schools from a variety of socio-economic areas in Bristol.

Following discussion with Professor Harvey Goldstein, of the University of London, the results were analysed by Dr. Robert Wood, of the Schools Examination Unit, University of London, using a recently developed American computer programme for item analysis. Several reading specialists as well as Dr. Wood and the CHES team members collaborated in a study of the items shown by the analysis to have adequate discrimination; the choice of items was such as to give the test a long tail at both ends,

so that the children with little or no reading ability would still achieve a valid score while at the other end the bright reader would not easily reach ceiling.

The sub-scales covered within the instrument are: vocabulary, syntax, sequence, comprehension and retention. The grid in the accompanying table provides further details. Other reading skills are assessed by instruments described later in this document.

2.24.ii Mathematics test

After consultation with many mathematics specialists there was no consensus of opinion about a suitable mathematics test for 10-year-olds. Many current tests were considered not only out of date but also uni-dimensional. Some tests which claimed to provide sub-scales within the items had based these sub-scales on ad hoc concepts of what should be covered by a mathematics instrument.

It was learned that important research into the testing of mathematical attainment was being undertaken within the National Foundation of Educational Research, a semi-government institution which is the main repository for educational and psychological test instruments in Britain. Both the Assessment of Performance Unit, housed within the N.F.E.R. and a testing body sponsored by Local Authority education departments, also linked with the N.F.E.R., were engaged on the development of modern mathematics tests based on the latest concepts of mathematical competence (for example, A.P.U. 1978). The studies of Sumner 1975 and Ward 1979 were of particular value in their analyses of the various domains of mathematical competence.

However, each organisation was at a relatively early stage in the development and piloting of its instruments and after several meetings between the heads of these two bodies and members of the CHES team it was concluded that further help could not be offered by either body to CHES at this stage. The only solution was therefore to appoint mathematics specialists who were aware of the newer thinking in this area and to request them to create a suitable wide-ranging test which would meet the demands for a modern instrument.

Both the specialists, Colin Appleton and John Kerley, were concerned with a London Inner City programme designed to interest the less able child in mathematics; one of these specialists had recently undertaken a major research study in that field. He suggested that the items should

Table 2. 2. Diagnostic grid for Friendly Maths Test.

Number of items: 6 groups, containing a total of 72 items.

Age range: The test will provide a score over the full range of mathematical competence, from the earliest awareness of number operations in the first year of school up to the levels expected at around 13 years of age.

Diagnostic coverage:

Main Category	Sub Category	Number of Items	Item number		
			Knowledge	Concept	Application
Four Rules	Addition	4	3, 4	1, 2	-
	Subtraction	5	5,7,8,9	6	-
	Multiplication	4	10,12	11,13	-
	Division	4	14,16	17	15
	Operations	2	-	18,19	-
		(19)			
Other Number	Place value	4	20,21	22	23
	Percentage	2	24	-	25
	Decimals	2	27	26	-
	Fractions	5	28	29,30,31,32	-
	Factors	1	33	-	-
	Number Sequence	1	-	34	-
	Base	1	35	-	-
	Approximation	1	-	36	-
		(17)			
Measure	Time	3	37,38	-	39
	Length	2	40	41	-
	Area	2	42,43	-	-
	Volume	2	46	45	-
	Capacity	1	44	-	-
	Mass	1	48	-	-
	Temperature	1	-	49	-
	Money	4	-	52	47,50,51
		(16)			
Algebra	Operation	2	53	-	54
	Logic	2	56	-	56
	Relations	2	57	58	-
		(6)			

Table 2. 2 (cont.) Diagnostic grid for Friendly Maths Test.

Main Category	Sub Category	Number of Items	Item number		
			Knowledge	Concept	Application
Geometry	Shape	2	60	-	59
	Angles	3	61	62,67	-
	Co-ordinates	2	-	-	63,64
	Symmetry	3	68	66	65
		(10)			
Statistics	Tables	1	70	-	-
	Graphs	3	69,71	72	-
		(4)			
TOTAL		72	34	25	13

be highly pictorial, with an emphasis on cartoon presentation. More than 220 items were created and amended on the basis of discussions with other specialists, before being submitted to CHES.

The items were again divided into two tests and administered to a new pilot sample of 400 children. Item analysis was then undertaken. This work proved difficult as it was necessary to preserve a range of items within each of the major areas of assessment.

Both the teachers' and children's responses to this new style of mathematics test were assessed and reported on by a member of the CHES team. In general the responses were mixed; some teachers were extremely critical of the levity of the items and said that their pupils felt the same as they did; other teachers were enthusiastic about what they felt was a refreshingly new approach to mathematics assessment, and reported that children enjoyed the test. One head reported that as a result of studying the test he planned to revise totally the mathematics curriculum in his school, to take account of new features which were stressed in the test.

The final instrument covers knowledge, concept and applications in the areas of the four basic rules, fractions, other number skills, measure in a variety of forms, geometry, algebra and statistics. As far as possible the individual items assess single rather than multiple skills. Teachers are encouraged to read out the limited number of words when poor readers do the test. The accompanying table sets out the diagnostic grid for this test.

