Reference Manual

SGS II

Schedule of Growing Skills II

Martin Bellman, Sundara Lingam and Anne Aukett

GL Assessment ®

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Introduction

This manual presents a new version of the *Schedule of Growing Skills,* which is a well-known developmental screening procedure, used as part of child health surveillance and promotion. The revised *Schedule of Growing Skills (SGS II)* is designed for use predominantly by health visitors, general practitioners, clinical medical officers, community paediatricians and also by other professionals involved in the care of young children. *SGS* has been derived from the work and publications of Dr Mary Sheridan, refined during a national research project and further developed through trials in a number of health authorities before reaching its present published form. *SGS II* was further developed taking into account the views of users of *SGS* over the last eight years.

It would be inappropriate to write about the *Schedule of Growing Skills* in isolation. Developmental examination and reviews from birth to the commencement of formal education is part of the wider process of health promotion and involves professionals from the health, educational and social services. Therefore, before going on to look at the *Schedule of Growing Skills* in detail, we have tried to place our own developmental examination procedure in the wider context of care for the health and development of young children. Chapter 1 discusses present thinking and policy on health promotion and the place of developmental examination in the range of surveillance services. Although much of this information may be well-known to readers of this manual, it is our intention to give an overview of the context from which *SGS* grew. Subsequent chapters focus on the *Schedule of Growing Skills* itself and its qualities as a developmental examination instrument: the training required to use it, its development and its place in relation to district policy for vision, hearing and language and motor developmental examination.

While surveillance and screening are technical subjects, their human context is not forgotten. Throughout this manual we will be emphasizing the overwhelming importance of the children themselves and their parents. Without this recognition, developmental examination becomes a dehumanizing process. Parents have an obvious emotional commitment to their children and want to know how to keep them safe and well. The concept of child health promotion and screening as described in the first chapter should offer an umbrella of professional services to families under which children will have the chance to develop at their optimal rate.

We hope that this manual will give detailed, practical support to health professionals who are introducing the *Schedule of Growing Skills* into their standard routines. While a practical User's Guide (Bellman, Lingam and Aukett, 1996) is available for personnel using *SGS II* on a day-to-day basis, we hope that the *Schedule of Growing Skills II* Reference Manual will help to increase their wider understanding of developmental examination and its crucial role in the health and well-being of all children.

Shortly after the publication of *SGS* in 1987, a Users' Group was established composed of doctors and health visitors throughout the UK. This group met several times in order to advise about clinical application of the *Schedule*. The comments of this group eventually built up into a portfolio which indicated the need for a second edition of *SGS* so that it could retain its place as a valuable tool for developmental screening.

Child Health Surveillance and Screening in Context

History

Developmental examination, screening or review of children is not carried out in isolation; it is part of the wider process of managing children's health, and encouraging better health promotion. In this chapter we look at recent thinking on health promotion and consider how this affects contemporary screening policy.

Two major reports made specific recommendations concerning child health promotion. In the first, 'Fit for the Future', Professor Donald Court (1976) called for special attention in eight areas:

- overseeing of general health;
- measurement and recording of physical growth;
- monitoring of development (developmental review or examination);
- infectious disease prophylaxis (by immunization);
- health education including the wider aspects of prevention;
- prompt treatment of illness;
- continuing care of the disabled;
- parental involvement in all procedures.

One of the major milestones in the development of a structured child health surveillance programme in the UK occurred in 1984 when the General Medical Services Committee (GMSC) of the British Medical Association, in conjunction with the Royal College of General Practitioners (RCGP), published a handbook designed to implement the policy set out by an earlier RCGP report, *Healthier Children – Thinking Prevention*

(Royal College of General Practitioners, 1982). This handbook recommended five screening checks: at birth, at six weeks, at seven months, at two to two and a half years, and at four and a half years. At each examination the practitioner was advised to:

■ make a brief physical examination;
■ carry out a developmental screening examination;
■ check the child's immunization status;
■ assess nutrition, general health, responsiveness;
■ review illnesses contracted;
■ answer parents' queries;
■ explore the mother–baby relationship;
■ remind parents about the next appointment.

These suggestions formed the basis of a framework around which the individual practitioner was expected to build the health promotion programme (see Figure 1.1).

From these two sets of recommendations, we can deduce the main intentions behind any programme of child health promotion. These include *prevention* of possible problems, *early identification* of problems whenever prevention fails, and the *management* and care of children once problems have been identified. With the growth of improved management information systems in many health districts, individual child details are often computerized and will be used to identify health trends, plan health education and social service resources and even inform thinking on political and social policy.

Both the Court Report (Court, 1976) and the GMSC/RCGP handbook rightly emphasize the importance of parents in a child's early years. Parents can play a part in determining their child's health and well-being; they can act as long-term guardians of the child's welfare and also as lay clinical practitioners, who have a key role in reporting on possible problems. We too will emphasize the role of the parent throughout our discussion of child surveillance and screening and in health promotion.

Figure 1.1: The key ingredients of a child health promotion/surveillance programme

Hearing and vision screening

Immunization

Continuing care of the disabled

Health education and promotion

Prompt treatment of illness

Developmental screening

Growth monitoring

Advice to parents
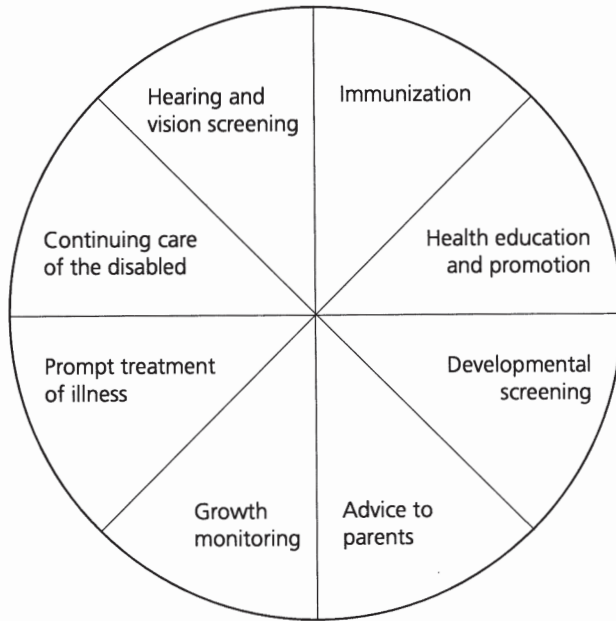
A good programme of child health promotion/surveillance is the right of every child; it makes huge demands on health service resources, on professional expertise and on child professionals' ability to communicate their findings to parents and other professionals. The development of clear channels of communication between general practitioners, health visitors, school nurses, specialists and parents is crucial to the success of any surveillance programme. This manual will demonstrate how the *Schedule of Growing Skills* can contribute to the work of a local practice, a community child health clinic or a whole health authority, in meeting the developmental screening aims of a health promotion programme.

The Implementation of a Child Health Promotion/Surveillance Programme

The recommendations about developmental screening discussed in the previous section may sound idealistic at a time when our health service is desperately short of money. However, it must be recognized that putting funds into child health is a long-term investment. The dividend will be better physical and socio-economic health for future generations. In practice, a child health programme may take many different forms. Usually the decision about the form it will take is made by an advisory committee concerned with child health. This choice should be determined by the population characteristics of the area and by the particular needs of local children. Again, the programme will be constructed – or may later be modified – to fit within the financial constraints of a district's budget and purchaser's requirements. The many issues at stake in the design of a district child health surveillance system were well researched by Bryant (1986).

In this section we will discuss briefly how three hypothetical health districts might adapt recommendations for developmental screening programmes to their local needs and financial constraints.

Authority A

This district was faced with a serious shortage of staff qualified to carry out child health promotion/surveillance. Their programme had to make the least possible demands on personnel time. However, since such a situation could lead to a decline in the quality of the service offered, the authority had to develop a programme which could be easily implemented and monitored.

Their strategy comprised two elements:

1. A minimal developmental screening and immunization service, in which all children would be screened for phenylketonuria, hypothyroidism, undescended testes and congenital dislocation of the hip. A routine immunization service was also offered.

2. A full developmental screening service for those children who were identified by parent participation questionnaires or professionals as having a possible delay or impairment.

Superficially, this model economizes on the premium time of trained professional staff by restricting their activity to children about whom there is concern. The onus for identification of developmental abnormalities is shouldered mainly by parents and other close carers. This is in the spirit of parental empowerment, as advocated by the Hall Report ('Health for all Children', Hall, 1996) and in order to be effective, requires much professional initiative and support. As a strategy, it should not be regarded as a 'cheap option' and it cannot be used as an excuse for service cuts.

This model may be appropriate for areas where the population is uniformly well educated and motivated and the standards of primary care are high. In areas where there are significant numbers of parents who cannot take on the responsibility of developmental surveillance or the quality of primary care is less than optimal, as in many urban areas, the risks of this model are, arguably, too high.

Authority B

This district decided to build on the minimalist strategy devised by Authority A and to include pro-active professional intervention for the section of the population that was least able to perform 'self-surveillance'.

Their strategy therefore comprised three elements:

1. A minimal developmental screening and immunization service, in which all children would be screened for phenylketonuria, hypothyroidism, undescended testes and congenital dislocation of the hip. A routine immunization service was also offered.

2. A full developmental screening service for those children who were identified by parent participation questionnaires, or professionals as having a possible delay or impairment.

3. Targeted child health promotion/surveillance, including a full surveillance system for those considered at risk.

5

The great advantage of this example is the close attention it pays to those children who are at risk. There are those who believe that the health service works according to a kind of 'law of inverse care' (Brimblecombe, 1975): those who are most able to demand the small amount of care they require fare better than those who are least able to demand the large amount they need. This programme is designed to respond to such criticisms and to provide, routinely, a more comprehensive service to the 'disadvantaged', while still making available a more general service to all.

Conversely, this very advantage poses a new problem; that of defining the term 'at risk'. This concept has always proved difficult to clarify, but any organization using it would have to provide a definition for its practitioners, parents and outside agencies.

First, while the definition in itself may have to be somewhat arbitrary, it is unlikely that it could remain fixed for any great length of time – given the increased population mobility and the rapidly changing local demographic profiles that are such a feature of industrialized Western society. Second, this model raises the ethical problem of the provision of different levels of service for different groups of children. Third, labelling a child 'at risk' carries with it a range of emotional overtones which may well give rise to hostile reactions from parents and other interested parties.

Authority C

The third authority decided to implement the Court and GMSC/RCGP recommendations in full and to provide a total child health promotion/surveillance programme.

This kind of programme benefits from being comprehensive. It offers a wide-ranging service to all, so it discriminates neither positively nor negatively. It provides the most practicable definition of an 'at risk' group, because it regularly and systematically surveys all children within its area and defines as 'at risk' those who – at a given time – need additional professional assistance. The programme also allows an authority simultaneously to treat all its patients as individuals and to retain an accurate picture of community health and needs. A further advantage arising from surveillance performed universally on the population is that policy makers at commissioning level can be confident that the case finding

process is accessible to all children and that none should 'fall through the net'. The authority would use the national Personal Child Health Record (*PCHR*) for every child (not only given to new births as it is in many areas) and have a fully computerized record of child health promotion and screening activities.

The disadvantages of the third model are, however, obvious. It is time-consuming and requires more trained staff (and therefore higher expenditure) than either of our other examples. It also makes a central feature of developmental screening which is the main method of identifying children who are 'at risk' of developmental problems, including concerns about a child's behaviour and minor speech delay or impairment. Developmental screening is itself a contentious issue, and will be discussed in more detail in the next section of this chapter.

Whichever of these options is chosen, the main aims of child health promotion/surveillance must be kept in mind – *prevention, identification, counselling* and the provision of *information* on health matters. Precise organization must be built on a clearly defined purpose.

Having decided on the nature of the programme, the central issue of who carries it out must be addressed. Again, practice varies considerably. Among the options presently being used are:

- General practitioners undertaking total child health promotion/surveillance for all children in their practice (without health visitor support).
- General practitioners and health visitors bearing responsibilities for total child health promotion/surveillance within the practice; either on practice premises or at a trust clinic.
- Fund holding general practitioners undertaking child health promotion/surveillance for all their children in their practice. They may nominate one practitioner to supervise and coordinate the overall programme and/or delegate the work (not responsibilities) to a local trust. The trust's staff, the health visitor and the doctor, does the whole work in the practice premises. The contract with the trust specifies that a consultant should supervise the programme and be in charge, and regular feedback and dialogue should be maintained with the general practitioners.

- Community paediatric staff and health visitors implementing a partial child health promotion/surveillance programme in a trust clinic, referring current illness and other detected developmental concerns to the child's GP (giving the option to the GP for assessment or referral).
- Home visits by a health visitor implementing the programme, combined with treatment of illness and immunization in a GP's surgery and at a child health clinic (or immunization also by health visitors at home). The GP carries out only the 6–8 weeks examination.

The crucial role of the health visitor in any programme of child health promotion/surveillance is one of several factors common to all the above options. Another recurring feature is the need for a system of developmental screening standing alongside prompt treatment of illness, care of the disadvantaged, infectious disease prophylaxis, the measurement and recording of growth and health education. We would emphasize the Court Report and GMSC/RCGP assumptions that no child health surveillance (or promotion) programme can be considered complete without an organized system of developmental screening. It is to this topic that we now turn our attention.

The Developmental Screening Debate

Developmental screening is a system that aims to check that children are developing normally for their age, as measured against prescribed criteria. Failure to meet these criteria may indicate developmental delay or impairment, or a deviation or variation in development due to an environmental or genetic cause. Appropriate referral, more detailed assessment and subsequent therapy or management programmes will be undertaken when the results of screening suggest a possible problem. This could be done initially in a special advisory clinic (SAC) rather than by a child development team (CDT).

The organization and purpose of child health promotion/surveillance was described in the Report of the Court Committee (Court, 1976) which recommended specific basic procedures and the appropriate ages at which they should take place. The Report stressed that these were the minimum

actions to be taken at any stage and that total health surveillance and treatment could only be carried out by general practitioners or by primary health care teams. The need for health education in addition to some developmental screening is further reinforced in 'Health for all Children' (Hall, 1996). A suggested core schedule is:

at birth (neonatal examination)

- evaluate immediate needs for resuscitation or special care;
- review the family history, especially of pregnancy and birth, in detail;
- identify obvious disorders by a neonatal examination, including the measurement of weight and head circumference, and use the examination proforma found in the national *PCHR* to carry out a head-to-toe examination;
- share concerns carefully (Leonard, 1994).

first two weeks

Many GPs consider it good practice to see all newborn babies. A routine physical examination is not necessary if done previously and recorded. Items omitted in a previous examination should be carried out.

- establish an ongoing child record e.g. the national *PCHR*;
- reassure parents (where appropriate) that their child is normal and take their concerns seriously.

at 10–14 days

- health visitor statutory visit;
- reinforce use of the national *PCHR*;
- explain the child health promotion programme and topics for health education;
- promote breast feeding;
- measure and plot head circumference in the national *PCHR*. (The head circumference might be more accurate at this visit than at birth; if it is significantly different, remeasure after a week.)

at six–eight weeks

- obtain parental opinion – use Parental Participation Questionnaire (PPQ) in the national *PCHR* – and take parental concerns seriously;
- give parents the opportunity to discuss and obtain professional advice on infant management, family problems, and additional support using the national *PCHR*;
- place low emphasis on the detection of impairment, unless the neonatal examination was suspect;
- check PPQ and perform a head-to-toe examination and developmental examination (use a standard examination proforma in the national *PCHR*);
- measure and plot weight, length and head circumference (if indicated, check for hip dislocation);
- initiate treatment or referral if necessary;
- observe minor abnormalities detected; the threshold for obtaining a second opinion should be low.

at seven–nine months

- obtain parental opinion using PPQ in the national *PCHR*;
- review development of hearing and vision; do a hearing test, if it is policy in the trust;
- observe visual behaviour and look for evidence of squint;
- measure and plot weight, length and head circumference (if indicated, check for hip dislocation);
- discuss health promotion/injury prevention.

at 18–24 months

It is suggested that this check is carried out nearer 24 months.

- obtain parental opinion using PPQ in national *PCHR*, particularly about behaviour, vision and hearing;

- review mobility, manipulative skills and social relationships;
- measure height and plot in national *PCHR*;
- discuss with parents the range of 'normal' growth and behaviour, particularly the development of comprehension and social communication;
- discuss nutrition, remembering the high prevalence of iron deficiency anaemia; carry out a haemoglobin estimation if it is policy in the trust.

at three and a quarter to three and a half years

- obtain parental opinion using PPQ in national *PCHR*, particularly about behaviour, vision, hearing and language;
- review development;
- measure and plot weight, length and head circumference in national *PCHR*;
- test vision and carry out a cover test for squint by orthoptist if it is policy in the trust; it is not recommended that GPs or health visitors do this;
- discuss development of behaviour and speech.

at four and a half to five and a half years (school entry)

- summarize health and development, including a review of the pre-school record;
- retest hearing and vision;
- measure and plot height and head circumference in national *PCHR*;
- obtain parental opinion using PPQ in national *PCHR*;
- obtain teachers' opinion using Teacher's Participation Questionnaire found in national *PCHR*;
- warn teachers of any delays or defects (in speech or behaviour, for example) that have been detected;
- give information to the school if the child needs to take medication at school.

As the above outline implies, one of the main activities involved in developmental screening is the administration of a relatively quick procedure that will enable the health visitor, general practitioner or paediatrician to obtain a reliable snapshot of a child's developmental skills across a range of areas. The *Schedule of Growing Skills* has been created to meet this need.

It is worth mentioning at this point that the term 'screening' is frequently misunderstood. Many people restrict their use of the word to describe a quick one-item test, such as that used to detect phenylketonuria. Their suggestion is that the more complex procedure of monitoring development (which we refer to as developmental screening) should be known as 'developmental assessment'. The problem with this proposal is that, by common usage, the term 'assessment' is normally perceived as a secondary and more detailed stage of examination and investigation (see page 24). We therefore intend to retain the term 'developmental screening' as discussed in this chapter with reference to the *Schedule of Growing Skills*.

Those who are in favour of developmental screening believe that, in many cases, early intervention enables children to achieve their full potential and prevents them from being subsequently identified as a child with special educational needs. Most professionals who practise developmental screening tend to use procedures such as *SGS*, Mary Sheridan's *Developmental Sequences* (see *From Birth to Five Years*, Sheridan, 1975), the *STYCAR* tests of *Hearing, Vision* and *Language* (Sheridan, 1976) the *Denver Developmental Screening Test* (Frankenburg, Dodds and Fandal, 1968–70, 1990), and *Developmental Screening* (Lingam, 1982; presented at the British Paediatric Association Annual Meeting in 1982). These tests are discussed in the *Manual of Child Development* (Lingam and Harvey, 1988) as a screen 'custom-made' to meet the local needs.

There are, however, those who have reservations about the use of developmental screening procedures, and the debate between the two camps has raised some important issues which we would like to examine.

Normal Development

The process of screening raises the question of what 'normal' development is. Normal neurological development tends to occur in a fairly standard manner and at a similar rate (in members of the same species). Minor deviations from this standard pattern are quite common; more major deviations probably occur more often than is appreciated. However, if the cause is transitory and mild in nature, the strength of the underlying developmental tendency is so great that the process will continue according to the normal pattern. There is great plasticity of neurological and cerebral development in the infantile period; therefore, temporary abnormalities and deviations identified at an early age are compensated for, and no clinical abnormality results.

Neurological and psychological development occurs as a result of the interaction of predetermined characteristics and environmental influences ('Nature and Nurture', McCall, 1981). Jean Piaget suggested that the process is affected in a variety of ways according to the environmental experiences of the child and occurs in several distinct, though interrelated, stages. The child starts by learning about himself and his actions, progressing through a phase of experiencing reactions which modify his responses, to a stage of hypothesis and deductive reasoning. There is continuing debate, between different schools, about the relative importance of genetic and acquired factors. Unlike the supporters of Piaget, for example, there are those who prefer the theories of Arnold Gesell, which emphasize the dependence of neuro-development on the maturation of the central nervous system (Knobloch and Pasanovick, 1979). Interwoven with neuro-developmental progress is the evolution of the psyche as put forward by Sigmund Freud and Erik Erikson, and the critical influence of the mother–child relationship described by Donald Winnicott.

What is Normal?

The aim of screening is to detect children who are, or may be, abnormal. It is thus essential that clear criteria are established to allow this classification to be made. In the field of child development there is little agreement on

appropriate criteria, and there is no sharp dividing line between normal and abnormal. It is argued that clear rules are inappropriate since so many complex factors affect neuro-development; for this reason an experienced field worker should be allowed to make subjective judgements of 'normality'.

In individual children there is substantial variance in the rates of progress of all aspects of development. Hence, it must be expected that developmental skills will not be exactly equal to the 'norm' even in so-called 'normal' children. If a profile is constructed for such children across several fields of development, there will be a scatter of results, although, if the study population is large enough, the mean will approximate to the normal standard.

It is important for an examiner to have reasonably clear guidelines for the identification of 'abnormal' children in a developmental screening programme. In the *Denver Developmental Screening Test (DDST)* (1967, second edition, 1990) the term 'abnormality' is applied when the child fails to perform items that have been completed by 25 per cent of the standard population (Frankenburg, 1971). The *Denver* test is a screening test of global development: developmental ages and quotients cannot be easily derived. In this test a child is allowed to 'fail' items in one field of development and still be considered normal. The *DDST* and *Lingam's Child Development Chart* (1982, revised 1985 and 1995) have been criticized as rigid and insensitive, but they may have a limited place in a scheme of pre-screening, providing their use is restricted to that of a very simple screen for children who can then be further evaluated by a more accurate method. Since the introduction of *DDST* in 1967, it has been even more abbreviated so that children with suspect developmental progress can be identified for performance of the full test (Frankenburg, 1981). The repeated use of valuable professional time in this way must be questioned.

It is well known that there is a wide range of normal development, even for major milestones. This complicates evaluation studies of observer error in assessing child development, as variations may occur in the subjects as well as the observers. In theoretical comparisons of developmental standards described by Mary Sheridan and Ruth Griffiths, Bellman *et al* (1985)

showed discrepancies of up to seven months in 57 per cent of test items compared during the first three years of life.

Few authors have been specific about the exact discrepancy between developmental age and chronological age that indicates significant developmental delay. Drillien (1977) suggests that this delay is present if a child functions at four-fifths, or less, of the level expected for the chronological age in any area of development. Thus a significant delay at 36 weeks of age is one greater than seven weeks, at 36 months old, one greater than eight months, and at 60 months old one greater than 12 months. The developmental quotients in his table lie between 78 and 83 (see Table 1.1).

Table 1.1: Definition of developmental abnormality by Drillien (1977)

	Chronological age	Developmental age	Delay	Developmental quotient
Drillien	12	10	2	83
(in weeks)	24	20	4	83
	36	28	8	78
	48	38	10	79
(in months)	24	20	4	83
	36	28	8	78
	48	38	10	79
	60	48	12	80

A 'centile' type 'screening record' was devised for use at the Woodside Health Centre, Glasgow, which showed developing skills portrayed on a chart in sequential steps (Barber *et al*, 1976). The results of this scheme were analysed after four years' usage. Barber used failure to perform tests appropriate to the chronological age of the previous age step as a criterion of developmental abnormality (Barber, 1981). Thus, according to Barber, significant delay is one of more than three months in the first year, more

than six months in the second year and more than 12 months thereafter (see Table 1.2). When the discrepancy is at these levels, Barber describes the child as having 'developmental delay' and if the discrepancy is greater than these, the child has 'developmental abnormality' (the quantity is greater). Thus, the term 'developmental delay' means a quantitative deficiency of the child's developmental age compared with normal. The developmental quotient that signifies 'abnormality' under this system varies according to the age of the child: from 54 at the age of 13 months, to 78 at the age of four and a half years. During the early months of life, the actual derived developmental quotient could be even lower. Such practical 'definitions' of abnormality have influenced the scoring and interpretation system of the *Schedule of Growing Skills*. (Note: Developmental disorder is different – it implies that the development is qualitatively abnormal, rather than being delayed, for example in autism, pragmatic semantic disorder or motor learning disorder or 'clumsy child syndrome'.)

Table 1.2: Definition of developmental abnormality by Barber *et al* (1976)

	Chronological age	Developmental age	Delay	Developmental quotient
Barber	11	8	3	73
(in months)	13	7	6	54
	15	9	6	60
	19	13	6	68
	24	18	6	75
	27	15	12	56
	36	24	12	66
	48	36	12	75
	54	42	12	78

A study to standardize the items in *SGS II* was carried out in 1996. 348 children were assessed by 33 administrators in widely different geographical areas in the UK. The results suggest that normal development

is relatively smooth, and failure to follow this pattern is abnormal. This argument is exactly analogous to physical growth when it is necessary to plot progress over time in order to diagnose abnormality, and a single point provides insufficient evidence. The standardization study was relatively small but it would be possible to draw 'growth charts' of developmental skills in centile form (as on standard height/weight charts) by studying a larger population of children using *SGS II*. This would then define developmental progress according to the population centile group into which the child falls and clearly show abnormal deviation patterns.

Normal Variation

Many factors that are associated with variable developmental progress at an early age may become normal subsequently.

Familial

Developmental trends often run true in certain families. A history of slow walking or slow talking, followed by spontaneous catch-up, in parents, siblings or other close relatives may explain some cases of apparent mildly delayed development.

Posture

Children who are persistently laid on their backs or nursed supine in the early months of life are often slower to develop skills in the prone position (such as pushing up on arms). Independent walking may be delayed in 'bottom-shufflers' or in children who have little or no opportunity to weight bear, perhaps because of wearing a frog plaster for a congenitally dislocated hip, or being placed for long periods in baby bouncers or walkers.

Race

African and Asian infants tend to be more advanced in motor skills than Caucasian babies.

Understimulation

Minor degrees of understimulation may cause delays that disappear as the child gets older and 'catches up'. Understimulation may occur due

to parental ignorance of good child-rearing practices. Children in care, or those who for some other reason have no stable environment, may also lack adequate stimulation, as may the children of large families, where parental attention is constantly diverted and divided. Chronic deprivation of development stimulation may cause persistent pathological delay needing treatment.

Twins

Speech and language development in twins may be late because the children use an idiosyncratic, mutually-understood communication system, which obviates their immediate need to develop conventional language.

