A STUDY OF THE PREVALENCE OF LANGUAGE DIFFICULTIES AND SPEECH INPUT DEFECITS IN RECEPTION AGE CHILDREN IN MAINSTREAM SCHOOLS AND WHETHER THESE CHILDREN ARE KNOWN TO SPEECH AND LANGUAGE THERAPY SERVICES

AMY EASTON

SEPTEMBER 2005

Submitted in partial fulfilment of the Msc in Speech and Language Sciences

Department of Human Communication Science
University College London

ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106-1346

CONTENTS

Abstract

Standardised language assessments and a speech input processing assessment were administered to 255 reception age children in mainstream schools in West Sussex LEA in January 2005.

Overall prevalence rates of language difficulty (including speech input processing difficulty) were found to be 24%. This figure was calculated using a SD cut off of –1.5 and a failure of 1 or more of the assessments and was found to be a considerably higher prevalence rate than was found in similar previous studies.

The gender ratio of children with language and/or speech input processing difficulties was found to be 2.49: 1 males to females and this is comparable to gender ratios in previous studies.

Of the children categorised as having a language difficulty by the screening tests administered 37.1% were known to Speech and Language Therapy Services. This percentage was increased to 53.8% when looking only at children who had failed 2 or more of the assessments.

Of the children who had only failed SIPc (the speech input processing assessment) and not either of the language tests the percentage known to Speech and Language therapy services was 18.2%.

Introduction

Prevalence of language difficulties in children

Prevalence means the percentage of cases in a given population at a specific time and is further defined by Enderby and Phillip (1986) as 'the total number of people with speech and language disorder at any one time in a population' (p156). This differs from incidence as incidence refers to the number of new cases in a given population.

There have been a number of studies carried out to ascertain the prevalence of certain speech and language disorders in past years.
Many of these studies were carried out in the 1970's and 1980's and the most recent publication concerning prevalence, by Law et al (2000), is a review of previous prevalence studies. The prevalence statistics quoted by these different studies often vary widely, and it is difficult to ascertain which, if any of these are accurate. The reasons for this include the inclusion or exclusion of certain criteria or pathologies in children by different studies (i.e. autism, developmental delay, or SLI); the different assessments used by different researchers; and possibly a lack of distinction between children with real language deficits and those with delays that are linked to socio-economic status or cultural difference. With this in mind, we can however still gain some idea of the prevalence of language difficulties in reception age children by investigating the methods and criteria used in previous studies, and excluding studies, for example, that solely concentrated on speech delay or disorder as opposed to language difficulties.

Law et al (2000) report that the median estimate for prevalence of language delay only in children aged approximately 5 years old is 6.8%.
This figure is calculated from a range of previous studies such as Beitchman et al (1986), Silva et al (1983), Tomblin et al (1997), Tuomi & Ivanoff (1977) and Dudley and Delage (1980 as cited in Law 2000) which between them

state a prevalence rate of between 2.4% and 10.4% for children aged five, with language delay.

This calculation of prevalence however, only covers children with language delay in isolation and not children who have both speech and language delay. This means that the rate of prevalence for those children with language delay in isolation and those with language delay co-existing with speech delay/difficulties combined is likely to be higher than the calculated rate of 6.8%. The only study to separate these factors out and therefore make it possible to combine the figures for language delay only and language delay combined with speech difficulties is Beitchman et al (1986), and this gives a rate of 12.6%.

The rates of prevalence in different studies varies quite widely and this is due to a number of factors, as have already been briefly mentioned. Beitchman et al (1986) aimed to establish the prevalence of speech and language disorders in children aged 5, attending English speaking schools in the Ottawa region of Canada. 1655 children were assessed via a speech and language screening battery of assessments. All children failing to reach the cut-off point in this screen were then assessed further in a more intensive battery of tests. Only children scoring below the cut-off points for these further assessments were classed as having a speech or language impairment. The overall prevalence rate of speech and language difficulties in this sample of children was found to be 19%. However, this figure is a statistic which combines children who have language difficulties and those who have speech difficulties, as well as those who have both. Beitchman et al also made estimates, using their statistics and looking at particular assessments, on the prevalence of the children from the sample with language problems only (8.04%), speech problems only (6.4%) and speech and language problems combined (4.56%) (Beitchman et al 1986). This therefore means that Beitchman found a prevalence rate of 12.6% for children with language problems (which is reached by adding the figure for language problems only to the figure for speech and language problems, so that it incorporates any child with a language problem either in isolation or combined with another difficulty.) The prevalence found by Beitchmen for language delay only is similar to the rates found by Tuomi and

Ivanoff (1997) of 6-7% for language delay in 5 and 6 year old children in Canada.

Many further studies did not distinguish between language difficulties and speech difficulties or other communication difficulties such as fluency and voice. This makes it difficult to compare prevalence rates to each other as they are assessing different difficulties. Many other studies have also researched the prevalence of speech and language difficulties amongst the pre-school population. Whilst this data is incredibly useful ordinarily, our own study focuses on the language difficulties and speech input processing difficulties of school age children and it is not relevant to compare the prevalence of difficulties in this age group to those of children aged 18 months or 2 and a half years. The main reason for this is that children who have delayed speech or language at such an early age will quite often 'catch up' with their peers by the age of 3 or 3 and a half. For example, Rescorla (1984) as cited in Adams, Byers Brown and Edwards (1997) studied 2 year olds and found a 10% rate of language delay in her sample, but when testing 3 year olds found only a 3-5% rate of language delay and explained this discrepancy as being due to the fact that some 2 year olds will have gone on to develop normal language by the age of 3.