2.24.iii

Language

The need to assess language is generally recognised. Language comprehension is a crucial factor in the child's ability to understand school lessons, while expressive ability is concerned in a more subtle way with the child's relations not only with peers and parents but also with the teachers themselves.

The English Picture Vocabulary Test (Brimer and Dunn 1962), an anglicised form of the well-known Peabody Picture Vocabulary Test (Dunn 1959), was considered as a possible measure of language comprehension. It was felt, however, that the E.P.V.T. was not entirely suitable for the CHES children (it is at present being updated by the N.F.E.R.). Although the test covers a wide range of ability, its dated appearance and the presence of certain pictures, familiar within the American context but relatively foreign within the British cultural environment, led to a decision that a new test should be created. Only a few other tests exist in this field (apart from clinical instruments such as the Illinois Test of Psycholinguistic Abilities) and none of these were considered suitable by the language specialists who were consulted.

Three linguists at different educational institutions, including Angela Hobsbaum, senior lecturer at the Institute of Education, University of London, with Valerie Mockridge and Frances Canning, were appointed to prepare the new test. The chief linguist worked closely with a Bristol artist, Edward Phelps, who was commissioned to design the drawings. Considerable problems had to be resolved both in the choosing of suitable words and in the preparation of drawings that were clear and easily identified. The test was administered to a Bristol sample of 400. Item analysis was again employed and a shortened version of the test was prepared for printing.

The final test covers vocabulary, sentence comprehension and sequence comprehension.

In the area of expressive language ability a number of items were devised by Ms. Hobsbaum for answering by the child's teacher in the Educational Questionnaire. This is a difficult area of assessment and structured tests would have offered little comparability across ethnic groups and other sub-cultural groups. Accordingly emphasis was laid on the teacher's judgements of the child's

expressive language in relation to what could be considered as the 'normal' expressive competence of 10-year-olds, in a set of 16 items. This approach will hopefully minimise the danger of biased judgements on the competence of minority group children.

2.24.iv

Cognitive attainment

This was one area where it was not necessary to create new instruments. For the past 15 years a major research project has been undertaken in Britain, with Government funding, to develop a set of cognitive ability scales which were based on norms and items indigenous to this country.

The CHES team had several meetings with leading psychologists, including Professor Alistair Heron, Director of the Education Research Unit, Department of Psychology, University of Sheffield, and Dr. Colin Elliott, one of the creators of the recently published British Abilities Scales (Elliott et al, 1978). It was decided to focus on two verbal and two non-verbal measures within the set of scales. The instructions for the administration of the test were re-written to make them more suitable for the teacher in the classroom. It was agreed that the aim was not that of achieving some hypothetical measure of 'intelligence', but rather one of assessing the level of cognitive abilities within the child so as to enable the effects of home and school influences to be estimated more sensitively.

The simplified administration protocol, together with the tests themselves, was made up into a special booklet by the publishers (the N.F.E.R.) for use within the cohort.

The four tests within this battery are word definitions, recall of digits, similarities and matrices.

2.24.v

Motivation

Many measures of motivation have been described in the literature but few of them contribute much to the variance of educational attainment. However at many of the discussions in the planning stage psychologists and teachers focused on the importance of assessing motivation in some form. A consensus developed that measures of self-esteem and locus of control were the most likely to yield usable motivation-related scores which would contribute meaningful amounts to educational performance. The CHES team also felt that a particular value of these measures would lie in their potential for identifying

children with extremely low values of self-esteem, or a largely 'external' locus of control, implying a fatalistic belief that there was little the child could do to alter his or her own level of attainment, (Lefcourt 1972).

An existing self-esteem measure, devised by Lawrence 1973, 1978, Chief Psychologist Educational Psychologist of Somerset, was administered in two halves to one of the pilot samples already described. A locus of control measure was assembled by Dr. Philip Gammage, a British authority in this field. Dr. Gammage selected items from some well known tests of locus of control, on the basis of his experience of the functioning of these items, and added several items from his own research instruments (Gammage 1975). This was likewise administered to a pilot sample in two halves. Since both measures were given together with the reading and mathematics tests, a total of 800 children scored on each measure.

In view of the importance of selecting items relevant to educational performance, the results of the pilot studies were examined in relation to each child's performance in reading and mathematics. The items were entered in multiple regression equations, using reading and mathematics scores as separate outcomes. Only those items which yielded satisfactory levels of significance and unique contributions to outcome variance were retained in the final instruments.

2.24.vi

Particular educational skills

In view of the study's emphasis on learning difficulties, a number of subsidiary educational measures were assembled on the basis of discussions with specialists in different areas of disability. Four diagnostic measures were constructed; one was a word list in which the child's attempts to read certain words would indicate particular perceptual difficulties; a subsidiary part of this test recorded the child's attempts to pronounce certain nonsense words. A second measure included dictation and handwriting assessments, again with a view to the information that could be obtained from close examination of performance. A third measure required the child to name body parts, with emphasis on laterality skills. The fourth diagnostic measure required the child to undertake a sequential recall task, in both directions.