Ethnic minority communities

Early English language development may be inhibited in children of families whose first language is not English, or who speak more than one language at home. This is particularly so for children with mild developmental delay. A majority with good skills will learn several languages simultaneously.

Sex

Females tend to have accelerated language development compared with males.

Nutrition

Children who are under-nourished or have iron deficiency with or without anaemia can show delayed or deviant development. This delay can persist even if the iron deficiency has been corrected.

Parental Anxiety

One of the declared aims (and benefits) of routine screening is to identify a defect or a developmental delay as early as possible. Critics argue that this process increases parental anxiety unnecessarily by introducing the thought that their child might be 'abnormal' in some way. It is only natural that levels of parental anxiety will be raised prior to and during the screening

process. However, as most practitioners are aware, parents are naturally anxious about their children's health.

The routine visit to the clinic for screening is an ideal opportunity to investigate, and more often than not, allay existing parental anxieties (whether or not these have been previously expressed). This means that the parents can be genuinely and effectively reassured. In his description of two child health clinics, Bax (1981) writes:

> *Contrary to the suggestion sometimes put forward that developmental testing can promote anxiety in parents, we found the reverse was true. Parents enjoyed talking about their children and watching them take part in developmental tests. Generally doctors could reassure them about their child's progress. Some parents expressed anxiety about their child's development – for example speech – at the time of examination, but in many cases this was unfounded. Sometimes a parent's expectations of how well his or her child should be doing was too high, and an explanation of normal child development allayed anxiety. In cases where a problem could be confirmed, parents were relieved that it had been recognized and some action taken!*

Sometimes the screening process will uncover an abnormality of which the parents were genuinely unaware. In this case, not only has the procedure done its job, but it has also provided an opportunity for 'counselling' the parents. In some instances, the problem may not be remediable. In such a case, say the critics, the parents' distress will begin earlier as a result of routine screening, than it would otherwise have done. It is our belief, however, that no irremediable defect sufficient to cause severe parental distress is likely to go undetected in the long term; earlier onset of this distress may be counterbalanced by immediate provision of support and counselling. The opposite side of the anxiety coin is the benefit derived by parents from being reassured that their child is developing normally. This is unmeasurable but is a positive yield of screening that is well recognized by practitioners.

Accuracy

Any screening device needs to satisfy a number of criteria if it is to be described as accurate. These are fully discussed in Chapter 5, and are listed here only briefly. First, the procedure must cover all aspects of neuro-developmental progress in the first few years of life. Second, it must be of demonstrable validity so that the judgements of health visitors and doctors may be based on sound information. Third, the procedure must be clear and straightforward to implement, so that practitioners throughout the country may observe and record the same behaviours in the same way. Finally, the result should be quantifiable, and capable of being related to a well-accepted 'norm'.

Critics will argue, with some justification, that the range of developmental variation in 'normal' children militates against the establishment of a well-accepted 'norm' by which delays and defects can be reliably identified. We hope to demonstrate in this book that this is not necessarily true either as a generalization or in relation specifically to the *Schedule of Growing Skills*.

Cost-effectiveness

The routine and regular process of developmental screening is expensive, especially if it is to be conducted at the level of detail suggested, for example, by the Court Report. If, in addition, the screening procedure is regarded as separate from the process of surveillance, some professionals will argue that it is time and money wasted.

We have argued throughout this chapter that developmental screening must be integral to surveillance so that it does not become an extra burden on professionals whose time is precious. The cost-effectiveness, as opposed to the simple cost of screening, only becomes apparent when specific results are reported, such as those described by Wilmot (1984). In this case, nearly nine per cent of children who were screened developmentally in general practice required referral. We are convinced that the procedure which reliably identifies children in these sorts of numbers represents an effective use of resources.

Time Effectiveness

Screening involves a central paradox: given the size of the task, it is crucial that each screen should be as brief as possible, yet there is no excuse for taking short cuts. Screening produces information that is crucial to children's future well-being, and any decline in standards is unacceptable.

We suggest that a suitably detailed, careful screening session can be carried out in approximately 20 minutes using the *Schedule of Growing Skills*. Not only does this save the professional's time; it also allows for the limited attention span of pre-school children.

Moral Issues

Nowadays, professionals need to have a broad understanding of the different classes and cultures represented in their case load, particularly in the details relevant to their speciality. Training in screening also needs to develop practitioners' self-awareness of their own attitudes towards these groups (see Chapter 5). Certain aspects of developmental screening have sometimes been criticized on the grounds that they inflict white middle-class values and expectations on other social and ethnic groups. Standards and practices of child-rearing, taken for granted by many professionals, are not necessarily shared by all parents. What is at issue here is not, however, the values and standards of any social group, but the detection of 'problems' associated with a child's development. However, we totally refute the suggestion that different levels of overall developmental achievement should be considered acceptable just because they are presented by children of different social groups. Neither can we agree with the idea that parental expectations of a child's developmental progress should modify the acceptability of that child's performance during a screening procedure.

Minimizing the Risk of Error

Health service professionals are rightly anxious to minimize the risk of error, both in the instruments they use and amongst the personnel employed. It is inevitable in the field of medicine, as in any other area of

human endeavour, that error may result in incorrect diagnosis or in an inability to answer every question that might be posed. However, critics of developmental screening are not, by and large, challenging the qualifications of trained personnel. Their concern is more with the validity – and hence the reliability – of the instruments and procedures used (Plewis and Bax, 1982).

The combination of well-trained personnel with a valid and reliable screening tool considerably reduces the risk of error. However, it must be stressed that any screening procedure is, by its very nature and purpose, a relatively insensitive instrument. It is designed to be quick to administer and to be capable of detecting those who require either treatment or further investigation. It is a tool to facilitate referral. We therefore suggest that a full assessment stage following the screening process will reduce the chances of a wrong initial diagnosis being perpetuated (see page 23).

Inclusion of Parents

Parental participation and consent is always needed. Occasionally, children are screened in nurseries, and there is a danger that parents may be excluded from the session. We believe that this practice should never be tolerated as it devalues parental responsibility and denies access to full information about the child. Parents should always be present at their child's screening session or their opinions obtained via PPQs. Their concerns must always be taken seriously.

Duplication of Work

There is some debate as to whether delay or defects detected as a result of screening might not have been picked up anyway through normal visits to the general practitioner or outpatients' clinic.

The research of Drillien and Drummond, as described in *Developmental Screening and the Child with Special Needs* (Drillien and Drummond, 1983) is relevant to this discussion. Having studied the screening of children in Dundee over a seven-year period, they discovered that four per cent of pre-school children had moderately severe or severe neuro-

developmental disability and that five per cent had moderate neuro-developmental disability. Of these problems, 73 per cent came to light as a result of developmental screening. Only 27 per cent of the problems had already been recognized: some had been evident at birth, or were diagnosed in hospital following an acute episode which caused the disability; others were identified and referred by different sources. Early intervention reduced the numbers of children requiring special educational placements.

Other research has been conducted in this area. For example Curtis Jenkins (1978) reported that 8.61 per cent of all children screened in his practice (excluding those with speech delay) were referred to specialists. Wilmot (1984) carried out 2,356 developmental examinations in his practice over a three-year period, and reported a referral rate of 8.8 per cent. Both these authors are general practitioners who were in a position to identify problems without using a specific screening programme.

All the developmental screening issues briefly discussed under the eight headings above merit full consideration. In our view, however, the benefits of routine screening far outweigh the potential risks. Although routine developmental screening is not yet mandatory, we firmly believe it to be an ethically acceptable part of child health promotion and surveillance – provided that appropriate action is taken to remedy or to support. For a screening programme to be fully effective, there must be provision of follow-up assessment and management facilities. We turn to this three-stage structure in the next section.

Screening Follow-Up: Assessment and Management

If screening is not to degenerate into mere survey work, there must be a system for acting on results and clear referral pathways. Characteristically this will comprise three stages, as shown in Figure 1.2.

Figure 1.2: The process of child healthcare for developmental problems

SCREENING
Identification of possible problem
(in primary health care).

REFERRAL

1st Level Assessment
(at special advisory clinic).

(Complex problems).

ASSESSMENT (2nd level)
Full diagnostic assessment by specialists.
Multidisciplinary by CDT.

MANAGEMENT
The provision of appropriate information,
treatment or support.
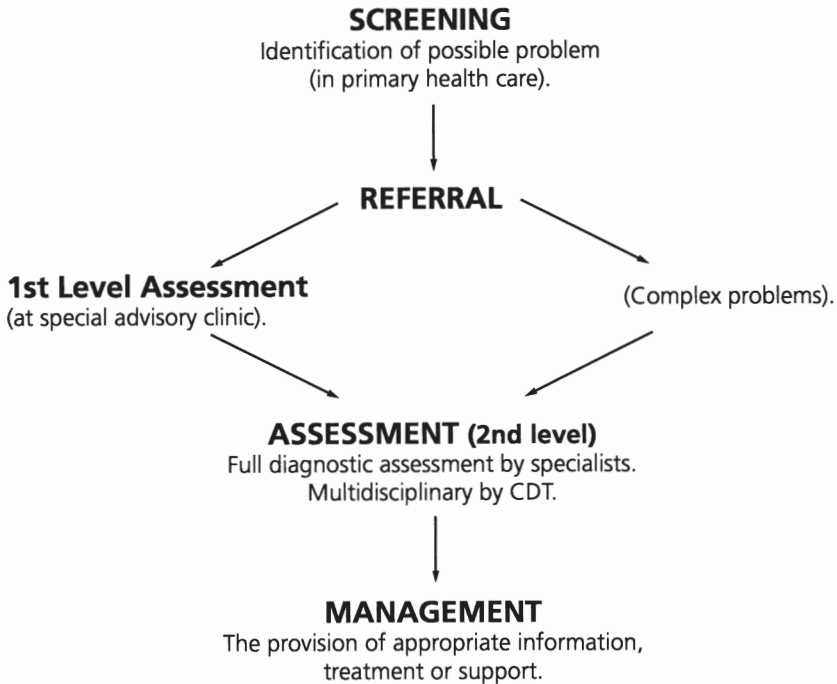
We have already looked in detail at the process of developmental screening. We shall now look briefly at the next two stages.

Assessment

For the purposes of this manual, 'assessment' is defined as a secondary level service carried out in response to parental or professional concern at the primary level. This can be done in local child health clinics or general practice premises where the first level screening was carried out. For minor or single problems the in depth assessment can be done by appropriately trained professionals. For more complicated or complex problems, children confirmed as or suspected of having a major developmental problem are

then assessed by the several disciplines (multi-disciplinary assessment) represented by members of a child development team, designed to investigate the 'whole child' in whom delay or defect is suspected. Its purpose is to reach a specific diagnosis of the problem or identify specific needs (strengths or weaknesses) so that appropriate specialist management can be provided. It should not be forgotten that assessment is also a safety net for screening children, disproving or amending a wrongly identified problem or defect. This in depth assessment is best carried out in a transdisciplinary manner by several professionals together (the child is seen in one session by a combination of paediatrician, speech and language therapist, physiotherapist, occupational therapist, psychologist, health visitor and teacher, as appropriate).

The term 'whole child' signifies that information about different aspects of the child's development will need to be gathered from a variety of sources. For example, if a child is suffering from significant speech or language delay, assessment will be carried out by a speech and language therapist together with a paediatrician. However, he or she may need to gather information from a variety of other professionals including the health visitor, audiologist, general practitioner, orthoptist, and educational or clinical psychologist.

Some of these specialist services are available at local clinics and health centres. In more complex cases, further assessment may take place at the child development centre, where counselling therapy and management (as discussed below) can also be undertaken.

The referral stage following screening and the whole process of assessment demand effective communication between different professions, all of whom use highly developed terminology and concepts relating to their speciality. Inter-professional cooperation is essential if the child is to be assessed and cared for in an effective way, and this cooperation depends on a formal system of meeting and reporting. This aim is often best achieved in a child development team (CDT).

The *Schedule of Growing Skills* contributes to the efficiency of this process by providing a simple standard form and referral note to ease the transition between general screening and specialized assessment.

Management

The aim of any management programme is to treat a child's problems effectively. The accuracy of the diagnosis reached during assessment is crucial to the effectiveness of the main feature of any management programme – the treatment plan, which should be geared to meet the needs of the child and family in the best possible way.

Practical issues should not be overlooked: *where* the child will be seen (school, nursery, home or clinic); how *often* (daily, weekly, monthly); and in what *context* (group or individual therapy).

Communication is as important in effective management as it is in assessment. At any one time, several professionals are likely to be involved with a child: for total intervention to be beneficial, each should be aware of what the others are doing.

Initially, the child may be referred to a specialist for a detailed assessment and diagnosis. The specialist may then decide that he or she is not the best person to treat the child, or that their treatment should be supported by intervention from other agencies. In this case a multi-disciplinary team would be built up and the professionals involved would devise a total treatment plan where all the elements support and complement each other. Figure 1.3 illustrates a possible pathway in the case of a child with speech and language delay.

A typical multi-disciplinary team may comprise:

- paediatrician (consultant, senior clinical medical officer, specialist registrar);
- speech and language therapist;
- physiotherapist;
- occupational therapist;
- educational and/or clinical psychologist;
- specialist health visitor;
- specialist social worker;

Figure 1.3: An example of the assessment procedure for a child suffering from speech/language delay

Health visitor screens a three-year old. She writes a report on the home background identifying any risk factors and will obtain information from other sources. She is concerned about the child's speech and therefore refers him to the speech therapist and audiologist (or checks the hearing herself). She may also refer for medical opinion.

Nursery school teacher/day care for report on child's social and cognitive levels and their concerns.

Speech and language therapist assesses receptive and expressive language in detail. Incoming information from relevant professions is also crucial to the making of an accurate diagnosis and management plan (e.g. nursery).

General practitioners or community paediatricians to check that there is not a medical base to the problem.

Audiologist to check hearing (if this has not been done recently) or if health visitors test is not normal.

The Speech and language therapist can also refer the child to the child development team to be seen jointly by a consultant or senior paediatrician and specialist speech and language therapist (for second opinion).

- music therapist;
- play therapist;
- (nursery) nurse;
- teacher/nursery teacher;
- secretary/administrator.

Other professionals involved in the total care of the child, such as health visitors, GPs, orthoptists, audiologists and medical specialists, particularly child psychiatrists, orthopaedic surgeons and ophthalmologists, will also need to be involved, especially in providing written reports.

The most important communication link is with the parents. So often, parents feel isolated from their child and the professionals who surround them. But their involvement and support is crucial for intervention to be successful. Parents should be involved with every decision and if possible be actively involved with the assessment and therapy.

Management should also be concerned with future considerations for the child, such as educational placement in a normal school with support, a special school or unit. In such cases, the parents would need to be closely involved and consulted, and the process of Statementing under the 1993 Education Act would need to begin. It would be the responsibility of the professionals to initiate this by notification to the Education Department as soon as the child appears or is considered to have special educational needs.

Parents as Partners

It is perhaps important to remind ourselves that, as Macfarlane (1986) notes, parents deal with 90 per cent of their children's illnesses, and provide them with the necessary care all the year round. This provision reflects a high level of expertise that should be acknowledged by all professionals involved in health promotion/surveillance. Parental anxiety concerning health or development must be taken seriously, as it has a high chance of being correct. A mother who suspects that her child may have a squint or deafness, for example, is very likely to be right.

Parental intuition does have its limitations, however. Very often it is restricted to the 'here and now'; developmental histories based solely on memory are notoriously inaccurate (Hart, Bax and Jenkins, 1978) unless a concurrent written record has been kept, using the national *PCHR*.

A minority of parents are lacking in parental skills. They are unable to provide the care that their children require and may thus appear to be uncooperative. It is important that these parents should be recognized at primary care level, as they are likely to need additional support. Frequently, their inadequacies result from deprivations outside their control and they should not become the objects of censure or discrimination. Such parents may be among those who rarely, if at all, keep appointments for therapy or assessment. They might not attend for immunizations. These 'hard-to-reach' families might be best served by a health visitor (and doctor) going to their homes. This will prevent the child being penalized for parental inadequacies and is a way of breaking the cycle of deprivation. It is out of the question, however, that these children should be discharged for persistent non-attendance.

Everything possible should be done to break down the barriers that so easily develop between parents and professionals. Professionals need to be conscious of the fact that many consultations only involve a one-way flow of information, with the parent always having to absorb new facts and instructions. A constant awareness of this imbalance should encourage professionals to devote an increasing proportion of their time to listening, and thereby give full acknowledgement to parental expertise. Parents appreciate having a written report of the professionals findings and opinions (McConachie, Lingam *et al*, 1988).

We accept the trend of modern child health surveillance towards greater parent responsibility, as advocated by Hall. However, we argue that continuing professional input will remain necessary to support parents for a majority of the population. Furthermore, for a minority of children in deprived circumstances, active professional screening will be the only way of identifying abnormalities at an early stage. *SGS II* is a developmental tool that can be efficiently and cheaply used at primary and secondary levels to improve case finding and promote developmental health.

The Development of the Schedule

The National Childhood Encephalopathy Study

The origins of the *Schedule of Growing Skills* was as a research instrument in the *National Child Encephalopathy Study (NCES)*, carried out between 1976 and 1981.

The *NCES* was set up because of increasing concern about possible severe brain reactions to whooping cough vaccine with loss of public confidence and falling national uptake rates.

Over 1000 cases were studied during a three-year period and analysis showed a very small statistically significant association between immunization with whooping cough vaccine and encephalopathy within the next three days. Further calculations showed that the attributable risk of encephalopathy followed by persistent 'brain damage' was 1:310,000 immunizations (Miller *et al*, 1981).

The clinical part of the *NCES* demanded that cases who did not recover fully within a short time had a comprehensive examination by a member of the research team. Reliable methods were required for performing both a neurological and developmental assessment. The neurological examination was based on conventional methods as described by Paine and Oppé (1966). The developmental examination was more problematic (Bellman, 1984): the procedures considered in the development of both components of the neuro-developmental assessment are outlined below.

The Requirements of Developmental Assessment

For the developmental examination several requirements had to be fulfilled:

Broad clinical scope

The schedule had to cover all aspects of development in the first three years of life (the NCES age range). In addition, the assessment had to be capable of being divided into specific aspects of development so that particular disabilities in individuals or groups could be identified.

Proven validity

The components of the schedule had to be shown to be valid or based on previously validated schemes.

Reproducibility

The test items had to be easily repeatable and subject to minimum variation, between different observers (inter-observer variation), and the same observer at different times (intra-observer variation).

Simplicity

The tests had to be simple to perform and interpret. Test equipment had to be attractive to children, light and compact.

Brevity

Many children were to be seen, and therefore the assessment had to be as short as possible.

Minimum equipment

Observers had to travel long distances to see children at home, anywhere in the UK, and it would have been impossible for them to carry heavy or bulky equipment. Some tests had to be done using the child's own toys.

Quantification

The research aim was to describe the developmental status of groups of children rather than of individuals, and the data had to be collected in a form suitable for computer processing. A descriptive assessment would therefore have been unsatisfactory and a scoring method was necessary, using measures such as developmental age (DA) or developmental quotient (DQ).

Standardized on British children

Many developmental tests had originally been designed for American children and these were considered unsatisfactory.

It was subsequently realized that these eight requirements fit in precisely with the needs of a clinical developmental screening test. With the encouragement of practising community paediatricians and health visitors, work was undertaken to design a practical screening tool based on the *NCES* method.

Review of Existing Assessments and their Influence on the *NCES*

The *NCES* age range was two months to 36 months, and many of the cases were expected to have a neurological deficit as well as developmental delay. A scale orientated towards this younger age group was therefore more appropriate than one designed for school-age children. These factors, plus the requirement that it should cover *all* aspects of development, considerably narrowed the choice of existing assessments.

Two tests developed and standardized on British babies are the *Griffiths Mental Development Scales* (Griffiths, 1967, revised edition 1984) and the *Sheridan Developmental Sequences* (published as the *STYCAR* sequences, Sheridan, 1976). The *Griffiths* scales give results (in the form of a mental age or developmental quotient) for several *separate* fields as well as for *global* development. In common with many of the other tests designed by

psychologists, they are complicated, lengthy, require special equipment and can only be administered by specially-trained personnel. On the other hand, the Sheridan tests do not require special equipment, since the child's own toys can be used. They are also relatively rapid, as it is not necessary to run formally through tests that are not appropriate to the child's particular ability. Their disadvantage is that they consist of extensive lists of items grouped according to age. Performance of all the test items would result in the assessment being no shorter than a full psychological assessment, such as *Griffiths*. The Cardiff modification of the *Denver Developmental Screening Test* (Bryant *et al*, 1974), although acceptable as far as standardization for British children is concerned, is too crude and is intended only for screening purposes and not for providing detailed information. Thus, it was concluded that, as long as a limited number of cardinal items could be abstracted from the *STYCAR* sequences, which would retain the validity of the assessment, the Sheridan scales were most appropriate for use in the *NCES*.

In order for comparisons to be made, each child had to be subjected to the same tested items and a standardized selection was made. These proformae described the abilities of individual cases, but could also be grouped to investigate the relation of particular disabilities to previous illnesses.

The standard developmental proforma was completed at each visit to each case. Together, these proformae formed a descriptive assessment of the child at particular ages in terms of the most advanced items successfully performed. Although this descriptive 'case history' would have been satisfactory for an individual assessment, it would not have been acceptable for use in the analysis of a group. It was therefore necessary to translate the items into developmental ages which could be scored and stored by computer. Thus each item was referenced to the appropriate 'age of performance' according to Mary Sheridan.

The four major fields of development in the *STYCAR* sequences are composed of several specialized skills which do not necessarily develop at exactly the same rate. For numerical scoring to be statistically acceptable, it was necessary to break down these fields into individual skills whose

development is steadily progressive and independent of other abilities. This was done as follows:

Field One: Posture and large movements

Sub-fields:　■　passive postural skills
　　　　　　　■　active postural skills
　　　　　　　■　locomotor skills

Field Two: Vision and fine movements

Sub-fields:　■　manipulative skills
　　　　　　　■　visual skills

Field Three: Hearing and speech

Sub-fields:　■　hearing and language skills
　　　　　　　■　speech and language skills

Field Four: Social behaviour and play

Sub-fields:　■　interactive social skills
　　　　　　　■　self-care social skills

A further proforma was designed according to this protocol, which consisted of the nine sub-fields made up of two or more categories representing basic independent skills (Bellman *et al*, 1985). Developmental age could be calculated for each sub-field from the items performed.

The Use of the *NCES*

It had been estimated at the beginning of the *NCES* that about one third of the notified children would meet the criteria indicating the need for clinical follow-up. In fact the proportion was greater than this, and approximately 500 children were eventually assessed on three separate occasions by the methods described above. Most of the cases were seen at home, throughout

the UK; thus the virtues of a simple, brief portable system of examination were well tested.

The modification of the *STYCAR* sequences fulfilled the function very well and satisfied all the demands made of it in terms of convenience and ease of use. The results of each assessment were recorded on the developmental proforma in the child's case file and were easily stored and processed on the study computer. It was then simple to analyse the data and produce neuro-developmental profiles – both of individual cases and of groups categorized, for example, according to diagnosis, cause or age.

Although the method was successful from a practical and analytical point of view, it was considered necessary to carry out some validation studies to support its use as the sole tool for measuring neuro-developmental outcome in this important study. Even though the 'norms' were based on the accepted standards laid down by Mary Sheridan, it could not be assumed that an innovative version automatically conformed to these standards.

Validation Studies of the *NCES*

Theoretical Comparison

Developmental items listed in the *NCES* schedule were compared directly with equivalent items listed in the *Griffiths* scales (Griffiths, 1967). The items were grouped into the four major fields in common usage, as shown in Table 2.1.

Table 2.1: Comparison of *NCES* fields and *Griffiths* scales

NCES fields	*Griffiths* scales
1: Posture and large movements	A: Locomotor
2: Vision and fine movements	B: Eye–hand coordination
3: Hearing and speech	C: Hearing and speech
4: Social behaviour and play	{ D: Personal–social E: Performance (a few appropriate items)

There was no *Griffiths* equivalent for some of the *NCES* items selected from the *STYCAR* sequences, but a total of 97 comparisons were possible. The ages at which they should be performed by 'normal' children were compared and the differences were as displayed in Table 2.2.

Table 2.2: Comparison of ages at which *Griffiths* and *STYCAR* items were performed

Age difference (months)	Proportion of items (n=97)
0	43%
1	29%
2	12%
3	8%
3+	7%

The *STYCAR* ages (Sheridan, 1976) tended to be higher than the *Griffiths* ages (Griffiths, 1967) for the same items, and the maximum was a discrepancy of seven months. This emphasizes the wide range of developmental achievement that is regarded as normal (see Figure 2.1).

Figure 2.1: Difference in months between 'normal' ages for performance of developmental items, according to *Sheridan* and *Griffiths*

Figure 2.1: continued

No equivalent for 11

Manipulation & vision
STYCAR Field 2/
Griffiths Scale D

Sheridan age minus Griffiths age (months)

No equivalent for 5

Hearing & speech
STYCAR Field 3/
Griffiths Scale C

Sheridan age minus Griffiths age (months)

No equivalent for 22

Social & play
STYCAR Field 4/
Griffiths Scale B+E

Sheridan age minus Griffiths age (months)
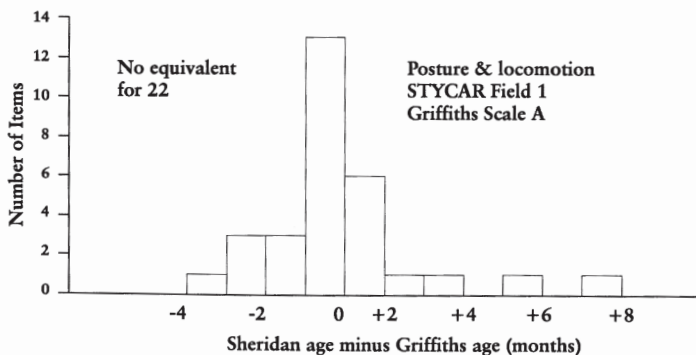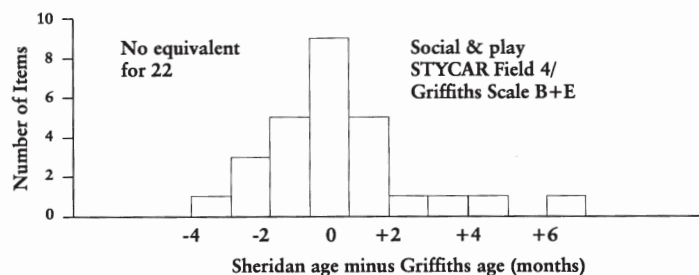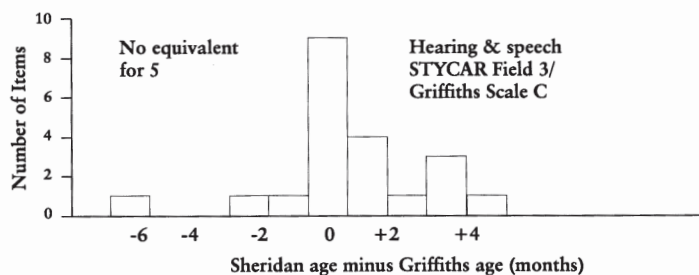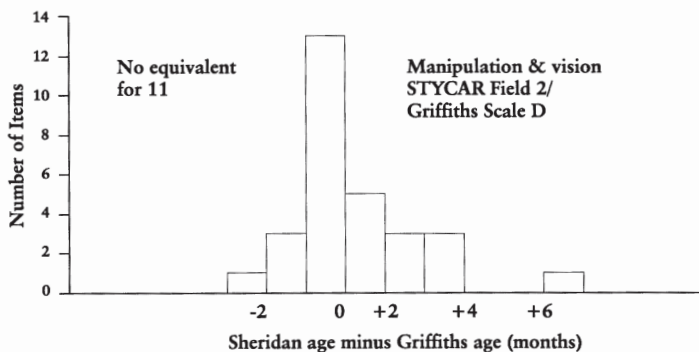
Clinical Comparison

Developmental assessments were carried out using both the modified *STYCAR* schedule and the *Griffiths* scales. The children were examined by different observers within a few days of each other. In order to maintain comparability, developmental ages were calculated for the four major fields in each system. The difference between the assessed ages is displayed in Table 2.3.

Table 2.3: Overall developmental age differences between *Griffiths* and the *NCES* schedule

Age difference (months)	Proportion of cases (n=100)
0	31%
1	24%
2	15%
3	9%
3+	21%

The resulting developmental ages were plotted against each other and correlation coefficients calculated (see Figure 2.2). These were highly statistically significant ($p<0.001$) in each field, and the points on the graph lay close to the 45-degree line which would, theoretically, indicate complete agreement. This result indicates that assessments using the *NCES* schedule give results which are broadly similar to those obtained using the *Griffiths* scales.

Figure 2.2: Scatter diagrams of assessed ages on the four major fields of *Griffiths* and the *NCES* schedule

Field 1: Posture and large movements *(NCES)*/Locomotor *(Griffiths)*
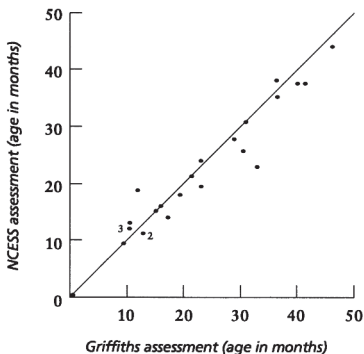
Field 2: Vision and fine movements *(NCES)*/Eye–hand coordination *(Griffiths)*
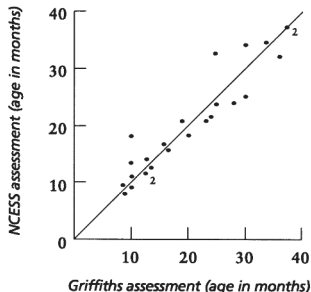
Field 3: Hearing and speech *(NCES/Griffiths)*
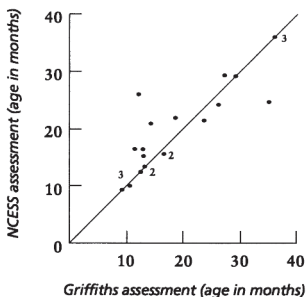
Field 4: Social behaviour and play *(NCES)*/Personal–social *(Griffiths)*
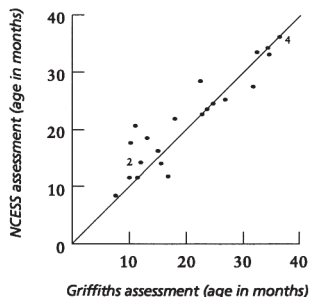
Reliability

A study of inter-observer reliability was carried out by two different observers who independently assessed 20 *NCES* cases using the *NCES* schedule. The difference in the ages determined by the two observers over the four fields of development are shown in Table 2.4.

Table 2.4: Inter-observer variation on the *NCES* schedule

Age difference (months)	Proportion of cases (n=80)
0	41%
1	9%
2	13%
3	19%
3+	19%

The correlation coefficients in each of the four fields was again highly significant ($p < 0.0001$), and the graph of developmental ages (DAs) plotted against each other (Figure 2.3) showed a similar close relation to the 45-degree complete agreement line. This indicates that different observers obtain similar results using the schedule and that the reliability of the scheme is satisfactory.

Figure 2.3: **Scatter diagrams of assessed ages on the *NCES* schedule, as noted by two observers**

Field 1: Posture and large movements
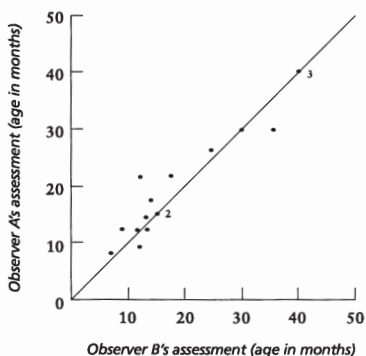
Field 2: Vision and fine movements
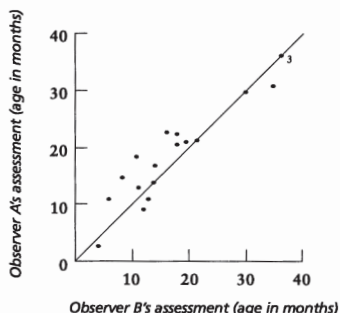
Field 3: Hearing and speech
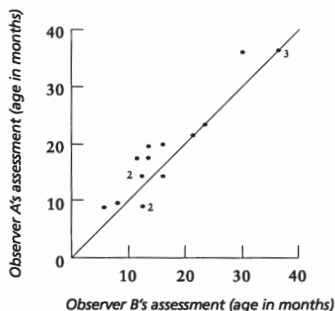
Field 4: Social behaviour and play
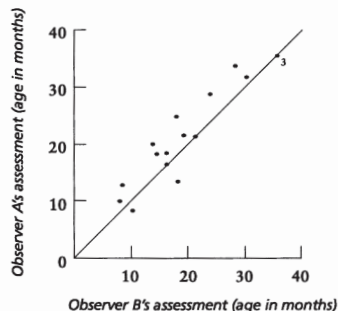
It is not surprising that results derived from the developmental assessment of children show considerable variation, and the above results are well in line with degrees of agreement between medical observations made in several circumstances (Cochrane and Garland, 1952; Wilson *et al*, 1980). It is well known that clinical judgement can be made more accurate by the use of standard itemized schemes, reducing inter- and intra-observer variability (Goldberg, 1970); the *NCES* development schedule brings this approach to usage of the *STYCAR* sequences.

The age differences in both the clinical validation study and the reliability study are within an acceptable range for variation of observation of biological parameters. They show little discrepancy from the theoretical range of 'normal' ages of developmental achievement, as found in the theoretical comparability study. It can therefore be considered that the modified *STYCAR* sequences satisfy general requirements for validity and reliability of clinical assessment tools (Plewis and Bax, 1982).

Table 2.5: Summary of clinical comparison, reliability and manual analysis studies

Field (STYCAR/Griffiths)	Spearman rank correlation coefficients		
	R	n	p
Clinical comparison			
1. Posture and large movements/Locomotor	0.93	25	<0.001
2. Vision and fine movements/Eye–hand coordination	0.95	25	<0.001
3. Hearing and speech/Hearing and speech	0.92	25	<0.001
4. Social behaviour and play/Personal–social	0.95	25	<0.001
Reliability			
1. Posture and large movements	0.96	20	<0.001
2. Vision and fine movements	0.93	20	<0.001
3. Hearing and speech	0.96	20	<0.001
4. Social behaviour and play	0.95	20	<0.001
Manual analysis			
1. Posture and large movements	0.98	25	<0.001
2. Vision and fine movements	0.98	25	<0.001
3. Hearing and speech	0.99	25	<0.001
4. Social behaviour and play	0.99	25	<0.001

From Research Project to Clinical Tool

Following publication of the *NCES* modification of the *STYCAR* sequences (Bellman *et al*, 1985), and presentations to meetings of paediatricians and health visitors, it became clear that there was a great deal of dissatisfaction with current developmental screening methods. It also became evident that the *NCES* modification, after suitable revision, could provide a way of filling this perceived need. Disadvantages of existing methods included:

■ *lack of standardization* or validation of idiosyncratic schemes;
■ *non-uniformity of methods* between Health Trusts, creating difficulties for transfer of information;
■ *inflexibility with regard to age*, leading to a reduction in the proportion of the population screened if children do not present at the exact standard ages;
■ *complexity* of use of some methods, causing lack of confidence by users and anxiety for mothers;
■ *need for special apparatus or environment* precluding use at home which again reduces the coverage of the population by excluding clinic non-attenders (who include the most needy section of the population);
■ *poor (and unknown) sensitivity and specificity*, resulting in a large number of false positives and false negatives.

The conclusion of these consultations was to design a screening method not subject to these disadvantages that was based on the *NCES* prototype.

The schedule was first used for mass screening in Hackney, London, where the developmental surveillance programme was under review. Previously, the assessments had been done exclusively by doctors, who had used a checklist approach at certain specific ages. The responsibility for administering the programme was taken on by health visitors, and they began assessing children at the same ages as before (eight months, 18 months and 30 months) using the modified *NCES* schedule. The training

that was given aimed to make full use of existing familiarity with the *STYCAR* sequences and procedures, and was not extensive. The technicalities of the schedule and the basic procedures for administration and analysis were covered in formal lectures to the whole body of health visitors. More detailed training was then given to small groups in their community clinics. Much practical experience was included, with the trainer in the role of both demonstrator and observer.

The *NCES* schedule was well accepted by health visitors and parents, and overcame most of the disadvantages of the previous conventional system. It was realized quickly that the developmental content was no different from any other method and, because the *STYCAR* approach was so familiar, health visitors had no difficulty with the clinical procedure. Their main problem was in managing the documentation of the schedule and finding their way around the rather complex looking proforma. However, after explanation of the design (which covered the complete age-range from birth to three years) and the scoring procedure (requiring only simple arithmetic) few health visitors were unhappy using the schedule.

Development of the *NCES* Schedule into the *Schedule of Growing Skills*

The experience of using the *NCES* schedule in Hackney confirmed that it was suitable as a population screening tool. Many helpful comments were received from the Hackney health visitors and community health doctors, and from many sources elsewhere. Advice was also sought from a GP who actively practised child health surveillance. A steering group was formed, consisting of representatives from each of the above medical disciplines and with the addition of a speech and language therapist. This group considered ways in which *SGS* might meet the requirements of the various groups of staff who carried out primary child development screening. Some modifications were made to the existing schedule to make it simpler to use, and it was then renamed the *Schedule of Growing Skills (SGS)*.

Another even more important innovation was made. Many districts had a surveillance programme that included assessment of children who are in their fourth year or just before their fifth birthday when they begin school. The schedule was therefore extended to cover the whole pre-school age range (from birth to five years), enabling it to be used as the sole tool for screening. The child's record would be kept throughout the first five years of life and would then be passed on to the school nurse.

The extension of the scale to include children up to the age of five years was constructed in a similar way to the original birth-to-three-years section. Most of the extra items were taken from the published *STYCAR* sequences (Sheridan, 1976) at the three-to-five-year level. For the 'Manipulation' field the 'peg in a cup' test, as described by Professor Kenneth Holt (Holt, 1977), was included. This was considered a simple standardized technique, which also provided the tester with a good opportunity to observe the quality of fine motor control.

Validity Study

As with the birth-to-three years items, it was felt necessary to validate the new items, and a similar study design was used. A group of children aged between 36 and 60 months were assessed by one observer with the extended *Schedule of Growing Skills* and by another with the *Griffiths Mental Development Scales* within the space of a few days. As the *Griffiths* scales cannot be split into separate skills like the *Schedule of Growing Skills*, comparisons were made with reference to the four major developmental fields using a similar method to that used in the original validation study. The *Griffiths* 'Performance' items above the age of three years corresponded more closely to the *STYCAR* 'Manipulation' field than the 'Social' field with which they were included in the original theoretical comparison. Thus the fields were compared as shown in Table 2.6, which gives the relevant Spearman rank correlation coefficients.

Table 2.6: Validity study between *Griffiths* and the *Schedule of Growing Skills*

The Schedule of Growing Skills	Griffiths Mental Developmental Scale	R	n	p
Gross movements	Locomotor	0.96	14	<0.01
Vision and fine movements	Eye–hand coordination and performance	0.52	45	<0.01
Hearing and speech	Hearing and speech	0.81	45	<0.01
Interactive and self-care social behaviour	Personal–social	0.68	45	<0.01

The developmental ages derived from each method were plotted against one another on a scatter diagram (see Figure 2.4). The points lay reasonably close to the theoretical 45-degree complete agreement line. The charts also show a consistent trend towards a higher developmental age scored on the *Schedule of Growing Skills* than on the *Griffiths* scales as the points lie predominantly to the left of the 45-degree line. This trend is similar to that shown in the comparable validity study of the birth-to-three-years items in the *NCES* schedule as described above. In terms of its use as a screening method, it is satisfactory that the *Schedule of Growing Skills* results in a higher age equivalent than the more detailed *Griffiths* test, as this increases its specificity. It would be unacceptable for a screening test of this nature to have a low specificity (even if the sensitivity was high) in view of the unnecessary anxiety which would occur and the extra secondary assessment resources that would be needed because of over-referral of 'false positives'.

Figure 2.4: Scatter diagrams of assessed ages on the four major fields of *Griffiths* and the *Schedule of Growing Skills*

Reliability Study

The *NCES* developmental schedule for children up to the age of three years was used in the Hackney Health District from 1981. The health visitors became expert at using the schedule and felt very comfortable with it. They kindly agreed to carry out a limited inter-observer study on the new items added to cover the three-to-five-year age range, the results of which are shown in Table 2.7. Children between these ages were assessed by pairs of health visitors, one of whom actively performed the examination while the other observed. The health visitors assumed alternating roles of examiner and observer on successive occasions.

Table 2.7: Inter-observer study of the *Schedule of Growing Skills*

Field	R	n	p
Gross movements	0.58	19	<0.01
Manipulation	0.97	20	<0.001
Vision	0.87	20	<0.001
Hearing	0.90	20	<0.001
Speech	0.96	20	<0.001
Interactive social	0.79	20	<0.001
Self-care social	0.47	20	<0.05

The developmental ages determined by each of the participating health visitors in the pairs were plotted against each other as in the previous studies (see Figure 2.3 on page 42). These charts (displayed in Figure 2.5) show that the points lie reasonably close to the 45-degree complete agreement line. The proportion of exact matches in each of the seven fields were as shown in Table 2.8 (see page 52). Bearing in mind that each occasion where there is not an exact match reduces the proportion by five per cent (or slightly more in the case of 'Gross movements'), these proportions are very good.

Figure 2.5: Scatter diagrams of inter-observer study of the *Schedule of Growing Skills*
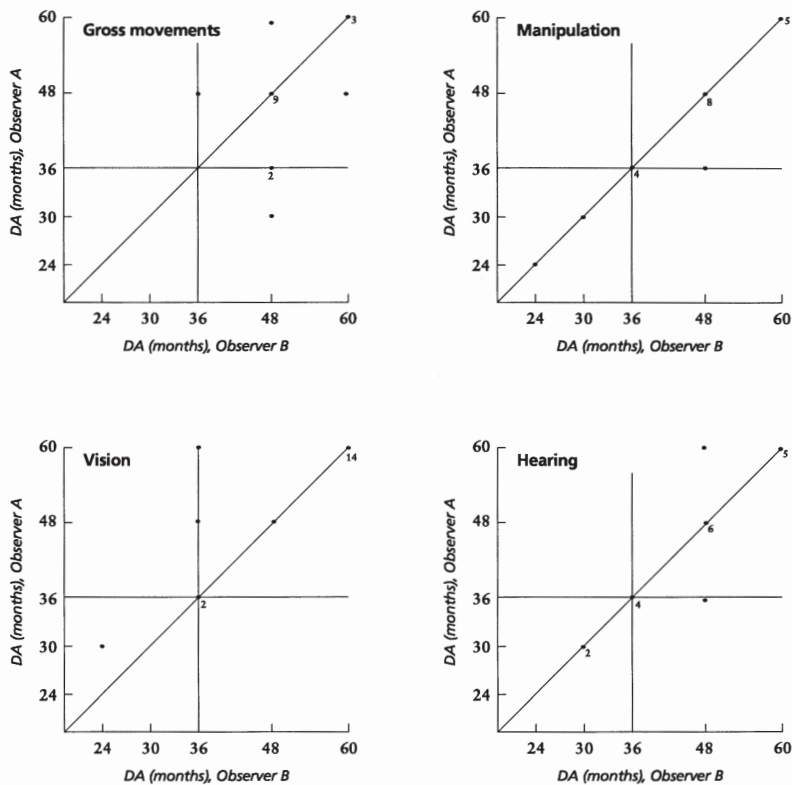
Figure 2.5: continued
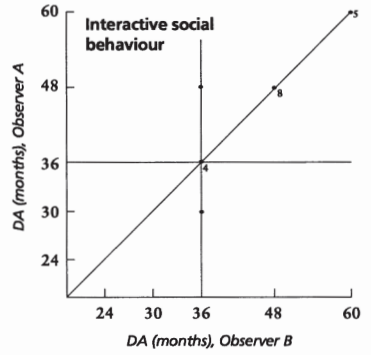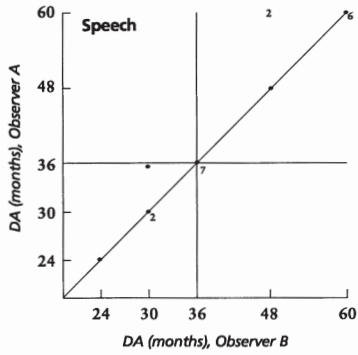
Conclusions from the Validity and Reliability Services

The correlation coefficients in the upper age group tend to be lower than those calculated from the corresponding studies of the birth-to-three items. The main reason for this is that the age intervals between 36 and 60 months are measured in two steps of 12 months each (36 months–48 months–60 months). In the score of a particular *Schedule of Growing Skills* field, therefore, any discrepancy resulting in a different developmental age had a relatively larger numerical effect. In the birth-to-36 months age range, the age intervals are in steps of three months or less under 18 months, and of six months from 18 to 36 months. Hence the numerical effect of different developmental ages resulting from the scores recorded would be much less.

Table 2.8: Proportion of exact matches in each of the seven fields during the inter-observer study

Gross movements	68.4%
Manipulation	95.0%
Vision	85.0%
Hearing	85.0%
Speech	85.0%
Interactive social	85.0%
Self-care social	75.0%

A correlation coefficient of 0.5 can be regarded as satisfactory and 0.8 as very good when comparisons of biological observations are made, and it was argued that the high correlation coefficients achieved in the birth-to-three studies were extremely satisfactory. In the studies carried out on the three-to-five years extension, they were between 0.52 and 0.96 for validity, as compared with *Griffiths* assessments, and between 0.47 and 0.97 for reliability in the inter-observer study. As has been previously noted, the developmental performance of young children is particularly liable to significant variation which makes statistical analysis of this nature hazardous.

The lowest correlation coefficient was in the inter-observer study of the 'Self-care social skills' field ($R=0.47$), and was due to an unequal

distribution of the comparison points which were clustered at the top of the age range. Additionally, the necessity for taking a parents' report of the developmental skills means that it is slightly less objective than other fields. However, as it is current development that is reported (as opposed to historical milestones), the information is fairly reliable (Hart *et al*, 1978). The next-lowest correlation coefficient was in the comparison of *SGS* 'Vision and fine movements' with the *Griffiths* fields 'Eye–hand coordination' and 'Performance' ($R=0.52$). These two *Griffiths* fields were combined, as Griffiths stated that her 'Performance' items corresponded best to 'Manipulative skills'.

The remainder of the correlation coefficients are good, and overall it can be concluded that the three-to-five year extension of *SGS* gives results which are acceptably valid and reliable. The *Schedule of Growing Skills* is designed to be used as a screen for developmental abnormalities, and should not be expected to pick up minor deviations from the normal pattern. If used in the way described in the User's Guide, *SGS* will satisfactorily identify major problems and act as a pointer to diagnosis of the areas affected over the complete pre-school age range, from birth to five years.

The Development of the *Schedule of Growing Skills II*

Professionals who have used a particular screening programme for a long period of time become expert in administering the test: they also develop a 'feel' for those items that are the most significant. Their observations provide a valuable contribution to the continuing development of the test.

Regular meetings of users of the *Schedule of Growing Skills* provided valuable feedback about its general use and specific items. Overall, satisfaction with *SGS* was very high from the point of view of both professionals and parents. However, a decision was made to carry out a major overhaul of the schedule of items and to revise the User's Guide and Reference Manual. This is consistent with the stated aim of the first edition to take account of users' views and make appropriate modifications. Several items were reworded in order to make them simpler and clearer and the order of items in a few skill sections was changed to fit in with clinical experience. A small number of items were removed

because they were not considered to add significantly to the information from the rest of the Schedule. Any new developmental sequence was subjected to investigation of validity and standardization (see later).

An issue that kept coming up was that *SGS* was somewhat deficient in picking up children whose functional performance was in the normal range but who, nevertheless, were found subsequently to have a cognitive deficit. Therefore, the complete set of items was reviewed and those that indicated cognitive skill were highlighted. They include some items in 'Manipulative skills' (55–69), 'Visual skills' (78–88) and 'Interactive social skills' (143, 144, 150, 152, 155 and 156). A small number of extra components have been added to increase sensitivity: two simple formboards are now included as these are well known to be very good at identifying difficulties. They are a standard component in many developmental tests and have the additional advantage that they are enjoyed by the children. It was also decided to include a peg-board test (Holt, 1991) as well as the 'peg in a cup test'. This is a better discriminator for impaired fine motor skills than the cup test on its own.

An independent study was commissioned to standardize and validate the revised schedule including new items and the cognitive section (see the Appendix). Community paediatricians and health visitors in NHS Trusts across England and Wales administered the proposed new Schedule to 348 children and the results are reported in the Appendix. Also, a concurrent and a construct validity study (against the Denver Developmental Screening Test) was carried out.

It is hoped that the *Schedule of Growing Skills* will continue to develop as needs change. There will always be a need for a standardized method of developmental assessment so that child health surveillance can be comprehensive and efficient at identifying children with problems as early as possible.

We gratefully acknowledge the comments and criticisms of the Users' Group upon which many of the changes in *SGS II* are based. It is planned to continue to convene periodic meetings of this group so that the *Schedule of Growing Skills* maintains its position in the fast moving world of child health surveillance.

The Standardization of the
Schedule of Growing Skills II

The main standardization took place between January and April 1996 with 348 children taking part. They were made up roughly of half boys and half girls and were defined by year of age from birth to five years old. They were tested by 33 administrators in eight NHS Trusts, the details of which can be found in the Appendix.

Various characteristics of the children were also analysed and compared to the general population. These included ethnicity and whether English was their first language, whether they had any disabilities, the qualifications of their parents, the position of the child in the family, and the type of area the child lived in. Results of these analyses showed that there was an over representation of ethnic minority groups, but there were no other significant differences between the sample and general population. For a more detailed discussion see the Appendix.

Analysis

Statistical analyses were undertaken to examine the item order, reliability and intercorrelations among the skill areas, including a cognitive skill area derived from the other areas. Age norms for each skill area were produced and used as a basis for the *SGS II* Profile Form.

Item Order

Prior to standardization, trial data was collected in order to check the order of the items. The item analysis undertaken to check that items were in the correct developmental order within sections and skill areas revealed no

significant deviations. More specifically, the 'Visual skill' area items, whose order had been changed, were now found to be in developmental order.

Test Reliability

The internal consistency of a test estimates the extent to which its items appear to be measuring the same skill. Therefore, in this instance, it estimates whether each skill area is measuring a single idea, and hence whether the items that make up the scale are internally consistent. There are a number of procedures for estimating the extent of internal consistency. A coefficient is generated, which can be interpreted in the usual manner for a correlation coefficient. The coefficient varies between 0 and 1, and the nearer the result is to 1 – and preferably at or over 0.8 – the more internally reliable is the scale. Table 3.1 shows the internal consistency coefficients, calculated using Cronbach's coefficient alpha. This is one of the most common indicies of reliability, and essentially calculates the average of all possible split-half reliability coefficients. The results for all skill areas suggest extremely high levels of internal consistency. Results for 'Passive postural skills' (.61) and 'Active postural skills' (.88) suggest somewhat lower levels of reliability. However, this may be due to the fact that these two skill areas cover limited age ranges, 0 – 6 months and 0 – 12 months respectively, and therefore are not relevant to every child. There are also a smaller number of items for these two skill areas, compared with other areas.

In addition to the analysis of the existing skill areas, a cognitive skill area, derived from the other skill areas, was examined for consistency. The items identified by the authors as having a cognitive element were included in this cognitive skill area. The results for this skill area suggest a very high level of internal consistency, since their coefficient alpha was equal to 0.97. This suggests that the items with a cognitive element do appear to be measuring the same developmental dimension. This particular skill area was examined in further detail as reported on page 57.