2.24.vii

Child behaviours

The child's social and neuro-developmental behaviours are known to play an important part in his or her ability to interact with peers and others

and to function successfully in society after leaving school. The assessment of these behaviours is difficult as it requires teacher judgements on the basis of experience with the child. Questions of confidentiality also arise on certain crucial issues.

The main instrument used here was a set of 53 items in a developmental questionnaire; this was located within the form that was to be answered by the child's class teacher and the head teacher of the school. The items were taken from various existing measures. Two major sources were the Connors Teacher Rating Scale (Connors 1969) and the Rutter Teaching Scale (Rutter 1967).

The decision not to use either of these scales in their original form was a difficult one. Both in their entirety would have contributed to cross-cultural comparisons. On the other hand, cultural influences on teachers' responses are so strong (existing evidence showing differences of orders of magnitude between assessments of children's hyperactivity levels in different countries) that the validity of such comparisons may be questioned. To have administered both instruments (neither of the scales could have been omitted in favour of the other) would have meant using a total of 65 items and omitting the many other useful items which were felt should be incorporated in a comprehensive scale.

Accordingly the Connors and Rutter items adjudged to be most suitable for the categories of interest were included in the new scale, with minor linguistic amendments to the Connors wording. Other items were taken from different measures, such as the Swansea assessment battery (Professor Maurice Chazan), or were suggested by specialists in different fields; Dr. Sheila Henderson, a research specialist at the Institute of Education, London, (in physical disability), was among those consulted.

A further problem arose over the question of how these items were to be answered. Previous experience of team members in the use of analog scales suggested that its wide range of possible scores (automated marking systems can yield up to 100 points on longer analog scales) would enable more sensitive measures to be obtained of the relevant behaviours, and this would then facilitate analysis (more variance being available for statistical interpretation, as compared with items having only two, three or four categories of measurement). This in turn meant a further departure from the original Connors and Rutter items, but there was no other way - other than using separate scales

for different items - in which the 3-category Rutter and 4-category Connors items could have been made comparable.

The new instrument contains items on hyperactivity, neuroticism-anxiety, anti-social conduct, inattentiveness, clumsiness and hand-eye co-ordination. Further discussion of this instrument appears in section 4.4.

Other aspects of the child's behaviour were assessed through a pupil questionnaire. The child was given the assurance that his or her answers would remain confidential and teachers were asked to devise a simple procedure whereby the child would place the completed pupil form in the envelope designed for returning the test instruments to the study headquarters. The two motivational measures were included in this questionnaire.

An important part of the pupil form was a set of questions relating to early smoking experience, since there is some evidence that an increasing number of young children, especially in more alienated social groups, are experimenting with cigarette smoking at an unusually young age. It is hoped that the answers will enable some assessment of the seriousness of otherwise of this practice; a few questions on respiratory functioning have been included on the form (apart from the considerable assessment being undertaken in the medical examination). Another important area assessed some basic nutritional matters, such as whether the child ate breakfast before coming to school; here too there is evidence that a disturbing minority of children are not properly fed at home.

The pilot project questionnaire was administered in several schools and the children were asked afterwards for their opinions on the form. No objections were expressed about the inclusion of items on the child's smoking experience.

2.24.viii

The educational environment

The questionnaire on the child's school environment was regarded as one of the major educational components in the survey. A great deal of recent research has focused on elements in the school ethos or its administrative functioning which contribute positively or negatively to child performance, both educational and social. Some London research has offered conclusive evidence that school environments

within identical socio-economic surroundings, and with the same social and educational intake of children, can have significantly differing effects on later delinquency and other behavioural deviance.

A considerable amount of discussion and study of the literature took place prior to the formulation of the initial pilot questionnaire. This draft was then examined by team members and modified substantially. At that stage it was circulated to ten leading educationists in different part of Britain. Responses and opinions differed a great deal, but on the basis of what was felt to be a general concensus of specialist opinion a further draft was prepared. This draft was given to 12 schools in Bristol, within different socio-economic areas of the city, and a member of the CHES team visited each school to discuss the questionnaire with the class teacher and head teacher who had combined to complete the form. A further draft was then prepared, and again this document was circulated among members of the CHES team. The working of individual items was carefully scrutinised to ensure clarity of interpretation. Only at this stage was the final questionnaire drawn up.

The questionnaire covers four areas: the child's educational status, social behaviour, developmental behaviour and educational environment.

Educational status included a number of questions dealing with special education or remedial treatment; it also examined the curriculum content and asked the teacher or head to assess the level of interest shown by parents in the child's education. Questions on social behaviours dealt with school absence and the child's relationships with peers. The child's developmental behaviours have already been referred to; the final items in this set ask for a teacher assessment of the child across the two well known personality dimensions of introversion/extraversion and anxiety/unworried.

The educational environment questions cover basic school data and focus in particular on evidence relating to class size and teacher input into the child's education; methods of encouragement and motivation, the classroom and school ethos (as judged by the teacher and head) and a variety of questions on counselling and discipline were also included. Several questions examined the nature of the school intake, in academic, social and minority group terms. The social level of the