Table 3.1: Internal Consistency Reliability Coefficients (Cronbach's Coefficient Alpha), maximum score, mean scores, standard deviations and standard error of measurement for each skill area

Skill Area	Alpha	Maximum	Mean score	Standard Deviation	Standard Error of Measurement
Passive Postural	.61	9	8.93	.40	0.25
Active Postural	.88	12	11.44	1.64	0.57
Locomotor	.96	20	12.79	6.19	1.24
Manipulative	.96	28	18.54	7.67	1.53
Visual	.92	20	15.11	4.51	1.28
Hearing and Language	.93	21	13.84	5.45	1.44
Speech and Language	.95	22	14.70	6.39	1.43
Interactive Social	.95	24	17.75	6.14	1.37
Self-Care	.93	23	14.82	6.17	1.63
Cognitive	.97	34	20.13	11.20	1.94

Note: $N = 348$

The standard error of measurement (SEM) has been calculated using the reliability coefficients and the standard deviations of the raw scores for each skill area. The SEM is a reflection of the consistency of performance in that it shows the extent of variation due to test error for each score achieved. As can be seen from these figures, the consistency of performance is good, since the SEM figures are low.

Reliability of Cognitive Skill Area

Table 3.2 shows details of the item analysis for the 'Cognitive skill' area. In general, each item has a very high corrected item–total correlation. This is the correlation between each item and the scale without the respective

item, and suggests that the items with a correlation coefficient over 0.6 appear to be measuring the same dimension as the overall skill area.

However, four items have results that suggest somewhat lower levels of reliability. These items have been emboldened in Table 3.2 (Items 76, 77, 78 and 79). The value of 'Alpha if item deleted' goes up, if any of these four items are removed from the skill area. This implies that these particular four items do not contribute to the overall consistency of the 'Cognitive skill' area. These items are:

76. Watches falling toy, but does not look for it on the ground
77. Looks toward the correct place for fallen toy (object permanence)
78. Searches for the lost toy
79. Watches movements of people at distance or out of window with interest

It is interesting that three of these items (Items 76, 77 and 78) relate to the concept of object permanence. The mean age for achieving object permanence is eight to nine months, and this psychological principle should, in theory have a large cognitive component. This unexpected finding may be due to the fact that the object used by the administrator was not of interest to the child. For example, the red pom-pom supplied in the kit may not be of interest to some children despite its bright appearance. Using the child's favourite toy instead of the pom-pom could produce different reactions. It is a matter of professional judgement to decide whether the child understands the concept of object permanence. This may need to be investigated further and, in some instances, require the use of alternative stimuli.

Item 79 relates to interest in surrounding items and people. It is expected that this would have a cognitive element, but has not been found to contribute to the overall consistency of the 'Cognitive skill' area. It is difficult to explain this finding.

Table 3.2:   Item Reliability Analysis for consistency of Cognitive skill area

Item	Corrected Item-Total correlation	Alpha if item deleted
55	.75	.974
56	.80	.974
57	.80	.974
58	.85	.973
59	.80	.974
60	.68	.974
61	.72	.974
62	.84	.973
63	.86	.973
64	.85	.973
65	.77	.974
66	.66	.974
67	.77	.974
68	.67	.974
69	.56	.975
76	**.20**	**.976**
77	.29	.975
78	.48	.975
79	.49	.975
80	.67	.974
81	.70	.974
82	.76	.974
83	.77	.974
84	.82	.974
85	.78	.974
86	.73	.974
87	.74	.974
88	.79	.974
143	.81	.974
144	.81	.974
150	.66	.974
152	.78	.974
155	.77	.974
156	.66	.974

There are four items that have a very high corrected item-total correlation (0.84 and above) and if they were to be deleted, the overall reliability would go down to 0.973 (see Table 3.2). This implies that these particular items are making a very large contribution to the overall consistency of the 'Cognitive skill' area. These items are:

58. Tower of 7 + bricks
62. Circular scribbles
63. Imitates vertical and / or horizontal line
64. Imitates circle

These items (58, 62, 63 and 64) relate to building and drawing, and would be expected to have cognitive components, since they all require the use of mental thought processes. All the other items (apart from the four items with lower levels of reliability) also have very high corrected item-total correlations, which implies that the items appear to be measuring the same dimension as the overall skill area. These remaining items were derived from the 'Visual skills', and 'Interactive social skills' areas and were chosen to be analysed for a cognitive element by the authors.

Age Norms for each Skill Area

Correlational data can be used to predict some aspects of human performance, in this case, developmental skills. To do this it is not enough to know that two variables are related; one needs to know the exact form of the relationship in order to make practical use of it. A formula or equation is required to allow the user of the test to predict the child's developmental skill level from a knowledge of the child's age. This process is known as regression – that is, the prediction of unknown values of one variable from known variables of another. By convention, the variable we are trying to predict is represented as the Y variable and the variable on which the prediction is based is always the X variable. So in this case a child's score in a skill area (Y) could be predicted from their age (X). Therefore, the problem reduces to finding an equation for Y in terms of X.

If all samples of data exhibited perfect correlations, the process of regression would be remarkably simple. However, the typical correlation is far from perfect. The solution is to find the best fitting line going through the scatter of points, which is the line that would involve the smallest errors if we used it to predict Y from X. More precisely, the regression line is that line which minimises the squared deviations between the points and the line measured in the Y direction.

The children's scores were all plotted against their ages on a scatterplot graph for each skill area. The slope and interception of the points indicated whether the relationship was approximately linear. A computer program for regression was then used to find the regression equations for each skill area.

The *SGS II* Profile Form presents the age norms for each skill area derived by this method and based on the authors' clinical experience. The number of children tested in the younger age range (0–18 months) was not considered sufficient to proceed purely on a statistical basis, so the authors' judgement (based on clinical experience and extensive use of *SGS*) was used to construct the *SGS II* Profile Form. However, the number of children at the older age range (18–60 months) is robust and so was used as the basis for the new age norms.

For the 'Passive postural' and 'Active postural' skill areas a linear equation was used to compute these values, because points fell in an approximation to a straight line, since these skill areas were only relevant to 0–6 months and 0–12 months respectively. For all other skill areas, the relationship between score and age could best be represented by a curve rather than a straight line. Therefore, in these instances quadratic regression equations were computed to predict the 'norm' scores corresponding to age intervals of 2 months; these were then banded to create the *SGS II* age bands. In some skill areas there were ceiling effects at certain age limits.

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Intercorrelations

Tables 3.3 to 3.9 present the intercorrelations between the individual skill areas in relation to the whole sample, in Table 3.3, and then separately for each of the six age groups (Tables 3.4 – 3.9).

In Table 3.3, which presents the intercorrelations for the whole sample, the correlations are all significant and positive. In general the relationships between skill areas are high. This implies that if a child scores high in one area they are likely to score high in another area.

Table 3.3: Intercorrelations of *SGS II* across the whole sample

N=349	Passive	Active	Locomotor	Manipulative	Visual	Speech & Lang	Hearing & Lang	Interactive Social	Self-Care Social	Cognitive
Passive	1.0									
Active	.72	1.0								
Locomotor	.37	.61	1.0							
Manipulative	.34	.54	.94	1.0						
Visual	.41	.61	.86	.86	1.0					
Speech & Lang	.33	.54	.92	.94	.84	1.0				
Hearing & Lang	.34	.53	.90	.93	.85	.94	1.0			
Interactive Social	.39	.63	.92	.92	.89	.94	.93	1.0		
Self-Care Social	.37	.56	.84	.84	.77	.85	.83	.87	1.0	
Cognitive	.32	.53	.94	.98	.91	.94	.94	.94	.85	1.0

All coefficients are significant at p<0.01 (2-tailed)

Looking at the results for the different age groups, the intercorrelations tend to be higher among the younger age groups and lowest (nearer to zero) among the oldest age groups (see Tables 3.4 – 3.9).

The coefficients for the 'Passive postural' skill area could not be computed for children one year old and above. This is due to the fact that this skill area is normally limited to the age range 0 – 6 months. Therefore, it becomes irrelevant for older children, who would not be tested or are likely to score the maximum score for this area. Similarly, the coefficients for the 'Active postural' skill area could not be computed for five year old children (see Table 3.9). This is due to the fact that this skill area is normally limited

to the age range 0 – 12 months, and therefore becomes irrelevant for older children.

In Table 3.4, all coefficients are significant and positive. This implies that there is a relationship between skill areas for children below one year old.

Table 3.4:   Intercorrelations of *SGS II* for children below 1 year old

N=54	Passive	Active	Locomotor	Manipulative	Visual	Speech & Lang	Hearing & Lang	Interactive Social	Self-Care Social	Cognitive
Passive	1.0									
Active	.69	1.0								
Locomotor	.42	.74	1.0							
Manipulative	.53	.62	.81	1.0						
Visual	.65	.79	.81	.74	1.0					
Speech & Lang	.41	.56	.84	.78	.68	1.0				
Hearing & Lang	.47	.65	.84	.87	.79	.78	1.0			
Interactive Social	.46	.69	.86	.83	.78	.79	.84	1.0		
Self-Care Social	.57	.69	.65	.68	.73	.63	.66	.71	1.0	
Cognitive	.39	.56	.89	.87	.881	.85	.87	.87	.63	1.0

All coefficients are significant at p<0.01 (2-tailed)

In Tables 3.5 and 3.6 nearly all of the coefficients are significant and positive. This implies that there is a relationship between skill areas for one and two year old children. The only coefficients that are not significant are some of those for the 'Active postural' area in Table 3.5, and for all coefficients in this skill area in Table 3.6. As explained before, this is probably due to the fact that the 'Active postural' skill area is limited to the age range 0 – 12 months, and therefore becomes irrelevant to older children.

Table 3.5: Intercorrelations of *SGS II* for 1 year old children

N=67	Passive	Active	Locomotor	Manipulative	Visual	Speech & Lang	Hearing & Lang	Interactive Social	Self-Care Social	Cognitive
Passive	1.0									
Active	–	1.0								
Locomotor	–	.32**	1.0							
Manipulative	–	.20	.81**	1.0						
Visual	–	.21	.82**	.84**	1.0					
Speech & Lang	–	.16	.79**	.78**	.71**	1.0				
Hearing & Lang	–	.23	.76**	.83**	.79**	.77**	1.0			
Interactive Social	–	.33**	.74**	.77**	.71**	.72**	.73**	1.0		
Self-Care Social	–	.14	.60**	.63**	.57**	.62**	.60**	.62**	1.0	
Cognitive	–	.17	.85**	.95**	.91**	.79**	.85**	.83**	.67**	1.0

**p<0.01 (2-tailed)   – coefficient could not be computed*

Table 3.6: Intercorrelations of *SGS II* for 2 year old children

N=58	Passive	Active	Locomotor	Manipulative	Visual	Speech & Lang	Hearing & Lang	Interactive Social	Self-Care Social	Cognitive
Passive	1.0									
Active	–	1.0								
Locomotor	–	.11	1.0							
Manipulative	–	.08	.63**	1.0						
Visual	–	.03	.53**	.47**	1.0					
Speech & Lang.	–	-.01	.60**	.55**	.60**	1.0				
Hearing & Lang.	–	-.09	.45**	.37**	.62**	.63**	1.0			
Interactive Social	–	.07	.46**	.44**	.39**	.57**	.47**	1.0		
Self-Care Social	–	.14	.57**	.62**	.35**	.50**	.36**	.54**	1.0	
Cognitive	–	.06	.68**	.80**	.75**	.67**	.57**	.71**	.64**	1.0

**p<0.01 (2-tailed)   – coefficient could not be computed*

In general, the relationship between skill areas is significant for three year old children (Table 3.7). The coefficients are lower, compared with the coefficients for younger children. This implies that, although there are significant relationships, these are slightly weaker. The relationship between the 'Active postural' skill area and 'Visual' skill area, although

positive and significant, is only significant at the five per cent level, $p < 0.05$. There are also a couple of relationships that are not significant, namely those between 'Locomotor' and 'Visual', 'Visual' and 'Interactive social' and between 'Visual' and 'Self-care' social.

Table 3.7: Intercorrelations of SGS II for 3 year old children

N=70	Passive	Active	Locomotor	Manipulative	Visual	Speech & Lang	Hearing & Lang	Interactive Social	Self-Care Social	Cognitive
Passive	1.0									
Active	–	1.0								
Locomotor	–	.52**	1.0							
Manipulative	–	.46**	.61**	1.0						
Visual	–	.29*	.18	.25*	1.0					
Speech & Lang	–	.42**	.54**	.74**	.11	1.0				
Hearing & Lang	–	.46**	.52**	.70**	.31**	.67**	1.0			
Interactive Social	–	.60**	.71**	.71**	.21	.71**	.69**	1.0		
Self-Care Social	–	.52**	.61**	.54**	.17	.51**	.50**	.56**	1.0	
Cognitive	–	.50**	.55**	.85**	.65**	.65**	.73**	.73**	.49**	1.0

* $p < 0.05$ **$p < 0.01$ (2-tailed)   – coefficient could not be computed

As the children get older, the relationships between skill areas are no longer as significant. For four year old children (Table 3.8) only a few of the coefficients are significant (at the one per cent level, $p < 0.01$), indicating fewer relationships between skill areas.

Table 3.8: Intercorrelations of *SGS II* for 4 year old children

N=47	Passive	Active	Locomotor	Manipulative	Visual	Speech & Lang	Hearing & Lang	Interactive Social	Self-Care Social	Cognitive
Passive	1.0									
Active	–	1.0								
Locomotor	–	-.02	1.0							
Manipulative	–	.05	.12	1.0						
Visual	–	.41**	-.18	.17	1.0					
Speech & Lang	–	-0.02	.19	.48**	.10	1.0				
Hearing & Lang	–	-.08	.29	.35*	.16	.84**	1.0			
Interactive Social	–	-.02	.20	.27	-.03	.84**	.85**	1.0		
Self-Care Social	–	-.05	.22	.01	-.20	.57**	.57**	.65**	1.0	
Cognitive	–	.26	.10	.79**	.40**	.64**	.59**	.55**	.15	1.0

* p<0.05 **p<0.01 (2-tailed)   – coefficient could not be computed

Finally in Table 3.9, the intercorrelations between skill areas for five year old children are unrelated, and are fairly insignificant. There are only a few positive significant relationships between skill areas. This is probably due to the fact that the majority of children will be scoring towards the maximum possible score in each of the skill areas by this age.

Table 3.9: Intercorrelations of *SGS II* for 5 year old children

N=45	Passive	Active	Locomotor	Manipulative	Visual	Speech & Lang	Hearing & Lang	Interactive Social	Self-Care Social	Cognitive
Passive	1.0									
Active	–	1.0								
Locomotor	–	–	1.0							
Manipulative	–	–	-.02	1.0						
Visual	–	–	.09	.06	1.0					
Speech & Lang	–	–	.02	-.01	.21	1.0				
Hearing & Lang	–	–	-.01	.06	.23	.49**	1.0			
Interactive Social	–	–	.04	.20	.38*	.16	.10	1.0		
Self-Care Social	–	–	-.13	.05	-.26	-.02	-.12	-.06	1.0	
Cognitive	–	–	.01	.59**	.77**	.23	.17	.56**	-.10	1.0

* p<0.05 **p<0.01 (2-tailed)   – coefficient could not be computed

SGS II Reliability and Validity Studies

Several studies have been undertaken to examine aspects of the reliability and validity of *SGS II*. These include scale consistancy, concurrent validity and construct validity. Scale consistensy determines the extent to which items in the scale are measuring the same thing. Concurrent validity determines the extent to which it can be said that *SGS II* measures the construct it purports to measure; and construct validity determines the extent to which scores on *SGS II* correlate from other scores from other established tests measuring the same construct.

The results of the concurrent validity study and the Denver construct validity study can be found in the Appendix.

Conclusion

The *Schedule of Growing Skills* was first published by GL Assessment in 1987, and was in need of revision. The restandardization therefore provides the validated up to date information required. Analysis has been carried out to check that the items are in the correct developmental order and the item order has been revised. There are also new items relating to the use of formboards.

The reliability, intercorrelations and age norms for the skill areas, including a cognitive skill area derived from the other areas have been produced. The inter-rater reliability and validity of *SGS II* have also been investigated.

High levels of internal consistency were found for all skill areas. The items identified by the authors as having a cognitive element were also analysed and found to have a very high level of internal consistency, which implies that they do appear to be measuring the same dimension.

The intercorrelations revealed that in general if a child scores high in one area, they are likely to score high in the other skill areas (and vice versa), especially at ages of three years and under.

The updated information supports *SGS* as a fast and flexible method of measuring child development, which can be used by NHS trusts as part of their child health surveillance programs.

Further Screening Procedures

Screening for Hearing, Vision, Speech and Language Problems and Motor Impairment

The skill areas of the *Schedule of Growing Skills* demand some further comment: we would like to stress that *SGS* does not (and, we believe, should not) try to provide a comprehensive screen for developmental disability. Two aspects of these crucial skills must be screened in any effective programme of developmental screening: the *cognitive* dimension (how a child interprets stimuli) and the *functional* dimension (whether the mechanisms that receive the stimuli actually work). The *Schedule of Growing Skills* areas dealing with hearing and vision mostly test the cognitive dimension, and should not be interpreted as comprehensive tests of function. Thus, examination of eyes for cataracts and squint, and examination of ears for wax and foreign bodies should be included in any other screening.

Why are the areas covering two such important skills incomplete? Our reasons for this arrangement relate to the nature of vision and hearing, and the use for which *SGS* is intended. A full assessment of vision, hearing and speech takes a long time. It also demands specialist knowledge and skills which are not usually included in the training of those who generally undertake developmental assessment or screening. In addition, the incidence of problems within these areas is very high among pre-school children.

Many health districts recognize the special nature of these two areas and provide separate screening and assessment services in vision and hearing

alongside developmental screening. Specialists using detailed assessments often carry out in depth examination of the functional aspects of these two areas. The *Schedule of Growing Skills* has been designed both to stand alongside existing district specialist screening programmes and to help districts develop new focused hearing and vision screening policies that incorporate *SGS*.

The 'Speech and language skills' area of *SGS* must also be set in the context of existing district policy. Unlike the 'Visual skills' and 'Hearing and language skills' areas, the 'Speech and language skills' area can be used very effectively to screen for speech and language problems, but due to the complexity and high incidence of such problems among young children districts may already have a more detailed assessment policy in this area.

In this chapter we look at some factors that a district must bear in mind when planning separate screening for hearing, vision, speech and language. It would be impossible to deal in any depth with these subjects in such a short space. However we hope our comments on classification, incidence, identification, treatment and district policy will help purchasers, providers and clinical personnel develop a coherent, overall screening policy.

Hearing

The importance of hearing to the full development of any human individual is obvious. Hearing is crucial to speech and language, which in turn are essential for normal social existence. The development of communication by spoken language is dependent on the quality of hearing during infancy, and children who are born profoundly deaf are unlikely to be normal in that respect. Lesser degrees of hearing impairment are also associated with delayed language development. It is logical that children learn to speak by listening, and that if this process is hindered in any way, then listening skills and speech production will be inhibited.

Classification

Conductive Hearing Loss

The most common cause of deafness in young children is interference with the mechanical passage of sound waves through the middle ear. Under normal circumstances, sound transmission is achieved by conduction from the ear drum along the ossicular chain, which is suspended in the air-filled middle ear cavity. If this cavity becomes filled with fluid, the vibrations of the ossicles are damped down and the sound wave energy is absorbed before it reaches the inner ear. The aeration of the middle ear depends upon a patent eustachian tube and in young children this easily becomes blocked (for a variety of reasons including large adenoids, cleft palate, allergies and frequent upper respiratory tract infections). This results in absorption of the air, which is replaced by secreted fluid (glue ear, secretory otitis media). The disorder is frequently bilateral and causes a hearing loss of up to 45 decibels. Since this is at the sound level of normal conversation, the development of speech and language through listening may be delayed in affected children. On rare occasions, conductive deafness is due to anatomical abnormality or absence of the middle ear structures (such as Treacher–Collins Syndrome) or atresia of the external auditory canal.

Sensori-neural Hearing Loss

An abnormality in any part of the hearing apparatus in the inner ear or auditory nerve causes deafness. In normal circumstances, sound waves entering the cochlea are transformed into electrical nerve impulses which travel from the cochlea to the auditory cortex in the temporal lobes of the brain. Failure in transmission is caused by structural anomalies of the cochlea, abnormalities of the hair cells or nerve lesions (such as acoustic neuroma). The degree of hearing loss varies from mild to profound, and the effect on speech and language development will vary correspondingly. Sensori-neural hearing loss may be of prenatal origin due to genetic factors (for instance, autosomal recessive inheritance or other syndromes) or intrauterine infection (rubella or CMV). It can also be of perinatal origin (hypoxia or severe jaundice) or postnatal origin following meningitis,

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ototoxic drugs (amino glycoside antibiotics, antineoplastic agents) and mumps. Some cases of genetic deafness may not present until the child is older and thus may appear to be acquired. Rubella and CMV deafness may also follow a similar pattern of progression.

Incidence

A collaborative study carried out in several European countries (Martin and Moore, 1979) found that one in 1000 eight year olds were suffering from a hearing deficit of 50 decibels or more in the better ear. Since most of the children identified suffered from congenital/sensori-neural deafness, it is safe to assume that the above prevalence approximated to the incidence expected in newborn infants. Most hearing impaired children are identified by the age of eight years, whereas estimates of incidence at an earlier age are less efficient: it has been estimated that at the age of three, only 50 per cent of congenital deafness is identified. The incidence of hearing impairment in children of secondary school age is approximately two and a half per cent and eight per cent of these have a sensori-neural deafness (Marttila, 1986).

The incidence of conductive deafness causing lesser degrees of hearing loss is much greater, more frequently due to glue ear. Glue ear occurs in approximately 20 per cent of school age children and up to 30 per cent of children of pre-school age, especially those attending a day nursery (Bluestone *et al*, 1983). In many of these children the disorder is intermittent and, while their language may be within the normal range, further speech difficulties may occur. However five to ten per cent of school children have a conductive hearing loss due to glue ear sufficient to cause language problems.

Identification of Hearing Impairment

Neonatal Screening Tests

As the hearing mechanism is intact and functional at birth, it is possible to assess hearing in a newborn infant. Such testing is not usually carried out until at least two days of age, so that immediate physiological changes

during the perinatal period have a chance to stabilize. The normal behavioural response is a non-specific startle or Moro reaction to a voice or some other sudden noise at a sound level above approximately 65 decibels. A more accurate method of performing a hearing examination on very young infants is by evoked response audiometry which can be carried out fairly easily at this age during natural sleep (Durieux-Smith and Jacobson, 1985). However, this requires complex and expensive apparatus as well as trained technicians and the technique is therefore not practical for population screening. Oto-acoustic emission (cochlear echo) audiometry is an alternative technique during the neonatal period or later, when the infant is asleep. It has been used successfully for detection of deafness in high risk babies and shows promise for universal population screening (Richardson, 1995). The best test varies according to the age of the child. Table 4.1 summarizes the techniques available for use in child health surveillance.

Table 4.1:   Summary of clinical tests of hearing in the pre-school period

Test	Developmental age
Startle reaction to sound (65 dB)	from birth
Stilling to sound (45 dB)	6–16 weeks
Localization (distraction) (35 dB)	7–18 months (18 months)
Speech discrimination tests (pictures or toys)	from 24 months (18 months, use three objects)
Conditioned audiometry (free field)	2–3 years
Pure tone audiometry (headphones)	$3\frac{1}{2}$ years
Audiometry with masking	from 5 years

Localization (Distraction) Testing

While there is debate about the efficacy of all aspects of developmental surveillance, the value of a hearing screening programme for infants aged between seven and nine months using a distraction technique is widely acknowledged.

Localization response shows a developmental progression over a prolonged period. By the age of around two months, the infant will show a stilling response to loud sounds; by four months there may be evidence of localization by deviation of the eyes in the appropriate direction (eye-glide). Soon after the age of four months the head turns towards the sound source. This response becomes fairly consistent by eight months (about 70 per cent at six months and 80 per cent at seven months). A consistent response indicates auditory maturation, that is, the achievement of hearing at 30dB level. This is the basis of the distraction screening test of hearing, which can be carried out reliably over the next four months. Over the age of one year, the child becomes progressively more able to inhibit the obligatory turning response and may turn only on the first presentation of the test sound. A localization test can be performed with care up to a maximum of 18 months of age.

If this test is performed carefully by trained personnel under correct conditions, its sensitivity and specificity is high. The technique is well described in such standard texts as the *STYCAR Hearing Test Manual* (Sheridan, 1976) and in the *Manual of Child Development* (Lingam and Harvey, 1984).

It is important that this screening test is carried out on a population basis and that infants are not *assumed* to have normal hearing on the basis of the development of the usual vocalization pattern. Hearing-impaired infants may vocalize at the usual time and later progress to a form of babbling.

Parental Participation Questionnaire (PPQ)

The most critical observers of child development are often the parents and other relatives. Several methods for using their observations in a structured

way have been devised, for instance in the hearing checklist found in the national *Personal Child Health Record* (*PCHR*) adapted from the initial checklist produced by Lingam and Watkin (1982). These can be a valuable addition to the screening programme, and may be used to identify high-risk groups on whom resources can be particularly concentrated. As mentioned in Chapter 1, parental concerns must be taken seriously.

Conditioned Responses

From the age of about 30 months, children can be conditioned to perform a specific task in response to a specific stimulus. For younger children, an appropriate stimulus is the voice ('go' game test); for older children, a pure tone can be used in the free field or (from the age of approximately 36 months) through headphones into separate ears.

Conditioning audiometry should be introduced as a game, for instance, putting bricks or balls into a bucket, pegs into a board or figures into a boat. The child is first taught to perform the task with much visual reinforcement; this is gradually withdrawn until the child carries out the task to the sound stimulus only. Loudness is progressively reduced until the minimum threshold is found. Using the voice, conditioned responses can be obtained down to 30 decibels at an age of 30 months and with a free field audiometer down to 15 decibels at 34 months (Thompson and Weber, 1974).

Speech Discrimination Tests

1. Toys or picture tests

More subtle abnormalities of hearing or speech can be detected by testing the child's ability to identify known objects when they are named by the tester. The objects used should be selected to test discrimination for certain sound patterns, and several structured approaches have been described (the Kendall/McCormick toy tests, for example). These tests are applicable as soon as the child is reliably capable of identifying common objects, that is, at approximately two years of age. From about three years of age pictures can be used instead of toys.

2. Word test

For older children, of school age, defined word lists are available (such as the Manchester Junior/Boothroyd). These are spoken by the examiner, who is out of the child's direct sight. The whole list must be completed, and the number of words correctly repeated by the child is scored by an assistant. By occluding ears separately, hearing ability can be assessed for each ear.

All the above screening tests should be performed under carefully controlled and monitored conditions and the staff performing them must be properly trained. It is important that sound level meters are available, so that staff can check the intensity of their test sounds and that hearing threshold levels can be identified if appropriate. Staff performing the test should have normal hearing themselves.

While primary early screening as described above is essential if hearing loss is to be identified in the community, the use of such a programme can be effective only if there are suitable secondary care services for dealing *quickly* with children found to be abnormal. These may be run as an integral part of the community service, in a hospital based audiology unit or in special advisory clinics run by specially trained community paediatricians.

Treatment

Deafness during the pre-school period may seriously delay speech and language development. The outlook for a child with an untreated hearing impairment depends upon several factors:

Severity

If the degree of deafness is very severe (over 60 decibels) and the child cannot hear any speech, then there is little chance of oral language developing. If the hearing threshold is better than 40 decibels, some speech can be heard and language will develop but its quality may be affected.

Age of Onset

Deafness acquired after the early stages of language development (three years) has a less serious effect than a congenital deafness or one occurring before this time.

Duration

Intermittent deafness (as in some cases of glue ear) is compatible with good speech development if there are *long* periods of good hearing in between. Persistent deafness from any cause is likely to cause problems.

Other Disabilities

Children suffering from deafness have a higher than normal incidence of other disabilities (including visual impairment, cerebral palsy and congenital abnormalities). The presence of these disabilities causes additional disadvantage and the need for effective treatment of the deafness is even greater.

Intelligence

A child with low intelligence will be unable to cope with a hearing impairment as well as one of average, or above average, intelligence, and therapy is less likely to be successful.

Family Support

Any child's greatest helpers should be the parents and other close family members. If these are non-compliant for any reason, a child's progress will probably be inhibited.

Audiological Services

The management of deaf children is very complex and requires a high level of expertise. Children should be referred to specialist paediatric audiology centres if possible. Hearing aids can be fitted to a very young baby; and the earlier they are fitted the better.

Children identified as having *any* degree of hearing impairment (according to the local policy for review or referral) should be assessed in an audiology unit. Management will depend on the diagnosis made, and some examples are given below.

Intermittent Glue Ear

If speech and language are progressing well the child should be reviewed by the audiologist regularly. Deterioration will probably prompt referral to an ENT surgeon. Tympanometry and audiometry may be used for monitoring progress.

Persistent Glue Ear

The child should be referred to a paediatrician or an ENT surgeon, who may consider medical treatment or surgical management which may consist of myringotomy, aspiration of middle ear fluid and insertion of grommets to maintain ventilation of the middle ear. If the adenoids are enlarged it is often beneficial to remove them. It has been found that children with Down's Syndrome are more susceptible to glue ear.

Congenital Conductive Hearing Loss

Congenital conductive hearing loss due to abnormalities of the middle ear require fitting of hearing aids, special educational help, and speech and language therapy at a very young age, and some children may need reconstructive surgery.

Sensori-neural Hearing Loss

Treatment is always by sound amplification with hearing aids. Modern electronic aids are very sophisticated, and require expert fitting and management by a specialist team of paediatric audiologists, technicians, teachers of the deaf and speech and language therapists. Usually two ear-level aids are best, and they should be worn from as young an age as possible for the maximum time during the day. Audiological rehabilitation is always required when hearing aids are prescribed, as even the best cannot reproduce normal hearing.

A District Policy for the Screening of Hearing

The 'Hearing and language skills' area of the *Schedule of Growing Skills II* (Items 90 to 92) provides a test of hearing *function* that should act as an appropriate check for the routine eight-weeks examination. However, *SGS II* does *not* include a test of hearing function suitable for older children. The 'Comprehension' items (93 to 110) test only the *cognitive* aspects of hearing and are *not* a hearing test.

If the hearing mechanism is to be screened, this must be done as a separate routine performed along the lines described above (Bellman, 1986). The personnel who perform specific hearing tests must be trained by, and cooperate closely with, the audiology unit that will provide secondary back-up. The district should run regular retraining courses for updating those involved in hearing testing. Such courses also provide opportunities for monitoring the hearing of the testers.

Vision

The development of the visual cortical architecture of the brain depends on normal receipt of visual stimuli from the retinae (Blakemore and Hawken, 1982). It follows that if the reception or transmission of these stimuli from the eyes is deficient during the early stages of postnatal development, when the infant is experiencing a visual environment for the first time, then the visual cortex may not be perfectly formed. Any resultant impairment of vision will probably be permanent unless the peripheral defect is quickly corrected.

Acknowledgement of this crucial early stage of visual development has led to recognition of the need for early detection of ocular abnormalities and the introduction of appropriate screening methods. These should be applied to *all* infants, as visual impairment can be difficult to detect unless a systematic approach is adopted. Totally blind infants have roving eye movements from the neonatal period and as they become more competent in interpreting clues from other sensory stimuli, may fixate on objects and faces and show a following response. This mimicry of the normal pattern of visual development may be misinterpreted unless specific tests are done.

Classification

The most common type of visual abnormality in young children affects one eye only, resulting in an inequality of the images received by the visual cortex. Each half of the retina of each eye sends stimuli via the optic pathways to the contralateral occipital cortex, where the images are interpreted. If the peripheral vision apparatus in the globe of the eyes is normal and identical, then these images will be perfectly superimposed. Because of the separation of the two eyes, there is a slight parallax difference in the images. The brain learns to interpret this to produce stereoscopic or binocular vision.

Amblyopia

Any difference between the two eyes that causes a significant variation in the images produced at the cortical level results in an inability to fuse the images satisfactorily. This situation cannot be tolerated by the brain, and the weaker image will be suppressed. If this continues, vision in the weak eye will become progressively worse and may in effect be lost. This results in amblyopia (or a 'lazy' eye) and an absence of binocular vision (van Noorden, 1976). A number of unilateral abnormalities may cause amblyopia:

Refractive errors cause imperfect focusing of the visual image on the retina, resulting in blurred vision. Such errors occur in four main ways:

- hypermetropia, where the eyeball is too short, resulting in long sight. Minor problems of this nature may be overcome in infancy, and may not require intervention;
- myopia, where the eyeball is too long, resulting in short sight. This is uncommon in the pre-school period. Where it does occur there is often a positive family history;
- astigmatism, where the cornea and lens have asymmetrical curvatures in the horizontal and vertical planes. Thus the image cannot be focused in both these planes simultaneously;

- anisometropia, where the strength of refraction of the cornea and lens is unequal between the two eyes.

Ocular abnormality causes impairment of the visual sensory impulses transmitted to the cortex. The abnormality must be fairly severe to result in amblyopia, and may be due to cataract, retinopathy, atrophy of the optic nerve, or corneal opacity.

Squint (strabismus) has several possible causes:

- the most frequent cause in young children is one of the above refractive errors. These usually produce an alternating convergent squint;
- the second commonest cause of squint is a neurological abnormality, causing weakness of the extra ocular muscles. This may be due to cranial nerve palsy or myopathy. The squint is usually non-alternating, and may be divergent or convergent;
- squints are rarely caused by an ocular abnormality, as above.

Amblyopia is the end result of these disorders, and is likely to be permanent if the underlying abnormality is not corrected within the first few years of life. If the abnormality (for example, squint) is not corrected by 5–7 years, the amblyopia that develops may be permanent. Thus, if parents report squint, referral to an orthoptist is mandatory. Intervention depends upon accurate identification, which is difficult at a young uncooperative age – particularly as approximately half the cases are not associated with an overt squint.

Bilateral Vision Abnormalities

Refractive errors and squints may affect both eyes. In the former case, the brain will receive no sharply focused image. Visual acuity when both eyes are tested together will therefore be poor. The 'masking' effect of a 'single good eye' is eliminated, and the chance of early identification with relatively simple techniques is increased. This should then lead to appropriate ophthalmological assessment and treatment.

One would expect that a defect in both eyes must necessarily be worse than if it was present only in one. This is certainly true in the case of refractive errors, but is the reverse for squints. When squints are present in both eyes, the usual effect is that fixation varies between the two eyes and the image received from the non-fixating eye is disregarded by the brain. In the rare case of alternating squint, the visual cortex in both hemispheres is used and may develop well. If the squint is corrected, early binocular vision should be easily established.

Colour Blindness

Colour blindness is a sex-linked recessive genetic disorder, affecting only males, but transmitted by female carriers. It usually has little practical significance, but boys who are affected should be given careers guidance advising them against those jobs which require accurate colour matching (such as colour printing). They are ineligible to become pilots, train drivers or policemen.

Other Visual Abnormalities

Genetic blindness accounts for approximately 45 per cent of visual impairment in children. In such cases, the onset of the impairment occurs in later childhood: vision is good during the pre-school period. The most frequent pathology is retinal degeneration. Visual impairment due to albinism is present from birth.

Congenital blindness due to intrauterine infection, cataracts, malformations and retinoblastoma is relatively rare, but should be identified as early as possible (at the neonatal or eight-weeks examination) for the best chance of treatment.

Incidence

The Vernon Report (Vernon, 1972) found that in the school population the number of pupils known to be blind was 1.37 per 10,000, and the number of partially-sighted pupils was 2.66 per 10,000.

Squints are common and are present in approximately 10 per cent of children in the first three years of life, and in seven per cent of five year olds at the school entry examination. A minority of children of this age can be successfully treated; amblyopia is present in roughly four per cent of the general population.

Colour blindness occurs in approximately 10 per cent of schoolboys as detected at the routine school entry examination. In half of these the defect is trivial, causing only a mild defect of red/green discrimination.

Identification

At the neonatal examination the gross anatomy of the eyes should be checked and the 'red reflex' elicited by fundoscopy. At the routine eight-weeks examination, the above procedures should be repeated. Evidence of normal visual function should be sought by asking the parents if the child looks at the mother's face, and by attempting to get the child to fixate on a torch light or a bright object. The eyes should be examined for nystagmus, as this may indicate visual loss.

Detection of Squint

Each half of the retina sends stimuli to the contralateral visual cortex where the images are interpreted, and this process of combining the respective images produces binocular vision. For the images to be fused effectively, they must be perfectly aligned: if, for some reason, the alignment is incorrect then one or other image will be suppressed.

The commonest cause of non-fusion of the cortical images is a corresponding non-alignment of the eyes due to strabismus. This is relatively common in infancy, and is often due to imbalance in the control of the extra orbital muscles. Other causes of imperfect symmetry of cortical visual images include refractive and astigmatic errors.

The latter causes of defective binocular vision are difficult to detect in infancy, but frank strabismus can be identified by careful observation.

Corneal light reflection (Hirschburg) test

This very simple technique can be used from an early age and is often done at about seven to nine months, at the same time as a localization (distraction) hearing test is performed. If a squint can be treated by the age of nine months, it is possible that permanent loss of binocular vision can be prevented. Treatment at this age usually involves simple measures such as eye patching, and requires referral and assessment in an orthoptic or ophthalmology department.

The technique of performing a corneal reflection test is described in the *Manual of Child Development* (Lingam and Harvey). Babies under six months might have intermittent (but not permanent) squint due to change in visual acuity. However, if the corneal reflection is asymmetrical, a cover test should be done (or referral to an orthoptist recommended).

Cover test

The earlier a squint is identified and treated, the greater the chance of restoring binocular vision. It is, however, worth attempting to find new cases up to approximately three to four years of age: in skilled hands, a cover test is applicable from the age of about one year. It should be done in all children if the corneal reflection is *not* symmetrical. After a period of training it can be performed by primary care health personnel, but its sensitivity and specificity at a young age is poor, since it is more difficult to administer at that time. Therefore, its use by health visitors, GPs and community paediatricians is probably better restricted to older children who can cooperate with the test. These tests are therefore best done by an orthoptist.

Identification of Problems of Vision

There is a debate about the efficacy of tests of visual function or acuity at an early age, and techniques should be kept as simple as possible.

■ *'Hundreds and thousands'*

Observing whether an infant can accurately pick up, finger- or eye-point to a single sugar strand (size 2 millimetres) is a good test of gross visual competence (function). At 6–8 months use a raisin, as only by one year will the baby be able to see hundreds and thousands.

■ *Fixed balls*

A rough idea of the degree of distant vision can be obtained in children of approximately 18 months and above using the *STYCAR* Graded Mounted Balls. The child should clearly respond to presentation of balls down to a size of an eighth of an inch (3 millimetres) diameter. This is also *not* a test of visual acuity but visual function.

■ *Miniature toys*

The *STYCAR* Miniature Toys test can be used to give an approximate assessment of visual acuity in children aged between two and three years. It is important that the specific *STYCAR* equipment is used, as this has been standardized for size, and that the test is done at the correct distance (three metres).

■ *Single letter tests*

By the age of three years, many children can recognize letters or at least identify them by matching the shape on a key card. At this age the *STYCAR* Five Letter test is appropriate, and by five years the Seven Letter test can be used. These tests allow assessment of distant vision according to conventional standards, and it must be recognized that before they can be performed visual acuity can only be roughly estimated. A similar technique can be used to assess near vision. However, it is known that this single optotype test (one letter in one card) overestimates visual acuity. This is due to lack of the crowding phenomenon present in the 'gold standard' Snellen test.

STYCAR tests are single optotype tests and they are useful if a child is unable to do the Snellen test and the practitioner needs information about the child's visual acuity.

From the age of three years, many children will tolerate occlusion of one eye with a soft adhesive translucent patch or with a wooden spoon or tissues, and this should always be attempted in order to test each eye separately for the presence of amblyopia.

■ *Linear chart letter tests* (Snellen linear optotypes)

It has been suggested that single letters may have a low sensitivity for amblyopia. This can be improved by the use of a linear chart, which is particularly useful for detection of poor visual acuity due to astigmatism (Simons, 1983). The Distant Vision letter Card (form B) as supplied is best for children of more than five years old; between the ages of three and five years appropriate tests are the 9 Letter Key Card (as supplied), the linear optotype picture vision tests chart (Lingam, 1992, available from the Association for the Prevention of Disabilities), or the Sonksen–Silver Acuity System (Salt *et al*, 1995).

The number of children able to cooperate with letter tests can be considerably increased if the child is given a card (or pictures) with which to identify the letters shown instead of a key card. Using this technique, approximately three-quarters of three year old children can be successfully tested, compared with about one half using a key card; even at 30 months, approximately one third will cooperate. The subject of visual acuity testing in pre-school children was reviewed comprehensively by Sonksen (1993).

Treatment

The earlier visual abnormalities are detected and appropriate treatment started, the greater the chance of ensuring good vision. Major anomalies of the eye, such as colobomata or cataracts, and severe visual impairment should be identified at the neonatal examination, and certainly at the six/eight weeks check. Such children should be referred to an ophthalmic surgeon for further assessment, which may include clinical and electrophysiological investigations. Treatment at a very young age can be offered by microsurgical techniques, such as cataract extraction. Refractive abnormalities can be corrected with contact lenses.

Treatment of squints aims for good visual function and cosmetic appearance. Unless the child is efficiently treated by the age of about seven years, it is doubtful whether good binocular vision will be achieved. Referral should be to an orthoptist, or an ophthalmologist supported by an orthoptic department where refraction can be carried out to determine the degree of correction needed. Therapy consists of prescription of glasses to correct the abnormality in the affected eye, so that the image produced at the visual cortex is accepted. The use of this image is reinforced by patching of the 'good' eye. Surgery can be performed later, when the acuity is improved.

Visual impairments without squint are treated by spectacles which can be worn from a very young age (about one year) or contact lenses. Families of children with genetic visual disorders should be offered genetic counselling after definitive diagnosis.

The Vernon Report (Vernon, 1972) and a report of a working party of the British Paediatric Association and College of Ophthalmologists (1995) recommended that teams consisting of community doctors, paediatricians, ophthalmologists, social workers, educational psychologists and specialist teachers should be set up to coordinate the assessment and medical and educational care of visually handicapped children. These children often have complex special needs and associated medical handicaps which are best managed cooperatively by multidisciplinary visual assessment teams (Hill *et al*, 1986).

A Trust Policy for Vision Screening

In the *Schedule of Growing Skills*, the 'Visual skills' field contains items relevant to the development of vision. These items, however, are more concerned with the *cognition* and *interpretation* of vision than with the efficacy and normality of the visual mechanism itself. Hence it is essential that an independent test of vision is carried out, according to a policy devised by the appropriate trust team. Such a policy will specify that the testing of visual function will be supplementary to the use of a developmental surveillance programme. It is worth noting that some trusts

are devising visual function screening programmes involving orthoptists for some or all of the procedures.

Speech

Verbal communication is one of the most complex of human activities, relying as it does on a series of interrelated skills and behaviours. Before discussing the problems that may occur, it is useful to look at the normal speech and language pathway as shown in Figure 4.1 (taken from Reynell, 1985). To achieve normal verbal language development, all these stages need to be developmentally and experientially intact.

Figure 4.1: The verbal communication pathway (Reynell, 1985)

Experience of language
Children need to be spoken to ⟵ and communicated with in order to develop speech and language skills.

Opportunity for verbal expression
The environment should provide a good stimulus for communication.

Hearing for speech
The hearing mechanism must be intact in order to receive and process incoming auditory stimuli.

Articulated speech
For the message to be understood the correct sounds must be selected and articulated.

Receptive language/verbal comprehension
The child must be able to 'decode' and attach meaning to incoming messages in order to respond appropriately (and develop listening skills).

Expressive language
The message to be expressed needs to be encoded into words and sequences of words which are developmentally appropriate.

Concept formation
The new message may be modified by past concepts or past concepts modified by new messages. The stage where language and thought meet.

Classification

There are numerous ways of classifying speech and language problems. The classification system described below is based on one devised at the Central Birmingham Health Authority Speech Therapy Department (Green and Russell, 1986). More comprehensive systems have been devised by Crystal (1980) and Byers Brown (1981).

Language Delay or Disorder

A language *delay* is indicated if a child is developing language normally but not at a rate appropriate to chronological age. A language *disorder* is indicated if the child's language development is not following a normal pattern. There may be gaps or mismatch of different language areas. In addition, language delay or disorder can be further classified on a functional basis into problems of receptive and expressive language (see the speech and language pathway illustrated in Figure 4.1).

A child's language problem can thus be classified in one of the following ways:

- receptive language delay;
- expressive language delay;
- receptive language disorder;
- expressive language disorder.

Commonly, a child has a mixed receptive and expressive delay or disorder.

Presence of receptive and severe expressive language disorder is a cardinal feature of the childhood autism spectrum.

On a linguistic basis language disorders can be classified into:

- semantic disorders – affecting the meaning of words;
- pragmatic disorders – affecting the social use of language;
- semantic-pragmatic disorder – when the child talks fluently but the content is inappropriate and meaningless. This overlaps with Asperger's syndrome, which is a type of high level autism in which social and imaginative functions are affected more than language.

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Phonological Delay or disorder

A phonological delay is indicated when the speech sound system a child is using does not match the level appropriate to chronological age, but is otherwise developing along a normal pattern. The child with a phonological disorder has a speech sound system which does not follow the normal development pattern.

Articulation Disorder

Some children are unable to produce specific speech sounds even though they may be aware of the rules of the sound system. This may be due to a structural problem (cleft palate, for example), to a neuromuscular problem (such as cerebral palsy), or, more frequently, to an unknown cause.

Dysfluency or Stammer

Byrne (1984) defined stammering as 'speech which is hesitant, stumbling, tense or jerky to the extent that it causes anxiety to the speaker and/or listener'. Approximately five per cent of children go through a phase of hesitating or repeating words as part of their normal language development. This becomes a problem if it persists or causes anxiety to the child or parent. It is persistent in about one per cent of children.

It should be remembered that any of the above classifications may occur together, for example:

■ a child may have a disorder that affects the receptive, expressive, and phonological areas of language;

■ a child with a cleft palate may also have a language disorder in addition to, or instead of, an articulatory disability.

Incidence

A major study conducted in Dundee by Drillien and Drummond (1983) found that of all pre-school neuro-developmental disabilities, speech and language disorders comprised the largest group. They gave an incidence of

5.6 per cent for identified speech disorders in pre-school children between two years of age and the age of school entry. Moderately severe or severe speech disorders were identified as being highly likely to pose difficulties at school entry in one per cent of the pre-school population (aged two years and above).

In the context of this discussion on the value of developmental screening, it is interesting to note that Drillien and Drummond (ibid) found that 29 per cent of the referrals to the hospital speech therapy department came from their screening programme and an additional 17 per cent from the community health doctors.

Identification

Screening for the identification of problems of speech and language is not as closely defined as that for vision and hearing. Yet speech and language screening is as potentially valuable for a child's future well-being as screening in other areas.

A district may decide to screen for speech and language problems in one of two ways:

1. As part of a total screening service offered by the district. The *Schedule of Growing Skills* fits into this category, as it provides a method of screening for speech and language problems for all children from birth to the age of five years.

2. By using a specific language screening test for example, *Reynell Developmental Language Scales* or guidelines for referral to speech therapy. At present, many of the screening tests have been devised locally by speech therapy departments. Speech therapists can then train health visitors, doctors and teachers to screen effectively.

Treatment

There is no prescribed method of treating children with speech and language problems, as each child will have an individual therapy programme devised by a speech and language therapist based on his or her needs and problems.

The type and frequency of therapy provided is at the discretion of the speech and language therapists involved and depends upon the client's needs and the resources available. Some of the options for speech and language therapists are:

Direct Intervention

This may be on a monthly, weekly or daily basis, in a one-to-one or group setting.

Indirect Intervention

This consists of advice to parents, nurseries, and home teachers about speech therapy for an individual child, with subsequent review.

Language Programme

The introduction of a language programme such as *Living Language* (Locke, 1985) or the *Derbyshire Language Scheme* (Knowles and Masidlover, 1980) into the daily curriculum of nurseries or other pre-school settings. The programme may be carried out by teachers or nursery nurses, with the guidance and support of a visiting speech therapist.

Policy for Speech and Language Screening

A total screening service will need to incorporate a speech and language screening system into the service. The *Schedule of Growing Skills* will meet the requirements of such a district, as the 'Speech and language' section provides an effective screen of these skills. If the *SGS* is being used, there is no need to implement any additional speech and language screening. Some districts, however, may already have established a speech and language screening policy that they may wish to maintain. If this is the case, the 'Speech and language skills' section of the *SGS* can either be omitted or be used to supplement existing services.

Gross Motor Development

Movements

Intrauterine movements begin at the post conception age of 12 to 14 weeks. A pregnant mother would be able to notice the generalized wriggling movements of the fetus at this age. From then onwards intrauterine movements become more marked, and two separate types, impulsive and responsive movements, can be noticed by the mother.

Impulsive movements

These are spontaneous movements; usually kicking that mothers can feel. Impulsive movements are weak in babies with chronic spinal muscular atrophy, myotonic dystrophy and other muscle disorders such as congenital muscular dystrophy.

Responsive movements

These are kicking movements which are felt in response to specific stimuli, for example, music. The baby can kick (even in a good rhythm) in response to music.

After 34 weeks, a baby's well-being is judged by "kick charts", with the implication that a baby who kicks well in the womb is healthy. We have seen babies who have stopped kicking *in utero* when the mother has had infections, and have been able to prove that fetal viral encephalitis *in utero* due to mumps or herpes virus can cause diminished fetal movements (Lyen, Lingam and Marshall, 1981).

Motor reflexes

After birth, babies can be tested for several reflexes – described as **primary or primitive** reflexes. They are present from 34 weeks and disappear in the first year of life.

Primary (Primitive) Reflexes

Moro reflex

This refers to a sequence of identical postural reactions (which are described in decerebrate or decorticate quadrupeds). The Moro originates in the subcortical level and is obtainable in anencephalics; it is a repertoire of automatic reactions. The presence of this reflex indicates functional integrity of the nervous system and also shows maturity; it is usually not seen in preterm babies under 32 weeks.

The Moro is elicited by a controlled head drop. The reflex afferent originates in the back of the neck, which is stretched by the drop.

Method: The head is held on the palm, as shown in Figure 4.2, and lifted 5 to 7cm above the bed or a smooth surface. The hand is lowered to elicit a slight extension of the neck.

Normal response: Abduction and extension of the arms with fingers spreading, then circumduction and flexion of arms with finger closure is the usual response.

Note: Present from 36 weeks gestation (preterm) to 4 months; becomes weak by 5 to 6 months and disappears at 6 months. Persistence beyond four months is abnormal – usually seen in children with central motor deficit (cerebral palsy and other degenerative conditions).

Figure 4.2: Testing for Moro reflex
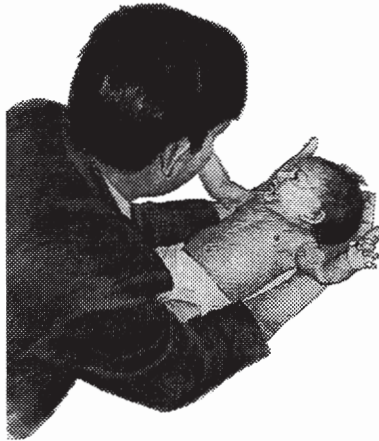
Placing reaction

Method: The baby is suspended upright by holding under the axillae. The baby's position would show flexion of both legs. In this position, the dorsum of the forefoot is gently touched against an obstacle such as the edge of a table or bed.

Normal response: The baby steps up smartly over the obstacle.

Note: Minor asymmetry is often present.

Automatic walking or primary stepping/primary walking

Method: The baby is suspended upright by holding under the axillae (as in the placing reaction) and gently placed on the surface. Then the baby is leant forward slightly (with the neck slightly in extension if necessary to initiate the movement).

Normal response: The baby walks automatically – movement is by unilateral extension thrust. The strides are of large amplitudes; minor scissoring is normal at this age.

Note: Automatic walking usually disappears by 4 weeks (however, it can be elicited in older infants up to 11 months by extending the neck).

Neck traction

Method: Pull to sit manually. Whilst the baby is in supine position, head in midline, the baby is grasped by the hands, and gently pulled forwards and upwards.

Normal response: Flexion of the arms and neck, with mild head lag. The head is often held vertical for a second or so and may flop forward.

Ventral suspension

Method: The baby is supported in the supine position with both hands held under the chest and/or abdomen (although it can be done with one hand – held on the palm).

Normal response: The baby's head droops a little (by force of gravity); the legs are slightly flexed in the hips and knees.

Note: Floppy infants shows a rag doll posture: head flexed and the legs in extension at knee (and hips). Hyperextension of the head at this age is abnormal, and suggests extensor hypertonus. By 6 weeks the head should be in line with the spine.

Figure 4.3: **The baby is held in ventral suspension with both hands under the chest.**
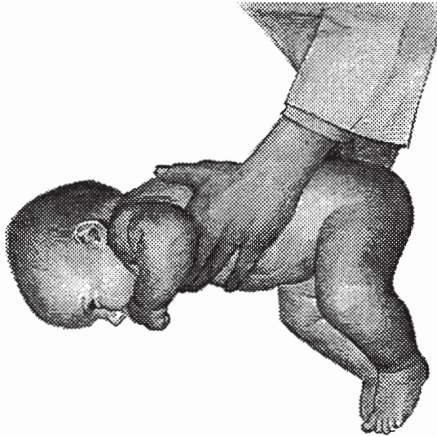
Galant's reflex (trunk incurvation)

Method: The baby is held in ventral suspension (see above) or the baby is placed prone on a flat surface. The examiner runs the index or little finger down the paravertebral area on one side.

Normal response: Curving of the spine and swinging of the trunk towards the stimulated side.

Note: Very preterm infants show this response. It disappears by 12 months.

Rooting and sucking reflex

Method: a) The examiner touches firmly (but lightly) the corner of the baby's mouth.
                              b) The finger tip is then introduced into the mouth (to touch the tip of the tongue).

Normal response: Rooting reflex – the head turns to bring the mouth onwards the finger. Sucking reflex – the baby sucks vigorously.

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Note: Rooting persists up to 4 months; in neurologically
                   abnormal children it can persist for longer or reappear.

Secondary Reflexes

The primitive reflexes disappear as more complex and permanent reactions
– the secondary reactions – appear. These reactions are concerned with the
orientation of the baby in space. Decorticate quadrupeds also show these
secondary reactions. Secondary reactions are concerned with posture,
balance, and protection from falling. They appear gradually and persist
throughout life. There are many secondary reactions:

Sideways parachute reactions

Method: The child is sat on the floor with support at the waist
                   level and suddenly tipped to one side.

Normal response: The arm on the side of the tilt extends with fingers
                   opened and spread out (saving reaction).

Note: Appears between 4 and 6 months.

Downward parachute

Method: The baby is held under the axillae, usually facing the
                   examiner (as shown in Figure 4.4) and raised above the
                   bed or couch (or floor) to a distance of 20cm or so. The
                   baby is suddenly brought down to a flat surface (holding
                   the baby throughout).

Normal response: Baby lands on both feet (sometimes tip-toe). The legs are
                   spread apart and the knees straight.

Note: Scissoring is abnormal (indicates spasticity). Asymmetry
                   may be due to involvement of one side. Persistent tip-
                   toeing is unusual and might also indicate spasticity.
                   Downward parachute appears between 4 and 6 months
                   of age.

Figure 4.4: The baby is held under the axillae in downward parachute, facing the examiner.

Forward parachute

Method: The baby is held as in ventral suspension – with both hands under the chest in prone position (see Figure 4.3). Then the baby is moved quickly head first downwards. The baby would need to have a surface to land on, for example the floor, or a bed.

Normal response: Extension of the baby's arms with spreading of the fingers. The arms are usually spread outwards and are symmetrical.

Note: Asymmetry is seen in hemiplegia; in children with spastic quadriplegia it is abnormal with no spreading of the arms and hands fisted. It is present in blind babies too. Forward parachute appears about three months after downward parachute at 7 to 9 months.

Motor Milestones

These are considered universal milestones of development, that is, they do not depend on ethnic origin or culture (culture–free). As a rule, children of African and Asian origin attain motor milestones a little earlier; the reason for this is not clear. They often walk by 8 to 9 months.

Development of motor milestones are particularly dependent on myelination; thus babies and infants with delayed myelination are slow developers of motor milestones and are floppy on neurological examination. Children with cerebral palsy, or other causes of spasticity such as inborn errors of metabolism, and those with chronical spinal muscular atrophy or myopathic disorders have "abnormal" locomotion and motor development. Children with joint laxity and hyperextensible joints also achieve motor milestones late. They tend to have internal or external rotation of the hips and flat feet, and so may appear clumsy.

Development of Sitting and Locomotion

The following table shows variations found in motor development. Often there is a family history of such variation:

Table 4.2:   Variations in motor development

Crawlers	83%	This is the 'normal' variation. These infants roll, sit, crawl, stand and walk.
Stand–walk type	6%	No crawling; move by various means to get to standing.
Shufflers (shuffling type)	9%	These babies are floppy – they move by shuffling (on the bottom in a sitting position). Shows 'sitting on air' on downward parachute.
Creepers (creeping type)	1%	These babies are also hypotonic but are not weak.
Rollers (rolling type)	1%	These babies are also hypotonic but are not weak.

Motor Development of Preterm Babies

Ex utero development of preterm babies occurs at a different rate. The exact course of this difference is not known; it may be related to nutrition or the rate of myelination. It could be related to free fatty acids which are generally lacking in most formula milks but present in breast milk. (It is possible to change milk formulae for those preterm infants on formula milk. This is because all milks have different added vitamins, antioxidants, free fatty acids, amino acids and other growth promoting factors – such as taurine and minerals. There is no practical advantage in giving the same milk time after time!)

The development of preterm babies in the first year should be assessed as **corrected age** by giving a full allowance for preterm birth. After one year correction is not required.

Table 4.3: Achievement of motor milestones according to gestational age (mean age in months from birth)

Gestation Birth (weeks)	Sit	Get to sit	Crawl	Stand	Walk
24	10	13	15.75	18	21.25
25	9.75	12.5	15.0	17.25	20.50
26	9.5	12.0	14.25	16.5	19.25
27	9.0	11.5	13.75	15.5	19.0
28	8.25	11.0	13.0	14.75	18.50
29	8.25	10.5	12.25	14.25	17.25
30	8.0	10.0	11.25	13.5	17.25
31	7.25	9.5	11.5	3.0	16.25
32	7.5	9.25	11.0	12.5	16.0
33	7.25	8.25	10.5	12.0	15.50
34	7.0	8.5	10.0	11.5	15.25
35	6.75	8.25	9.75	11.0	14.75
36	6.5	8.0	9.25	10.25	14.25

(Acknowledgement: Data from Dr Peter Robson's work).

Training and Implementation Issues

The Importance of Training

The efficacy of any procedure is directly related to the expertise of the practitioners undertaking it. It is therefore crucial that they are all adequately trained.

The organization of in-service training is the responsibility of individual provider units and departments. However, careful training is one of the most important ingredients for the successful use of the *Schedule of Growing Skills*; furthermore, this chapter sets *SGS* within the context of existing professional training.

'Fit for the Future' (Court, 1976) discussed the overall implications of training in child care:

> *A good system is one in which all know what is required of them and feel that they have been adequately trained for the work they are expected to do. Our proposals for a better service cannot be realized without an extension in training involving children, parents and professionals alike.*

Our own clinical experience and the process of developing, trialling and standardizing *SGS* have emphasized the particular importance of frequent in-service training in child screening. Most professionals wish to keep their clinical skills sharp and recognize the importance of regular up-dating. We wish to set out the rationale and principles for a developmental training programme.

Regular organized in-service training impinges on a programme of developmental screening in a number of ways:

■ Screening makes great demands on the time, knowledge, enthusiasm and energy of the professionals involved. Experience shows that a GP, community paediatrician or health visitor holding screening sessions day after day finds it difficult to maintain consistent standards in the administration, interpretation and decision-making required by the process. In-service training sessions act as refreshers for the busy professional, allowing screening staff to get together and re-establish standards, share problems and re-affirm their commitment and enthusiasm.

■ Within any unit a number of different professionals, with varying qualifications, initial training, backgrounds and interests may be involved in screening. Regular in-service training sessions can iron out any differences and ensure that a unit's screening policy is consistent.

■ As we emphasized in Chapter 2, individual referral decisions must be based on a practitioner's detailed knowledge of local needs and conditions – information which goes far beyond the scope of most initial medical or nursing training. The social make-up of a community changes rapidly and regular training is the only way of passing on such information in a coherent, up-to-date form.

■ The introduction of any new health policy can only be considered complete when it is backed up by training. In this context, training is not a luxury, but an essential part of the process of fruitful change.

If we demand *validity* and *reliability* from the instruments we use, we should expect all judgements made by personnel using them to be rooted in the same two qualities. Frequent training is one method of maintaining the reliability, sensitivity and validity of professional, clinical decision-making.

Training for Health Surveillance and Promotion

Just as screening makes sense only as part of the total process of health surveillance, so training for screening must be seen as part of the wider process of health surveillance training. Purchasers must accept that child health is not cheap. The quality of surveillance depends on the expertise of the professionals involved. Training is an investment in a high quality service aimed at future dividends of good community health.

Training in health surveillance and promotion already exists at national, regional and district levels. The aims of such training can be divided into four main areas: knowledge, skills, attitudes and relationships.

1. Knowledge

   - to recall the major pre-school developmental sequences and the wide range of normal development;
   - to update knowledge on immunization;
   - to study the latest and most effective tests of sensory screening (hearing and vision);
   - to understand the resources available locally to help children and their families;
   - to understand the latest and most evvective treatment for chronic disabling conditions which might affect the emotional, social and intellectual development of children;
   - to realize the overriding influence of health promotion and education;
   - to understand the value of research, evidence-based practice, risk management and audits.

2. Skills

   - to improve techniques in the examination of children, especially with regard to their developmental skills
   - to review and improve communication with parents;

- to appreciate and develop counselling skills;
- to improve the way the parents are told that their child has a disability.

3. Attitudes

- to give due regard to parental views and expertise and to take parental concerns seriously;
- to develop an awareness of our own attitudes towards ethnic minority communities;
- to be aware of our own attitudes towards children and their physical and psychological needs;
- to be aware of our own prejudices in all areas of life that may affect the professional–family relationship.

4. Relationships

- to be aware of all other agencies, both professional and voluntary, involved in the care of children and the support of families, and to fully understand their role;
- to develop relationships with other professionals, so that there is broad agreement in the advice given to parents.

A course encompassing all these aims would meet many of the requirements we have discussed in this manual, from integrated training in developmental screening to consideration of the wider issues that must inform any clinical judgement.

One of the major problems facing any health surveillance course designer is the wide range of professionals attending. We would argue against segregating courses so that they are designed purely for GPs, paediatricians or health visitors. A mix of professionals engenders a fruitful interchange of ideas and approaches, as well as ensuring that practice is consistent across an authority. However, the course organizer must remember that each of these professionals will approach such a course from different starting points.

General Practitioners

Only GPs are equipped to offer the totality of health surveillance and promotion. However, it would be impractical to think that all practitioners would wish to undertake this type of work. Many have other special interests, and no single doctor can have enough time to devote to every specialization in primary care. During the formal vocational training programme for general practice many trainees take a paediatric senior house officer (SHO) post in hospital and/or the community. Those who are trained only in hospital must have at least a half day for community training and should attend a child health promotion/surveillance training course.

The Royal College of General Practitioners (RCGP), in *Healthier Children – Thinking Prevention*, 1982, recommended formal training in paediatrics in four learning situations:

■ junior hospital posts;
■ community health services;
■ training practices;
■ day or half-day release courses.

It also highlighted the special need for training in developmental paediatrics and the early detection of disability. Courses in these areas would give practitioners sufficient confidence to initiate a surveillance programme. In addition, training would need to cover psychological and emotional development in childhood. Finally, the RCGP stressed that GPs must realize the impact of children's needs on practice organization. Thus, easy contact, quick appointments and satisfactory emergency cover should be provided.

GPs who have an interest in health surveillance, but no specific training, can attend in-service training courses relevant to this work. It must be acknowledged, however, that they will not be able to acquire the breadth of training and experience that could have been available if developmental paediatrics had been included in their undergraduate and vocational

training. For future generations of trainee GPs, training in developmental paediatrics must be made available. Day-release courses on more specific topics (such as vision, hearing, speech and language), can be particularly useful – if only for updating.

Most important from our point of view is the necessity for some specific training in the use of a particular screening programme. Many different programmes are already in existence, and some doctors are using them without specific training. We believe that it is important for every professional using a developmental screening test to have appropriate training, so that they are efficient and confident in its use.

Clinical Medical Officers/Staff Grade Community Paediatricians

Community paediatricians are unable to offer total health surveillance, because they are not seen as part of the primary health care team and cannot generally prescribe for current illness. This deficit can be mitigated if they are attached to practices that do not undertake their own screening. The majority of community paediatricians have had considerable in-service or course training in developmental paediatrics and child assessment. If this is so, their training needs at present are:

- training in the use of a specific developmental programme (such as *SGS*), if they are not already specifically trained to use one;
- day-release courses on more specialist aspects of vision, hearing and speech and language development;
- experience in working with a child development team and consultants.

Health Visitors

Health visitors constitute the other major professional group likely to be involved in developmental screening. Their training already equips them for this work, and for some other parts of health surveillance/promotion. In practice, much developmental screening is already undertaken by health visitors (MacFarlane and Pillay, 1984).

Screening programmes are in use in many districts, and there is usually some in-house training before the programme is brought into use. In a few, there are regular updating training sessions, which enable a group of health visitors to meet and test children together, to make sure that their techniques in administering the programme have not slipped by frequent usage. These updating days are frequently used to monitor techniques in testing of hearing, and their extension to the administering of full screening techniques is to be applauded.

Course Design

In our experience, a one-week course, or its equivalent in day-release, is the most time that can be reasonably allocated to health surveillance training. Within these constraints, it is possible to cover the following key topics:

- training in the use of a developmental screening schedule;
- updating on immunization and contraindications;
- health education, with special attention to age-appropriate advice;
- sensory testing: hearing and vision;
- speech and language development: disorder and delay;
- overview of the emotional problems of the pre-school child;
- chronic handicapping conditions;
- the Education Act (1993), The Children's Act (1989), and local implementation;
- local health, educational, voluntary and social service facilities for children/families with special needs;
- nutrition and growth (including use of child growth charts);
- social and environmental factors;
- child protection;
- counselling;
- ethnic minority communities;
- professional attitudes and skills.

Practical sessions are very popular; we have found that parents readily volunteer to bring their children, and many 'book' their place on future courses. There are also excellent videos on child development which can be useful for training and are available from the Association for the Prevention of Disabilities and other sources.

Social Issues

Training must help prospective screeners to understand the national, regional and local factors that affect child health. The health authority should have a district profile available that can provide such information: the contents of training courses will vary, depending on the problems most frequently identified within the authority.

All professionals need to be aware of the ill-effects of poor nutrition and cold, damp housing, especially as increasingly widespread unemployment is placing more families at risk. A medical sociologist's input can be extremely valuable in encouraging professionals to explore these issues.

Especially relevant is the inverse care law which means that families most in need of health care services are least likely to get them. One of the greatest challenges for community child health is to reach the children who do not attend clinics.

Ethnic Minority Communities

It is the responsibility of an individual health authority to make sure that health surveillance and promotion is available to all children. In some areas this will mean that those involved in delivering these services will be responsible for large ethnic minority communities. In order to deliver the same standard of surveillance to all, special training must be given to enable professionals to understand the needs, attitudes and expectations of ethnic minority communities.

Many criticisms are made concerning the validity of screening devices for children from other countries. However, until such time as culture-free screening tests are available we contend that the *Schedule of Growing Skills*

will provide a valuable base-line profile for those who have been working in that community. Professionals should know which skills a certain ethnic minority will be ahead in, and which (due to cultural differences) they may be behind in. Similarly, a professional should know when to adapt a test item according to the culture of a child. For example, item 166 ('eats skilfully with spoon') can be adapted to take the culture of a child into consideration – instead of asking about feeding with a spoon, reference could be made to chopsticks for instance.

Local discussion of Profiles will provide the best basis for deciding appropriate referrals. The basic point is that an equal quality of service and surveillance must be offered to all parents in any health authority.

Training in the Use of the *Schedule of Growing Skills II*

Training for health surveillance is a major issue for providers and health authorities to face. The *Schedule of Growing Skills* is designed to minimize the amount of training needed before it can be used effectively. It will fit in easily with existing authority schemes for child health surveillance training. Professionals who already have experience of using the *STYCAR* sequences, and who are aware of Dr Mary Sheridan's work, will find the *SGS* to be a new view of an old friend. The general approach and many of the specific items will be familiar to GPs, paediatricians and health visitors.

Experience has shown that many districts have nominated trainers or tutors who have great skill in planning training courses. However we have made some detailed suggestions for the content of a *Schedule of Growing Skills* course, based on our experience during its development. In this section, however, we wish to address some of the more general issues raised by training for use of *SGS*.

Delegates and Tutors

Ideally, a mixture of professionals should attend any course, as was stressed earlier in this chapter. Tutors should also be chosen from a variety of

professions, to ensure that all topics can be covered and all questions answered.

Further Training

The role of consultant community paediatricians is still evolving and there is no standard job description. Some are acting as epidemiologists, teachers and researchers, as well as being managerially responsible for the child health services. Others have a large clinical commitment, either with general paediatricians in hospital, in community clinics, or in liaison clinics with GPs. A proportion are involved only with disabled children, responsible for assessment and management. Whichever of these roles has been adopted, the community paediatrician is in an ideal position to advise or take part in further training programmes in aspects of child health surveillance/promotion.

In some districts there has been a tendency to organize separate in-service training for hospital doctors, GPs and community paediatricians. This is a great pity, as joint in-service training gives an ideal opportunity for helping each branch of the profession to develop an understanding of the others' role.

A child health promotion/surveillance advisory committee could be set up in order to recommend ongoing programmes of multi-disciplinary training. A sub-committee of community paediatricians and general practice trainers could, with the help of appropriate colleagues, draw up a plan in child health training for doctors with a special interest. The group could

- allocate places on regional training courses;
- devise a district-based series of courses ranging from half-day release to one week.

The content of such courses will, in many cases, respond to the training needs of newly-appointed doctors in general practice, community and hospital. Others could be devised to meet the specific needs that have been identified, for instance 'self-audit' amongst more senior doctors. If self-

audit is encouraged, areas of ignorance or uncertainty can be identified and the appropriate course devised to meet those needs. In practice this means that those responsible for training should at regular intervals ask doctors what areas within child health they would most like a training session to cover.

Courses may also be designed according to referrals that have resulted from use of *SGS*. It would be easy for managers to keep accurate records of positive referrals and also of referrals that proved to be negative. If the latter were related to one particular area of development, an appropriate in-service training session could be devised to increase the expertise in that particular area.

In-service training must be viewed as a necessity rather than a luxury. A well-trained doctor or health visitor undertaking child health surveillance/promotion will engender real confidence with parents and children alike.

Specialization by Community Paediatricians

Many paediatricians working in the community specialize in a particular aspect of child health and are responsible for various district-based services including:

- fostering and adoption;
- audiology;
- child protection;
- developmental assessment;
- enuresis and emotional problems;
- school health;
- adolescent medicine.

These paediatricians will need the opportunity to attend courses and conferences on their chosen speciality. The expertise they develop will give them the knowledge and skills that will enable them to contribute to the appropriate courses for postgraduate training.

The emphasis of modern child health services is on health promotion in partnership with parents, empowering them with knowledge and skills, and less direct professional input (Hall, 1996). Child health surveillance remains a core aspect of multi-disciplinary community work and it is obligatory to deliver a service of the highest possible quality. The key to this is to ensure that all staff are thoroughly trained and that their skills are kept sharp by regular refresher courses. There should be ongoing monitoring of the results of surveillance using an audit model by which local standards are compared with published achievements elsewhere (Mann and Vallance Owen, 1992). This information should be part of the in-service training so that all members of the multi-disciplinary team are kept up to date.

By using a carefully designed, scientifically structured approach, as outlined in this chapter, screening can be a highly effective, economically justified part of the child health surveillance/promotion programme.

Appendix

Sample Selection

The main standardization took place between January and April 1996, with the target sample drawn to include 360 children, made up of 60 children (30 boys and 30 girls) from each of the six age groups defined by year of age from birth to five years old. The characteristics of these children and the NHS Trusts that took part are detailed in this Appendix. For details of the analyses carried out on item order, reliability and intercorrelations among the skill areas (including the cognitive skill area) see Chapter 3.

Nineteen NHS Trusts who were conversant with the *Schedule of Growing Skills* were contacted and asked to take part in the standardization.

Table A.1 gives the details of the actual number of NHS Trusts agreeing to participate in the *SGS II* standardization, two of which were based in Essex and have been counted as one NHS Trust, and the number of assessors willing to take part at each NHS Trust. Many of the NHS Trusts were able to provide only a couple of administrators, and others were unable to participate in the standardization at all, due to a general lack of time.

The thirty-three administrators, all of whom were familiar with *SGS*, were each asked to identify two children in each of the six age groups (one of each sex), giving a total of twelve in all. Children were selected at random, where possible, according to whether they were registered to be screened. The usual screening ages for children in relation to the *Schedule of Growing Skills* are eight months, eighteen months and three years old. If there were difficulties selecting children in the older age bands, it was suggested that the older siblings of the screening age children should be used.

Table A.1: Number of administrators at each NHS Trust agreeing to take part in the standardization

NHS Trusts agreeing to take part	Number of administrators
Lancaster Priority Services	2
West Glamorgan	3
Premier Health (Staffs)	3
Gwent Community	6
Bury Healthcare	2
Northern Birmingham Community	6
Essex	6
Hemel Hempstead	5
TOTAL	33

Table A.2 presents the actual number of children assessed on the *Schedule of Growing Skills* Standardization Edition for the eight NHS Trust areas. Overall, 348 children took part in the standardization, but higher percentages of children were assessed in NHS Trusts in Gwent (23.3 per cent), Birmingham (18.4 per cent) and Essex (21.6 per cent), since there were higher numbers of administrators willing to take part here.

Table A.2: Number and percentage of children assessed on the *SGS* Standardization Edition in each NHS Trust area

NHS Trust	Number	Percentage
Lancaster	28	8.0
W. Glamorgan	28	8.0
Staffs	31	8.9
Gwent	81	23.3
Bury	22	6.3
Birmingham	64	18.4
Essex	75	21.6
Hemel Hempstead	19	5.5
TOTAL	348	100

Materials

Before the standardization exercise, trial data was collected in order to check that the order of items followed developmental chronology. As a result of this analysis, the item order of the 'Visual skill' area was revised and item 76 dropped. However, the attained sample for the trial data was much smaller than intended, and therefore results could only be taken as a guideline. The Standardization Edition Manual and Record Forms, including the revisions in item order, were produced. The kit materials were also updated and sent to the administrators, along with detailed administration instructions, child questionnaires with which to collect background information, and consent forms.

Scoring Procedure

Children's performance was recorded in the usual way on the Standardization Edition of the Record Form. Administrators were asked to start scoring each section of testing at an earlier item than they would normally, to ensure that the child could complete earlier items. This data was used by the NFER to calculate the children's raw scores, which was then collected and transformed into standardized scores.

The child questionnaire was completed by the administrators who asked the parent(s) or guardian of the child to answer all the questions. Administrators were also responsible for coding the questions relating to the guardian(s) or parent(s) educational background. More specifically, the answers to questions about parents' highest qualifications were coded by the administrators, using the key supplied as part of the administration instructions.

Characteristics of Candidates

During the *SGS* Standardization Edition assessment session, the administrator asked the child's parents questions from the child questionnaire, which included background information on the:

- age of child;
- gender of the child;
- parents living with the child;
- number of siblings living with the child;
- position of child in the family;
- ethnicity;
- whether their first language was English;
- whether the child had disabilities;
- whether the child attended (or used to attend) nursery school;
- whether mother and/or father had any academic/professional qualifications;
- type of qualifications obtained by mother and/or father;
- type of area child lived in.

The full data on the sample are set out in Table A.3, which shows a detailed breakdown of the ages of the 349 children that took part in the assessment. The data for one child could not be included in all analyses, as the questionnaire was completed with no corresponding Record Form.

Table A.3 also reveals that fewer assessments were carried out on the older age groups (four year olds and five year olds). This was due to the fact that the usual screening ages for children assessed on *SGS* are at eight months, 18 months and three years old, as mentioned earlier. However, these numbers are sufficient to provide a satisfactory standardization for an assessment instrument of this type.

Table A.3: Number of children participating in the standardization

Age	Number	Percentage
Below 1 year olds	54	15.5
1 year olds	67	19.2
2 year olds	58	16.6
3 year olds	70	20.1
4 year olds	47	13.5
5 year olds	45	12.9
Data Missing	8	2.3
TOTAL	349	100

Note: *percentages do not sum to exactly 100 due to rounding.*

Table A.4 presents the number of girls and boys tested on the *Schedule of Growing Skills* Standardization Edition. The percentage of boys and girls taking part in the standardization was approximately equal.

Table A.4:   Number and percentage of boys and girls participating in the standardization

Gender	Number	Percentage
Boys	175	50.1
Girls	169	48.4
Data Missing	5	1.4
TOTAL	349	100

Note: *percentages do not sum to exactly 100 due to rounding.*

As shown in Table A.5, the majority of children who took part in the standardization were white (78.8 per cent) compared to 94.5 per cent in the population as a whole. The number and percentage of other ethnic groups participating in the standardization are given in the table. A total of 7.1 per cent were black and a total of 9.8 per cent were of Asian origin. According to the 1991 census, nationally the percentages were 1.6 per cent and 3.4 per cent respectively. The over-representation of ethnic minority groups was probably a consequence of the locations of the small number of NHS Trusts taking part in the standardization.

Table A.5: Number and percentage of ethnic groups participating in the standardization

Ethnic group	Number	Percentage
White	275	78.8
Black (Caribbean) (African) (Other)	21 – 4	6.0 – 1.1
Asian (Indian) (Pakistani) (Bangladeshi) (Chinese) (Other)	18 12 2 – 2	5.2 3.4 0.6 – 0.6
Other	13	3.7
Data Missing	2	0.6
TOTAL	349	100

The majority of children (86 per cent) live with both their mother and father (see Table A.6). A further 11.7 per cent live with their mother only, 1.7 per cent with their mother and step-father and 0.6 per cent with other guardian/parental combinations. Interestingly, there were no children living with their father only. According to the 1994 General Household Survey, 80 per cent of children lived with both parents (16 per cent of married couples had one dependent child and 64 per cent had two or more children). A further 20 per cent of children lived with their mothers only (6 per cent of mothers had one dependent child and 14 per cent had two or more children). A further one per cent of children were reported as living with their father alone. Therefore, the standardization statistics are very similar to the national statistics.

Table A.6: Number and percentage of parents living with children participating in the standardization

Parents living with child	Number	Percentage
Mother and Father	300	86.0
Mother only	41	11.7
Father only	–	–
Mother and Step-Father	6	1.7
Father and Step-Mother	–	–
Other	2	0.6
TOTAL	349	100

Only 1.1 per cent of the children who took part in the standardization were registered as disabled (see Table A.7). There are no national statistics for registered disabled children for us to make comparisons. However, the 1994 Social Focus on Children details statistics on disability among children, collected in a special survey of children in private households in Great Britain in 1985. This estimated that there were 360 000 children under 16 with one or more disabilities. More boys than girls had disabilities – four and a half per cent of boys aged between five and nine were affected, compared with only three per cent of girls. Children over five were more likely to have a disability, although this may be due to increased identification of disabilities as a child enters school life. Similarly, in the 1992 Household Survey, five per cent of children under five in Great Britain were reported to have a limiting long-standing illness.

Table A.7: **Number and percentage of registered disabled children participating in the standardization**

Registered disabled	Number	Percentage
Yes	4	1.1
No	342	98.0
Data Missing	3	0.9
TOTAL	349	100

Table A.8 shows the number and percentage of siblings living with the children who took part in the standardization. The majority of children had one other sibling (40.4 per cent), followed by only children, or children who do not have siblings living with them (24.6 per cent). A further 20.6 per cent had two other siblings living with them. The mean number of siblings was 1.25, giving the number of children in the household as 2.25. This is very slightly higher than the average for the population. The 1994 General Household Survey reports the average (mean) number of dependent children for married couples was 1.9, 1.7 for lone parents, and 1.8 total for all families with dependent children. Dependent children are persons aged under 16, or aged between 16 and 18 in full time education.

Table A.8:   Number and percentage of siblings living with children
              participating in the standardization

Number of siblings living with child	Number	Percentage
0	86	24.6
1	141	40.4
2	72	20.6
3	20	5.7
4	8	2.3
5	5	1.4
6	3	0.9
Data Missing	14	4.0
TOTAL	349	100

Note: *percentages do not sum to exactly 100 due to rounding.*

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The majority (91.1 per cent) of children taking part in the standardization had English as their first language (see Table A.9). Two of the skill areas ('Hearing and language' and 'Speech and language skills') concern English Language skills. Therefore, it is to be expected that the proportion of the sample which spoke English as their first language would influence the norm scores for these areas.

Table A.9: **Number and percentage of children participating in the standardization with English as first language**

First language	Number	Percentage
English	318	91.1
Other	25	7.2
Data Missing	6	1.7
TOTAL	349	100

Just over half of the sample (55.9 per cent) lived in town or urban areas (see Table A.10). A further 26.6 per cent of the sample lived in the suburbs and 11.5 per cent lived in rural areas. Only six per cent of the sample lived in city centres.

Table A.10:   Number and percentage of children participating in the standardization living in different areas

Area child lives in	Number	Percentage
Rural	40	11.5
Suburbs	93	26.6
Town/Urban	195	55.9
City Centre	21	6.0
TOTAL	349	100

About two-thirds of the children's mothers (67.3 per cent) had academic/ professional qualifications (see Table A.11). Just under two-thirds of the children's fathers (61.6 per cent) had academic/professional qualifications (see Table A.12). There was quite a high percentage of missing data (20.1 per cent) where the father did not live with the child, or the mother did not know this information.

According to the 1994 General Household Survey, the proportion of people aged between 16 – 69 with an educational qualification was 68 per cent. The standardization figures given above are comparable with this national statistic. The 1994 General Household Survey also reported that, overall, men were more likely than women to have some form of qualification (72 per cent compared with 65 per cent). In this standardization sample, men and women have a similar likelihood of having some form of qualification (61.6 per cent and 67.3 per cent respectively). However, if the missing data for fathers were to be obtained, it may be that a high proportion have an educational qualification, bringing the sample in line with the national statistics.

Table A.11: **Number and percentage of mothers with professional qualifications**

Academic/professional qualifications (mother)	Number	Percentage
Yes	235	67.3
No	81	23.2
Data Missing	33	9.5
TOTAL	349	100

Table A.12: **Number and percentage of fathers with professional qualifications**

Academic/professional qualifications (father)	Number	Percentage
Yes	215	61.6
No	64	18.3
Data Missing	70	20.1
TOTAL	349	100

Tables A.13 and A.14 present the various types of qualifications held by the mothers and fathers respectively, of the participating children.

The 1994 General Household Survey states that men were more likely than women to have a degree (12 per cent compared with 7 per cent). The figures in Tables A.13 and A.14, which are 12.9 per cent and 8.9 per cent respectively, are similar to these national statistics.

Women, on the other hand, were more likely than men to have reached only GCSE grades A – C ('O' level standard). Again, the figures in Tables A.13 and A.14, 24.4 per cent and 20.9 per cent respectively, reflect this national trend.

The percentage of mothers and fathers with different types of professional qualifications can be compared with the 1992 General Household Survey, which gives figures for the highest qualification level attained by sex.

According to the 1992 General Household Survey, 36 per cent of women had no qualifications, 12 per cent had GCSE Grades D – E, 25 per cent had GCSE Grades A – C, eight per cent had GSE 'A' Level or equivalent, 10 per cent had attended higher education below degree level, six per cent had a degree or equivalent, and two per cent had foreign and other qualifications. Comparing these figures with those in Table A.13 shows similarities. However, there is a much lower percentage of mothers with no qualifications (22.1 per cent) compared with the national figures for women (36 per cent).

According to the 1992 General Household Survey, 31 per cent of men had no qualifications, 11 per cent had GCSE Grades D – E, 19 per cent had GCSE Grades A – C, 14 per cent had GSE 'A' Level or equivalent, 11 per cent had attended higher education below degree level, 11 per cent had a degree or equivalent and three per cent had foreign and other qualifications. Again, comparing these figures with those in Table A.14 show similarities but with a much lower percentage of fathers with no qualifications (20.3 per cent) compared with the national figures for men (31 per cent).

Table A.13: **Number and percentage of mothers with different types of professional qualifications**

Type of qualification (mother)	Number	Percentage
No qualifications	77	22.1
GCSE Grades D – E or equivalent	65	18.6
GCSE Grades A – C or equivalent	85	24.4
GSE 'A' Level or equivalent	45	12.9
Higher education below degree level	37	10.6
Degree or equivalent	31	8.9
Foreign and other qualifications	6	1.7
Data Missing	3	0.9
TOTAL	349	100

Note: *percentages do not sum to exactly 100 due to rounding.*

Table A.14: **Number and percentage of fathers with different types of professional qualifications**

Type of qualification (father)	Number	Percentage
No qualifications	71	20.3
GCSE Grades D – E or equivalent	39	11.2
GCSE Grades A – C or equivalent	73	20.9
GSE 'A' Level or equivalent	43	12.3
Higher education below degree level	46	13.2
Degree or equivalent	45	12.9
Foreign and other qualifications	9	2.6
Data Missing	23	6.6
TOTAL	349	100

The majority of children (49 per cent) participating in the standardization were first born in the family (see Table A.15). A further 33.2 per cent were second born, and 10 per cent third born. The remaining 7.8 per cent were fourth, or subsequent children.

Table A.15: **Number and percentage of children according to position born in family**

Position of child in family	Number	Percentage
First born	171	49.0
Second born	116	33.2
Third born	35	10.0
Fourth born	18	5.2
Fifth born	5	1.4
Sixth born	3	0.9
Other	1	0.3
TOTAL	349	100

Just under half (41.8 per cent) of the sample participating in the standardization attended or were attending nursery school (see Table A.16). This was related to age, with the older children being more likely to attend nursery school.

According to the Statistical Bulletin for Pupils under five years of age in schools in England – January 1995, 27 per cent of all pupils under five were in nursery schools and classes. This figure refers to children attending maintained nursery and primary schools – it does not account for independent and special schools or private nursery schools or classes. This may explain why the percentage of the sample attending nursery was much higher, at 41.8 per cent (Table A.16).

Table A.16: Number and percentage of children attending nursery school

Attends nursery school	Number	Percentage
Yes	146	41.8
No	195	55.9
Data Missing	8	2.3
TOTAL	349	100

Concurrent Validity Study

A study was carried out to test children who had already been diagnosed as having some kind of developmental delay, since it was hypothesized that the *Schedule of Growing Skills* would pick up on this developmental delay. The administrators tested 11 children all of whom had been referred for specific developmental problems. The following cases show where the *SGS II* standardization edition picked up on these specific problems.

- Case No. 006001

  A boy aged 19 months was referred by his health visitor who was concerned about his hand function and overall movement skills. As shown in Figure A.1, his *SGS II* score in the Manipulative skill section does not indicate a significant delay as it is not more than one age interval below his chronological age but it does suggest a slight delay. It indicates that although he would not need to be referred, he should be recalled within six months. The child's scores on the Visual skill and Social skill areas are also a cause for concern although again they do not indicate a significant delay. The child could be recalled in six months to reassess these areas as well.

Figure A.1

Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 19	28 27	20	21 20	22 21	24	23 22 21	34 33 32	60 mths
48 mths			18 17	26 25 24	19	19 18	20 19	23	20 19 18	31 30 29 28	48 mths
36 mths			16 15	23 22 21	18 17	17 16	18 17	22 21 20	17 16	27 26 25 24	36 mths
30 mths			14 13	20 19 18	16	15 14	16 15	19 18	15 14	23 22 21 20	30 mths
24 mths			12 11 (10)	17 16 15	15 14	13 12	14 13 12	17 16	13 12 11	19 18 17 16	24 mths
18 mths			9 8 7	14 13 12	13	11 (10)	11	15 14	10 9 8	15 14 13 12	18 mths
15 mths			6 5	11 (10)	(12)	9 8	10 9 8	13 12 11	(6)	10 9 8	15 mths
12 mths		12	4 3	9 8	11 10	8 7	7 6	10 9 8	5 4	8 7 6	12 mths

C.A. 19mths

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- ## Case No. 006004

A boy aged 35 months was originally referred by a health visitor to a Speech and Language Therapist due to concerns about his language abilities, and to assess whether the child had special educational needs. The Speech and Language Therapist referred him on to a paediatrician to get a wider view of the child's difficulties. Figure A.2 shows plainly that this child has a significant developmental delay in the Speech and Language skill area but not in the Hearing and Language skill area. This indicates that this child has difficulties in expressing language rather than in comprehending it.

Figure A.2

Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 19	28 27	20	21 20	22 21	24	23 22 21	34 33 32	60 mths
48 mths			18 17	26 25 24	19	19 18	20 19	23	20 19 18	31 30 29 28	48 mths
36 mths			16 15	23 22 21	18 17	17 16	18 17	22 21 20	17 16	27 26 25 24	36 mths
30 mths			(14) 13	20 19 18	(20)	15 (14)	16 15	19 18	15 (14)	23 22 21 20	30 mths
24 mths			12 11 10	17 (16) 15	15 14	13 12	14 13 12	(17) 16	13 12 11	19 18 (17) 16	24 mths
18 mths			9 8 7	14 13 12	13	11 10	11	15 14	10 9 8	15 14 13 12	18 mths
15 mths			6 5	11 10	12	9	10 9 8	13 12 11	7 6	11 10 9	15 mths
12 mths		12	4 3	9 8	11 10	8 7	7 6	10 9 8	5 4	8 7 6	12 mths
10 mths		11 10	2 1		7	9	6	(5)	7	3	5 4	10 mths
8 mths		9 8 7		6	8	5	4	6	2	3 2	8 mths

C.A. 35mths

- Case No. 006005

  A girl aged 49 months was referred by a health visitor as her parents were concerned about their daughter's interactive social skills. She had been found to be aggressive, lacking in empathy and unwilling to cooperate with both adults and other children. As Figure A.3 shows, this child's score on the Interactive Social skill area indicates a significant delay (more than one age interval below her chronological age). Results for the individual items (for example items 144, 145 and 155) confirmed the parents' belief that their daughter was lacking in social skills. In this case it was suggested that she be reassessed at a later date concentrating on pragmatics.

Figure A.3

Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 / 19	28 / 27	20	21 / 20	22 / 21	24	23 / 22 / 21	34 / 33 / 32	60 mths
C.A. 48 mths 49 mths			18 / 17	26 / 25 / 24	19	19 / 18	20 / 19	23	20 / 19 / 18	31 / 30 / 29 / 28	48 mths
36 mths			16 / 15	23 / 22 / 21	18 / 17	17 / 16	18 / 17	22 / 21 / 20	17 / 16	27 / 26 / 25 / 24	36 mths
30 mths			14 / 13	20 / 19 / 18	16	15 / 14	16 / 15	19 / 18	15 / 14	23 / 22 / 21 / 20	30 mths
24 mths			12 / 11 / 10	17 / 16 / 15	15 / 14	13 / 12	14 / 13 / 12	17 / 16	13 / 12 / 11	19 / 18 / 17 / 16	24 mths

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- Case No. 006018

  A boy aged 39 months was referred by a health visitor as his parents were concerned about his interactive social skills, his lack of empathy, his short attention span and his general rigid, repetitive behaviour. Figure A.4 shows that his Interactive Social skill area score indicates a significant developmental delay, and his results on individual items indicate possible attention deficit hyperactivity disorder (ADHD) or Autism.

  Figure A.4

Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 / 19	28 / 27	20	21 / 20	22 / 21	24	23 / 22 / 21	34 / 33 / 32	60 mths
48 mths			18 / 17	26 / 25 / 24	(19)	19 / 18	(20) / 18	23	20 / 19 / 18	31 / 30 / 29 / 28	48 mths
C.A. 39 mths — 36 mths			(16) / 15	(23) / 22 / 21	18 / 17	(17) / 16	18 / 17	22 / 21 / 20	(17) / 16	(27) / 26 / 25 / 24	36 mths
30 mths			14 / 13	20 / 19 / 18	16	15 / 14	16 / 15	19 / 18	15 / 14	23 / 22 / 21 / 20	30 mths
24 mths			12 / 11 / 10	17 / 16 / 15	15 / 14	13 / 12	14 / 13 / 12	(17) / 16	13 / 12 / 11	19 / 18 / 17 / 16	24 mths
18 mths			9 / 8 / 7	14 / 13 / 12	13	11 / 10	11	15 / 14	10 / 9 / 8	15 / 14 / 13 / 12	18 mths

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- ## Case No. 006006

  A girl aged 31 months was referred by the child's GP due to the child's constant head banging before bedtime. Figure A.5 shows that for all skill areas her behaviour was age appropriate, that is showing no developmental delays, although the Cognitive section was two age intervals below the chronological age. *SGS II* was used to rule out developmental delay as a cause of the problem behaviour, so the health professional could concentrate on the behavioural problems. In this case, it was suggested that this behaviour was only associated with sleep, and so could be tackled using behaviour management techniques.

Figure A.5

Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 / 19	28 / 27	20	21 / 20	22 / 21	24	23 / 22 / 21	34 / 33 / 32	60 mths
48 mths			18 / 17	26 / 25 / 24	19	19 / 18	20 / 19	23	20 / 19 / 18	31 / 30 / 29 / 28	48 mths
36 mths			16 / 15	23 / 22 / 21	18 / 17	17 / 16	18 / 17	22 / 21 / 20	17 / 16	27 / 26 / 25 / 24	36 mths
C.A. 31mths — 30 mths			14 / (13)	20 / 19 / 18	16	15 / (14)	(16) / 15	19 / (18)	15 / 14	23 / 22 / 21 / 20	30 mths
24 mths			12 / 11 / 10	17 / 16 / (15)	15 / (14)	13 / 12	14 / 13 / 12	17 / 16	(13) / 12 / 11	19 / 18 / 17 / 16	24 mths
18 mths			9 / 8 / 7	14 / 13 / 12	13	11 / 10	11	15 / 14	10 / 9 / 8	(14) / 13 / 12	18 mths
15 mths			6 / 5	11 / 10	12	9	10 / 9 / 8	13 / 12 / 11	7 / 6	11 / 10 / 9	15 mths

- ## Case No. 004012

  A girl aged 58 months was referred by a consultant for management of her rehabilitation following head injuries sustained when kicked by a horse. Physical injuries included a ruptured spleen resulting in a splenectomy and mild residual ataxia, most prominent in the left side. A subtle cognitive deficit was found after assessment using *BAS*, *WPPSI R* and *TROG*. Figure A.6 shows that three months after the head injury the girl's development is age appropriate in all skill areas, although for the Cognitive section it is one age interval below but this is not significant. In this case, serial assessment with *SGS II* helped to document progress for both the child's parents and for the professionals involved.

Figure A.6

Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 / 19	28 / 27	(20)	21 / (20)	(22) / 21	24	23 / 22 / 21	34 / (33) / 32	60 mths
48 mths			18 / 17	(26) / 25 / 24	19	19 / 18	20 / 19	(23)	20 / 19 / 18	31 / 30 / 29 / 28	48 mths
36 mths			(16) / 15	23 / 22 / 21	18 / 17	17 / 16	18 / 17	22 / 21 / 20	17 / 16	27 / 26 / 25 / 24	36 mths
30 mths			14 / 13	20 / 19 / 18	16	15 / 14	16 / 15	19 / 18	15 / 14	23 / 22 / 21 / 20	30 mths

(Handwritten on left: C.A. 58 mths)

- Case No. 004011

A girl aged 28 months was referred by a consultant for neuro-developmental care. She had intractable epilepsy and suffered an encephalopathic illness with hepatic and renal disturbance that resulted in a quadriplegic dyskinetic motor impairment and visual and cognitive deficits. Figure A.7 shows that this child is obviously severely delayed in all skill areas, as well as the Cognitive section, with scores ranging from the six months to 15 months age bands, confirming the effects of the illness. As in case 004012, *SGS II* is useful for parents and professionals in documenting any progress made.

Figure A.7

Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 / 19	28 / 27	20	21 / 20	22 / 21	24	23 / 22 / 21	34 / 33 / 32	60 mths
48 mths			18 / 17	26 / 25 / 24	19	19 / 18	20 / 19	23	20 / 19 / 18	31 / 30 / 29 / 28	48 mths
36 mths			16 / 15	23 / 22 / 21	18 / 17	17 / 16	18 / 17	22 / 21 / 20	17 / 16	27 / 26 / 25 / 24	36 mths
30 mths			14 / 13	20 / 19 / 18	16	15 / 14	16 / 15	19 / 18	15 / 14	23 / 22 / 21 / 20	30 mths
24 mths			12 / 11 / 10	17 / 16 / 15	15 / 14	13 / 12	14 / 13 / 12	17 / 16	13 / 12 / 11	19 / 18 / 17 / 16	24 mths
18 mths			9 / 8 / 7	14 / 13 / 12	13	11 / 10	11	15 / 14	10 / 9 / 8	15 / 14 / 13 / 12	18 mths
15 mths			6 / 5	11 / 10	12	9	10 / 9 / 8	13 / 12 / 11	7 / (6)	11 / 10 / 9	15 mths
12 mths		12	4 / 3	9 / 8	11 / 10	(8) / 7	7 / 6	10 / 9 / 8	5 / 4	8 / 7 / 6	12 mths
10 mths		11 / 10	2 / (1)	(7)	9	6	5	(7)	3	5 / 4	10 mths
8 mths		9 / 8 / 7		6	8	5	(4)	6	2	3 / 2	8 mths
6 mths	9 / (8) / 7	6 / (5) / 4		5 / 4	(6)	4 / 3	3	5 / 4	1	(1)	6 mths
3 mths	6 / 5 / 4	3		3 / 2	5 / 4	2	2	3 / 2			3 mths

C.A. 28 mths

- ## Case No. 004003

A boy aged 10½ months was referred by his GP after failing the 8 months health visitor's check. He was unable to sit alone, roll over or bear weight on his feet. Physical and neurological examinations and investigations revealed no specific cause for his delay but there is a family history of delayed early milestones and mild learning difficulties in school. Figure A.8 shows that he is functioning broadly at the six months age level and the paediatrician felt the child's development would need monitoring.

Figure A.8

					Skill Areas						
Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 19	28 27	20	21 20	22 21	24	23 22 21	34 33 32	60 mths
48 mths			18 17	26 25 24	19	19 18	20 19	23	20 19 18	31 30 29 28	48 mths
36 mths			16 15	23 22 21	18 17	17 16	18 17	22 21 20	17 16	27 26 25 24	36 mths
30 mths			14 13	20 19 18	16	15 14	16 15	19 18	15 14	23 22 21 20	30 mths
24 mths			12 11 10	17 16 15	15 14	13 12	14 13 12	17 16	13 12 11	19 18 17 16	24 mths
18 mths			9 8 7	14 13 12	13	11 10	11	15 14	10 9 8	15 14 13 12	18 mths
15 mths			6 5	11 10	12	9	10 9 8	13 12 11	7 6	11 10 9	15 mths
12 mths		12	4 3	9 8	11 10	8 7	7 6	10 9 8	5 4	8 7 6	12 mths
10 mths		11 12	2 1	7	9	6	5	7	3	5 4	10 mths
8 mths		9 8 7	6	8	5	4	6	(2)		3 2	8 mths
6 mths	9 8 (7)	6 5 4	(5)	7 (6)	(4) 3	(3)	(5) 4	1		(1)	6mths
3 mths	6 5 4	(3)		3 2	5 4	2	2	3 2			3mths
1 mths	3 2 1	2	1		3 2		1	1			1 mths

C.A. 10½ mths (marked beside the 10 mths row)

141

- ## Case No. 004005

   This concerns a boy of 43 months with Down's Syndrome diagnosed at birth. Figure A.9 confirms significant delays in all skill areas, with the boy functioning at below the 24 months level. However, subsequent *SGS II* assessments have shown a steady progression in all skill areas.

Figure A.9

Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 19	28 27	20	21 20	22 21	24	23 22 21	34 33 32	60 mths
48 mths			18 17	26 25 24	19	19 18	20 19	23	20 19 18	31 30 29 28	48 mths
36 mths			16 15	23 22 21	18 17	17 16	18 17	22 21 20	17 16	27 26 25 24	36 mths
30 mths			14 13	20 19 18	16	15 14	16 15	19 18	15 14	23 22 21 20	30 mths
24 mths			12 11 (10)	17 16 (15)	15 14	13 12	14 13 12	17 16	13 12 11	19 18 17 16	24 mths
18 mths			9 8 7	14 13 12	13	11 10	11	15 14	10 9 (8)	15 14 13 12	18 mths
15 mths			6 5	11 10	(12)	9	10 (9) 8	(13) 12 11	7 6	11 10 9	15 mths
12 mths		12	4 3	9 8	11 10	(8) 7	7 6	10 9 8	5 4	8 7 (6)	12 mths
10 mths		11 10	2 1	7	9	6	5	7	3	5 4	10 mths

C.A. 43mths

- Case No. 004006

  A boy of 16 months, again known to have Down's Syndrome, was referred by his previous consultant paediatrician when he moved to a new area. Figure A.10 shows him to be functioning between the ages of six and ten months, although his Self-Care social skills are age appropriate. The higher scores sometimes obtained for Self-Care social skills should be treated with caution as they are scored according to parental report rather than observation. He is functioning at the six months age level in both the Visual and Cognitive areas, which is to be expected since the Visual skill area contributes significantly to the Cognitive section.

Figure A.10

					Skill Areas						
Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 / 19	28 / 27	20	21 / 20	22 / 21	24	23 / 22 / 21	34 / 33 / 32	60 mths
48 mths			18 / 17	26 / 25 / 24	19	19 / 18	20 / 19	23	20 / 19 / 18	31 / 30 / 29 / 28	48 mths
36 mths			16 / 15	23 / 22 / 21	18 / 17	17 / 16	18 / 17	22 / 21 / 20	17 / 16	27 / 26 / 25 / 24	36 mths
30 mths			14 / 13	20 / 19 / 18	16	15 / 14	16 / 15	19 / 18	15 / 14	23 / 22 / 21 / 20	30 mths
24 mths			12 / 11 / 10	17 / 16 / 15	15 / 14	13 / 12	14 / 13 / 12	17 / 16	13 / 12 / 11	19 / 18 / 17 / 16	24 mths
18 mths			9 / 8 / 7	14 / 13 / 12	13	11 / 10	11	15 / 14	10 / 9 / 8	15 / 14 / 13 / 12	18 mths
15 mths			6 / 5	11 / 10	12	9	10 / 8	13 / 11	7 / ⑥	11 / 10 / 9	15 mths
12 mths		12	4 / 3	9 / 8	11 / 10	8 / 7	7 / 6	10 / 9 / 8	5 / 4	8 / 7 / 6	12 mths
10 mths		11 / 10	2 / ①	7	9	6	⑥	⑦	3	5 / 4	10 mths
8 mths		9 / 8 / ⑦		⑥	8	5	4	6	2	3 / 2	8 mths
6 mths	9 / 8 / 7	6 / 5 / 4		5 / 4	⑦ / 6	④ / 3	3	5 / 4	1	①	6 mths
3 mths	6 / 5 / 4	3		3 / 2	5 / 4	2	2	3 / 2			3 mths

C.A. 16mths

143

- Case No. 004009

  A boy of 45 months with a diagnosis of Down's Syndrome was seen initially at six months, following a referral from his GP. figure A.11 shows him to be functioning basically at the 24 months age level.

Figure A.11

Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 / 19	28 / 27	20	21 / 20	22 / 21	24	23 / 22 / 21	34 / 33 / 32	60 mths
48 mths			18 / 17	26 / 25 / 24	19	19 / 18	20 / 19	23	20 / 19 / 18	31 / 30 / 29 / 28	48 mths
36 mths			16 / 15	23 / 22 / 21	18 / 17	17 / 16	18 / 17	22 / 21 / 20	17 / 16	27 / 26 / 25 / 24	36 mths
30 mths			14 / 13	20 / 19 / 18	16	15 / 14	16 / 15	19 / 18	15 / 14	23 / 22 / 21 / 20	30 mths
24 mths			12 / (11) / 10	17 / (16) / 15	15 / (14)	(13) / 12	(14) / 13 / 12	17 / 16	(12) / 11	19 / 18 / 17 / 16	24 mths
18 mths			9 / 8 / 7	14 / 13 / 12	13	11 / 10	11	15 / 14	10 / 9 / 8	(15) / 14 / 13 / 12	18 mths
15 mths			6 / 5	11 / 10	12	9	10 / 9 / 8	13 / 12 / 11	7 / 6	11 / 10 / 9	15 mths

Skill Areas

C.A. 36 mths / 45 mths

144

- ## Case No. 004004

A boy of 17 months diagnosed with Down's Syndrome was first seen at three months, when he was referred by his GP for continued developmental advice and support follow up. Figure A.12 shows that he has deficits in the Visual and Hearing and Language skill areas and his Cognitive functioning is also delayed at around the 12 months age level. This is what would be expected in a child with Down's Syndrome, and suggests that these areas should be closely monitored.

Figure A.12

				Skill Areas							
Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	**Age** (months)
60 mths			20 / 19	28 / 27	20	21 / 20	22 / 21	24	23 / 22 / 21	34 / 33 / 32	60 mths
48 mths			18 / 17	26 / 25 / 24	19	19 / 18	20 / 19	23	20 / 19 / 18	31 / 30 / 29 / 28	48 mths
36 mths			16 / 15	23 / 22 / 21	18 / 17	17 / 16	18 / 17	22 / 21 / 20	17 / 16	27 / 26 / 25 / 24	36 mths
30 mths			14 / 13	20 / 19 / 18	16	15 / 14	16 / 15	19 / 18	15 / 14	23 / 22 / 21 / 20	30 mths
24 mths			12 / 11 / 10	17 / 16 / 15	15 / 14	13 / 12	14 / 13 / 12	17 / 16	13 / 12 / 11	19 / 18 / 17 / 16	24 mths
18 mths			9 / 8 / 7	14 / (12)	13	11 / 10		15 / 14	10 / (9)	15 / 14 / 13 / 12	18 mths
15 mths			(6) / 5	11 / 10	12	9	10 / (9)	13 / (11)	7 / 6	11 / 10 / 9	15 mths
12 mths		(12)	4 / 3	9 / 8	(11) / 10	(9) / 7	7 / 6	10 / 9 / 8	5 / 4	(8) / 6	12 mths
10 mths		11 / 10	2 / 1	7	9	6	5	7	3	5 / 4	10 mths

(Left-margin annotation at the 15 mths row: C.A. 17 mths. Numbers shown in parentheses are circled in the original; the 15 mths line is struck through.)

145

- Case No. 001003

  A girl of 33½ months had already been diagnosed as having a developmental delay based on the *Griffiths* scales. This assessment considered her to be functioning age appropriately in the Locomotor, Performance and the Eye–Hand Coordination skill areas, and to be mildly delayed in the Personal/Social, Hearing and Speech and Practical Reasoning skill areas. Figure A.13 shows age appropriate behaviour in Locomotor skill, Manipulative skill (similar in item content to the *Griffiths* Performance skill area) and Visual skill (similar in item content to the *Griffiths* Eye–Hand Coordination skill area). This child also showed mild developmental delay in the Interactive Social skill area, reflecting the delay in the *Griffiths* Personal/Social skill area. However, she was found to be functioning age appropriately in the *SGS II* Self-Care Social skill area although the item content is quite similar to the *Griffiths* Personal/Social skill area. She was also found to be functioning at an age appropriate level in the *SGS II* Hearing and Language skill area but had a mild delay in the Speech and Language skill area. Again, this reflects the *Griffiths* Hearing and Speech skill area where a mild delay, most evident in the items relating to speech, was found. This case study clearly shows where *SGS II* picks up on developmental delays already suggested by other developmental assessments.

Figure A.13

					Skill Areas						
Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 19	28 27	20	21 20	22 21	24	23 22 21	34 33 32	60 mths
48 mths			18 17	26 25 24	19	19 18	20 19	23	20 19 18	31 30 29 28	48 mths
36 mths			16 15	23 22 21	18 17	17 16	18 17	22 21 20	17 16	27 26 25 24	36 mths
C.A. 33mths — 30 mths			14 (13)	20 19 18	16	15 14	16 15	19 18	15 14	23 22 21 20	30 mths
24 mths			12 11 10	(17) 16 15	15 (14)	(13) 12	14 13 12	17 16	(13) 12 11	19 18 17 16	24 mths
18 mths			9 8 7	14 13 12	13	11 10	(11)	(12)	10 9 8	(15) 14 13 12	18 mths
15 mths			6 5	11 10	12	9	10 9 8	13 12 11	7 6	11 10 9	15 mths

- ## Case No. 001002

  A boy of 26 months was already found to have mild developmental delays. Figure A.14 shows that his behaviour is age appropriate in the Locomotor, Manipulative, Visual, Interactive Social, Self-Care Social and Cognitive areas. A significant delay found in the Hearing and Language skill area and a mild delay found in the Speech and Language skill area reflect observations made during general check ups made between the ages of 11 and 26 months.

Figure A.14

Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 / 19	28 / 27	20	21 / 20	22 / 21	24	23 / 22 / 21	34 / 33 / 32	60 mths
48 mths			18 / 17	26 / 25 / 24	19	19 / 18	20 / 19	23	20 / 19 / 18	31 / 30 / 29 / 28	48 mths
36 mths			16 / 15	23 / 22 / 21	18 / 17	17 / 16	18 / 17	22 / 21 / 20	17 / 16	27 / 26 / 25 / 24	36 mths
30 mths			14 / 13	20 / 19 / 18	16	15 / 14	16 / 15	19 / 18	15 / 14	23 / 22 / 21 / 20	30 mths
24 mths			(12) / (11) / 10	17 / 16 / 15	15 / (14)	13 / 12	14 / 13 / 12	17 / 16	13 / 12 / 11	19 / 18 / 17 / 16	24 mths
18 mths			9 / 8 / 7	(14) / 13 / 12	13	11 / 10	11	15 / (14)	(10) / 9 / 8	15 / 14 / 13 / (12)	18 mths
15 mths			6 / 5	11 / 10	12	9	(10) / 9 / 8	13 / 12 / 11	7 / 6	11 / 10 / 9	15 mths
12 mths		12	4 / 3	9 / 8	11 / 10	(8) / 7	7 / 6	10 / 9 / 8	5 / 4	8 / 7 / 6	12 mths
10 mths	11 / 10		2 / 1	7	9	6	5	7	3	5 / 4	10 mths

Header spanning columns: **Skill Areas**

Handwritten annotation on the left margin at the 24 mths row: **C.A. 26 mths**

147

Construct Validity Study

Health visitors in a Community Trust carried out parallel assessments using *Denver II* and the *SGS II* standardization edition on a group of 15 children. The following case studies illustrate some of the more interesting findings.

- Case No. 002018

  This 17-month-old child started walking only one month prior to assessment. When tested, he was walking fairly well with a wide based gait, though slightly unstable. His profile on *SGS II* was normal in all developmental fields. However, the *Denver* test showed a few failed items in the Gross Motor and Personal–Social fields.

  The health visitor felt that he was progressing well generally and therefore chose to disregard these failed items. Walking at 16 months is well within the normal range and the health visitor was not concerned about this child's development. The developmental profile shown by *SGS II* illustrated in Figure A.15 confirmed this impression and would be very reassuring to the mother. In contrast, the failed items on the *Denver* test may have generated unnecessary anxiety.

Figure A.15

Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
Skill Areas											
60 mths			20 / 19	28 / 27	20	21 / 20	22 / 21	24	23 / 22 / 21	34 / 33 / 32	60 mths
48 mths			18 / 17	26 / 25 / 24	19	19 / 18	20 / 19	23	20 / 19 / 18	31 / 30 / 29 / 28	48 mths
36 mths			16 / 15	23 / 22 / 21	18 / 17	17 / 16	18 / 17	22 / 21 / 20	17 / 16	27 / 26 / 25 / 24	36 mths
30 mths			14 / 13	20 / 19 / 18	16	15 / 14	16 / 15	19 / 18	15 / 14	23 / 22 / 21 / 20	30 mths
24 mths			12 / 11 / 10	17 / 16 / 15	15 / 14	13 / 12	14 / 13 / 12	17 / 16	13 / 12 / 11	19 / 18 / 17 / 16	24 mths
18 mths			8 / (a) / 7	14 / 13 / (12)	13	11 / (10)	11	15 / 14	(10) / 9 / (8)	15 / 14 / 13 / 12	18 mths
15 mths			6 / 5	11 / 10	(12)	9	(10) / 9 / 8	(12) / 11	7 / 6	11 / 10 / (9)	15 mths
12 mths		12	4 / 3	9 / 8	11 / 10	8 / 7	7 / 6	10 / 9 / 8	5 / 4	8 / 7 / 6	12 mths

C.A. 17 mths

148

- Case No. 002013

  This child aged seven months has a normal profile on *SGS II*, as shown in Figure A.16, and is in fact advanced in some fields. The *Denver* test also shows a basically normal profile with a few failed items at the age level. In the Language field, two of these are at significant levels (more than 50 per cent of children passing the item). The health visitor felt that the general developmental progress was satisfactory and did not consider referral necessary. The failed items on the *Denver* test may have caused some anxiety if considered in isolation.

Figure A.16

Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 / 19	28 / 27	20	21 / 20	22 / 21	24	23 / 22 / 21	34 / 33 / 32	60 mths
48 mths			18 / 17	26 / 25 / 24	19	19 / 18	20 / 19	23	20 / 19 / 18	31 / 30 / 29 / 28	48 mths
36 mths			16 / 15	23 / 22 / 21	18 / 17	17 / 16	18 / 17	22 / 21 / 20	17 / 16	27 / 26 / 25 / 24	36 mths
30 mths			14 / 13	20 / 19 / 18	16	15 / 14	16 / 15	19 / 18	15 / 14	23 / 22 / 21 / 20	30 mths
24 mths			12 / 11 / 10	17 / 16 / 15	15 / 14	13 / 12	14 / 13 / 12	17 / 16	13 / 12 / 11	19 / 18 / 17 / 16	24 mths
18 mths			9 / 8 / 7	14 / 13 / 12	13	11 / 10	11	15 / 14	10 / 9 / 8	15 / 14 / 13 / 12	18 mths
15 mths			6 / 5	11 / 10	12	9	10 / 9 / 8	13 / 12 / 11	7 / 6	11 / 10 / 9	15 mths
12 mths		12	4 / 3	9 / 8	11 / 10	8 / (7)	7 / 6	10 / 9 / 8	(5) / 4	8 / 7 / 6	12 mths
10 mths		11 / 10	2 / (1)	(7)	9	6	(5)	7	3	5 / 4	10 mths
8 mths		9 / (8) / 7		6	8	5	4	6	2	3 / 2	8 mths
6 mths	9 / 8 / 7	6 / 5 / 4		5 / 4	(7) / 6	4 / 3	3	(5) / 4	1	(1)	6 mths
3 mths	6 / 5 / 4	3		3 / 2	5 / 4	2	2	3			3 mths

(Handwritten annotation on left of the 6 mths row: *C.A. 7mths*)

- Case No. 002007

  The health visitor considered that this child's development was normal, though the parents did not encourage her to play sufficiently. The profile on *SGS II*, shown in Figure A.17, was within the normal range, as was the *Denver* test. On the *SGS II* Record Form, she is noted to have built a tower of three bricks but did not build four, which is shown as being achieved by 50 per cent of children on the Denver test. Both tests therefore can be used by the health visitor to demonstrate the areas of play where the child can improve.

Figure A.17

Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 / 19	28 / 27	20	21 / 20	22 / 21	24	23 / 22 / 21	34 / 33 / 32	60 mths
48 mths			18 / 17	26 / 25 / 24	19	19 / 18	20 / 19	23	20 / 19 / 18	31 / 30 / 29 / 28	48 mths
36 mths			16 / 15	23 / 22 / 21	18 / 17	17 / 16	18 / 17	22 / 21 / 20	17 / 16	27 / 26 / 25 / 24	36 mths
30 mths			14 / 13	20 / 19 / 18	16	15 / 14	16 / 15	19 / 18	15 / 14	23 / 22 / 21 / 20	30 mths
24 mths			12 / 11 / 10	17 / 16 / 15	15 / 14	13 / (12)	14 / (12)	17 / 16	13 / 12 / 11	19 / 18 / 17 / 16	24 mths
C.A. 18 mths (21mths)			(9) / 7	(14) / 12	13	11 / 10	11	15 / (14)	(10) / 8	15 / 14 / 13 / 12	18 mths
15 mths			6 / 5	11 / 10	(12)	9	10 / 9 / 8	13 / 12 / 11	7 / 6	11 / (10) / 9	15 mths
12 mths		12	4 / 3	9 / 8	11 / 10	8 / 7	7 / 6	10 / 9 / 8	5 / 4	8 / 7 / 6	12 mths

• Case No. 002006

This 20-month-old child was developing well, though the health visitor was a little concerned about her self-care skills. However, the developmental profile on *SGS II*, seen in Figure A.18, including that field was normal. The *Denver* test also gave normal results. The *SGS II* profile can be shown to the mother to reassure her. The Record Form is also a useful tool for informing her of the developmental items that the child should be developing, particularly in the Self-Care Social field, without generating anxiety by comparing the skills to age norms.

Figure A.18

Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 / 19	28 / 27	20	21 / 20	22 / 21	24	23 / 22 / 21	34 / 33 / 32	60 mths
48 mths			18 / 17	26 / 25 / 24	19	19 / 18	20 / 19	23	20 / 19 / 18	31 / 30 / 29 / 28	48 mths
36 mths			16 / 15	23 / 22 / 21	18 / 17	17 / 16	18 / 17	22 / 21 / 20	17 / 16	27 / 26 / 25 / 24	36 mths
30 mths			14 / 13	20 / 19 / 18	16	15 / 14	16 / 15	19 / 18	15 / 14	23 / 22 / 21 / 20	30 mths
24 mths			12 / 11 / 10	17 / 16 / 15	15 / 14	13 / 12	24 / 13 / 12	17	13 / 12 / 11	19 / 18 / 17 / 16	24 mths
18 mths			9 / 8 / 7	14 / 13 / 12	13	11 / 10	11	15 / 14	10 / 9 / 8	15 / 14 / 13 / 12	18 mths
15 mths			6 / 5	11 / 10	12	10 / 9 / 8	13 / 12 / 11	7 / 6	7 / 6	11 / 10 / 9	15 mths

C.A. 20mths

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- Case No. 002003

The health visitor considered that this child aged 31 months was developing along normal lines but was concerned about the clarity of his speech. As Figure A.19 shows, his developmental profile on *SGS II* is within normal limits, and he had no significant failures on the *Denver* test. The *SGS II* Record Form notes the difficulties of intelligibility (by his mother) and he failed the *Denver* item 'speech all understandable', though not at a significant level. Both methods, therefore, confirm that general development including language is progressing normally, and the health visitor used her judgement by arranging to review speech in three months with the possibility of referring him to a Speech and Language Therapist.

Figure A.19

Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 / 19	28 / 27	20	21 / 20	22 / 21	24	23 / 22 / 21	34 / 33 / 32	60 mths
48 mths			18 / 17	26 / 25 / 24	19	19 / 18	20 / 19	23	20 / 19 / (18)	31 / 30 / 29 / 28	48 mths
36 mths			16 / 15	23 / 22 / 21	18 / 17	17 / 16	18 / 17	(22) / (21) / 20	17 / 16	27 / 26 / 25 / 24	36 mths
C.A. 31mths 30 mths			14 / (13)	20 / 19 / 18	(16)	15 / (14)	(16) / 15	19 / 18	15 / 14	23 / 22 / 21 / 20	30 mths
24 mths			12 / 11 / 10	(17) / 16 / 15	15 / 14	13 / 12	14 / 13 / 12	17 / 16	13 / 12 / 11	19 / (18) / 17 / 16	24 mths
18 mths			9 / 8 / 7	14 / 13 / 12	13	11 / 10	11	15 / 14	10 / 9 / 8	15 / 14 / 13 / 12	18 mths

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- Case No. 002029

  The health visitor considered that this eight-month-old girl was developing normally, but was a little concerned about her manipulative skills. Figure A.20 shows that on the *SGS II* profile she was one age interval below her age line in the Manipulative field, which contrasted with most other fields where she was above. This is consistent with a normal pattern of a discrepancy in one field, though not necessarily at a significant level. However, the *Denver* test showed failure in two items in the Fine Motor Adaptive section at a significant (more than 75 per cent of children passing) level. This appears to indicate that the child has a real delay in these skills, which was not how the health visitor interpreted the situation. She can show the *SGS II* Profile Form to the girl's mother to reassure her that the child is within the normal range, and then show her the Record Form to indicate the items that should be performed next and suggest appropriate play activities. As there are no age levels shown on the Record Form, this can be done without generating undue anxiety.

Figure A.20

					Skill Areas						
Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
60 mths			20 19	28 27	20	21 20	22 21	24	23 22 21	34 33 32	60 mths
48 mths			18 17	26 25 24	19	19 18	20 19	23	20 19 18	31 30 29 28	48 mths
36 mths			16 15	23 22 21	18 17	17 16	18 17	22 21 20	17 16	27 26 25 24	36 mths
30 mths			14 13	20 19 18	16	15 14	16 15	19 18	15 14	23 22 21 20	30 mths
24 mths			12 11 10	17 16 15	15 14	13 12	14 13 12	17 16	13 12 11	19 18 17 16	24 mths
18 mths			9 8 7	14 13 12	13	11 10	11	15 14	10 9 8	15 14 13 12	18 mths
15 mths			6 5	11 10	12	9	10 9 8	13 12 11	7 6	11 10 9	15 mths
12 mths		12	4 3	9 8	11 10	8 7	7 6	10 9 8	5 4	8 7 6	12 mths
10 mths		11 10	2 (1)		7	(4)	(6)	(5)	(7)	5 (4)	10 mths
C.A. 8mths — 8 mths		(8) 7		6	6	5	4	6	2	3 (2)	8 mths
6 mths	9 8 7	6 5 4		8	7 6	4 3	3	5 4	1	1	6 mths
3 mths	6 5 4	3		3 2	5 4	2	2	3 2			3 mths

- Case No. 002028

  The health visitor felt that this eight-month-old child was developing normally, apart from his manipulative skills. Figure A.21 shows that the *SGS II* profile is one age interval below his age line whereas most of the others are above. On the *Denver* test he failed one item in the Gross Motor section at a significant level (more than 90 per cent of children passing) and two items in the Fine Motor Adaptive section (one more than 90 per cent, one more than 75 per cent passing). These failures on the *Denver* test may be interpreted as indicating a need for review or referral. The *SGS II* profile is more reassuring and is consistent with the health visitor's clinical opinion that the child is developing normally. She can show the mother the *SGS II* profile, which demonstrates the normal pattern, and then show her the Record Form to illustrate the specific Manipulative items where she expects the child to improve and feels the child should be actively stimulated.

Figure A.21

Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
						Skill Areas					
60 mths			20 / 19	28 / 27	20	21 / 20	22 / 21	24	23 / 22 / 21	34 / 33 / 32	60 mths
48 mths			18 / 17	26 / 25 / 24	19	19 / 18	20 / 19	23	20 / 19 / 18	31 / 30 / 29 / 28	48 mths
36 mths			16 / 15	23 / 22 / 21	18 / 17	17 / 16	18 / 17	22 / 21 / 20	17 / 16	27 / 26 / 25 / 24	36 mths
30 mths			14 / 13	20 / 19 / 18	16	15 / 14	16 / 15	19 / 18	15 / 14	23 / 22 / 21 / 20	30 mths
24 mths			12 / 11 / 10	17 / 16 / 15	15 / 14	13 / 12	14 / 13 / 12	17 / 16	13 / 12 / 11	19 / 18 / 17 / 16	24 mths
18 mths			9 / 8 / 7	14 / 13 / 12	13	11 / 10	11	15 / 14	10 / 9 / 8	15 / 14 / 13 / 12	18 mths
15 mths			6 / 5	11 / 10	12	9	10 / 9 / 8	13 / 12 / 11	7 / 6	11 / 10 / 9	15 mths
12 mths		12	4 / 3	9 / 8	11 / 10	8 / 7	7 / 6	10 / 9 / (8)	5 / (4)	8 / 7 / 6	12 mths
10 mths		11 / 10	(2) / (1)	7	(8)	6	(5)	7	3	5 / 4	10 mths
8 mths		9 / 8 / (7)		6	8	(2)	4	6	2	(3) / 2	8 mths
6 mths	9 / 8 / 7	6 / 5 / 4		(5) / 4	7 / 6	4 / 3	3	5 / 4	1	1	6 mths
3 mths	6 / 5 / 4	3		3 / 2	5 / 4	2	2	3 / 2			3 mths

C.A. 8 mths

• Case No. 002050

The health visitor considered that this 30-month-old child was developing normally, though she was a little concerned about speech. This is confirmed by the *SGS II* profile, Figure A.22, which shows a significant delay in the Hearing and Language field of two age intervals below his age line. On the *Denver* test, all items at the expected level were passed in the four major fields of development including language. The *SGS II* profile also suggests a possible mild general delay as development in four of the seven fields was one age interval below the expected level. The profile can be shown to the mother to explain the pattern clearly; she could then look at the Record Form to see the actual items that the child has already achieved and may be expected to achieve in future. This can be done without generating the anxiety that may occur if items are tied to specific age levels. The detailed Record Form can then be used for follow up and progress documented.

Figure A.22

Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)
Skill Areas											
60 mths			20 / 19	28 / 27	20	21 / 20	22 / 21	24	23 / 22 / 21	34 / 33 / 32	60 mths
48 mths			18 / 17	26 / 25 / 24	19	19 / 18	20 / 19	23	20 / 19 / 18	31 / 30 / 29 / 28	48 mths
36 mths			16 / ⑮	23 / 22 / 21	18 / 17	17 / 16	18 / 17	22 / 21 / 20	17 / 16	27 / 26 / 25 / 24	36 mths
30 mths			14 / 13	20 / ⑭	16	15 / 14	16 / 15	⑲ / ⑱	15 / 14	23 / 22 / 21 / 20	30 mths
24 mths			12 / 11 / 10	17 / 16 / 15	15 / ⑭	13 / 12	⑭ / ⑫	17 / 16	⑬ / ⑫ / 11	19 / ⑱ / ⑰ / 16	24 mths
18 mths			9 / 8 / 7	14 / 13 / 12	13	⑪ / 10	11	15 / 14	10 / 9 / 8	15 / 14 / 13 / 12	18 mths
15 mths			6 / 5	11 / 10	12	9	10 / 9 / 8	13 / 12 / 11	7 / 6	11 / 10 / 9	15 mths

C.A. 30mths

- Case No. 002048

  The health visitor was a little worried about the speech and language development of this 30-month-old child. The *SGS II* Profile Form shows a significant delay in the Speech and Language field of three intervals below the age line. The Cognitive field is also significantly delayed at two age intervals below the line. These two findings are very suggestive of a true developmental delay affecting language and cognition. Although Social fields were at normal levels, the other fields were also one age interval below the age line, and so consistent with the impression of a developmentally abnormal child. However, on the *Denver* test, all items in the four major fields of development were age appropriate and therefore did not show any demonstrable developmental delay. The *SGS II* results suggest the need for review or referral, and the Profile Form should be given to the mother to demonstrate the concern. She can then be shown the Record Form to see the specific items that need to be addressed. The details on the form are kept for documentation of progress.

Figure A.23

					Skill Areas							
Age (months)	Passive Posture	Active Posture	Locomotor	Manipulative	Visual	Hearing & Language	Speech & Language	Interactive Social	Self-Care Social	Cognitive	Age (months)	
60 mths			20 / 19	28 / 27	20	21 / 20	22 / 21	24	23 / 22 / 21	34 / 33 / 32	60 mths	
48 mths			18 / 17	26 / 25 / 24	19	19 / 18	20 / 19	23	20 / 19 / (18)	31 / 30 / 29 / 28	48 mths	
36 mths			16 / 15	23 / 22 / 21	18 / 17	17 / 16	18 / 17	22 / 21 / 20	17 / 16	27 / 26 / 25 / 24	36 mths	
C.A. 30mths 30 mths			14 / 13	20 / 19 / 18	16	15 / 14	16 / 15	19 / (18)	15 / 14	23 / 22 / 21 / 20	30 mths	
24 mths			(12) / (11) / 10	(17) / 16 / 15	15 / (14)	13 / (12)	14 / 13 / 12	17 / 16	13 / 12 / 11	19 / 18 / 17 / 16	24 mths	
18 mths			9 / 8 / 7	14 / 13 / 12	13	11 / 10	11	15 / 14	10 / 9 / 8	(15) / 14 / 13 / 12	18 mths	
15 mths			6 / 5	11 / 10	12	9	(10) / 9 / 8	13 / 12 / 11	7 / 6	11 / 10 / 9	15 mths	
12 mths		12	4 / 3	9 / 8	11 / 10	8 / 7	7 / 6	10 / 9 / 8	5 / 4	8 / 7 / 6	12 mths	

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The *Schedule of Growing Skills II* is a developmental screening procedure designed for use by health visitors, general practitioners, paediatricians and other professionals involved in the care of young children from birth to five years old.

Based on the first edition of the *Schedule of Growing Skills*, this new edition has been trialled extensively and standardized to make it a reliable and statistically valid tool. A Cognitive element has been derived from the existing nine skill areas, and information about the validity of *SGS II* is provided. This edition also includes revised and expanded administration instructions, attractive new testing materials and a wide-ranging discussion of *SGS II* as part of a comprehensive child health programme.

The Reference Manual studies the development and standardization of the *Schedule of Growing Skills II* and its relationship to previous studies and screening procedures. It also contains discussion and practical suggestions on how to implement *SGS II* within a wider health district policy on child health surveillance, promotion and screening. Expanded chapters on specialist speech, language, hearing and gross motor development screening are included.

The *Schedule of Growing Skills II* includes:

- a Reference Manual that discusses the development and implementation of *SGS II*.
- a User's Guide that gives information on how to administer, score and interpret the assessment.
- a Picture Book and other testing materials to be used in conjunction with the User's Guide.
- Record and Profile forms to trace the child's development in the nine different skill areas as well as in the new Cognitive section.

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