Types of assessment used and criteria for failure of an assessment in previous studies

The studies which looked at prevalence of language difficulties each used a different battery of assessments to test the participants. For example, Tuomi and Ivanoff (1977) used an initial screen whereby undergraduate speech and language therapy students judged a child's response to the question "What do you do at home?" as well as some picture description. The children who it was decided had failed this screen (as judged by the undergraduate students using their knowledge of normal child development), were then tested with the Peabody Picture Vocabulary Test (a measure of single-word receptive vocabulary); the Carrow Screening Test for Auditory Comprehension of Language and the Illinois Test of Psycholinguistic Abilities.

Beitchman et al (1986) also used a two stage screening test. During phase one of their study, which took approximately 30 minutes to administer, the following tests were done – Bankson Language Screening Test (which assesses expressive language including semantic knowledge, morphology, syntax, visual perception and auditory perception.); the Screening Test for Auditory Comprehension of Language (STACL).
For children who failed stage one and went through to stage two testing, the following assessments were used – The Test of Language Development (TOLD) (which measures receptive and expressive language and covers phonology, syntax and semantics); The Peabody Picture Vocabulary Test and The Goldman-Fristoe-Woodcock Auditory Memory Tests (Memory for content and Memory for Sequence subtests).

Criteria for failing an assessment or assessments also influences the prevalence rate and means that studies cannot necessarily be directly compared when using different cut-off points for classification of failure.
In Law et al's (1998) review of prevalence studies it is stated that "the majority of studies took diagnostic assessment score cut-offs between –2 and –1.5 SD's below the mean" (p12)

In one study by Paul et al (1992) (as cited in Law et al 1998) of speech and language difficulties in children aged 2 to 9, a cut-off point of –1 SD was used and this meant that a prevalence rate of 19% was found. Whilst not directly comparable to many of the other studies as speech difficulties were not separated from language difficulties, it shows that a more liberal cut-off point can have a large impact on the consequential calculated prevalence rate and it could be considered the figure reached does not reflect true clinical cases as there are a number of reasons a child could fail one assessment by only –1 SD. From a clinical point of view -1 SD is not statistically significant and is actually within the normal range.

In the study by Tomblin (1997), of language delay a prevalence rate of 7.4% was reached even though a fairly liberal cut-off point of –1.25 SD was used

and this may have been because failure of two assessments was needed before the child was accepted as having a language difficulty.

Speech Input processing problems and Auditory processing disorder

No prevalence data was found on speech input processing difficulties in children of reception age.
However, "over the past 20 years, a theory of central auditory processing disorder (CAPD) has been constructed according to which persons with unimpaired auditory sensitivity may have degraded spectral or temporal acuity or speech recognition, with serious consequences for academic performance and language learning" (Watson et al 2003, p170).

Two studies that have focussed on auditory processing abilities in children are Pinheiro and Musiek (1985), and Sanger et al (1987) (as cited in Watson et al 2003.) Watson et al examined these studies and estimated that "approximately 30% (of children).... were found to have auditory processing abilities in a range that has sometimes been considered evidence of a central auditory processing disorder." (Watson et al 2003 p170) Most of the assessments in these studies are standardised tests of the children's ability to understand speech under difficult listening conditions. These studies found that the difficulties were virtually unrelated to reading achievement. Yet other research has suggested that auditory processing problems and speech input problems can be linked to literacy difficulties as the child gets older. (Vance 1994) states that "poor auditory discrimination and phonological processing skills might have a marked effect on verbal and lexical development", while Treiman et al (1998) state that difficulty in perceiving the units of sound which make up a word can lead to delayed development of reading and spelling skills.

Socio-economic status as a factor affecting language development

Bishop (1997) stated that 'social background is another factor known to relate to rate of language development in the population at large'. (p38)
The theory of 'verbal deprivation' which suggests that children present with poor language skills because they receive inadequate models of language at home has now been widely discredited. However, it remains true that 'many children of families from lower socio-economic groups present with a marked difference in performance between home and school environments, the conclusion being not that they do not have the necessary language skills but that they do not display them in less familiar contexts." (Law et al 1998 p2)
This has obvious implications regarding prevalence studies where the children are assessed in the school or clinic environment and may not perform to the best of their abilities. This would further skew prevalence results if the population assessed for the prevalence study had a particularly high number of children from a low socio-economic group and could then not be said to represent the prevalence of language difficulties in the wider population.

There are also issues surrounding the validity of data gained about socio-economic group in previous prevalence studies. Some studies were carried out "in areas with a relatively advantaged population (Burden et al 1996, Rescorla et al 1993)" (Law et al 2000 p 174)
Other studies differed in the factors they took into account when stating a participant came from a low socio-economic background. For example, The national Index of Multiple Deprivation, was used by Broomfield and Dodd (2004) (though this was an incidence study, not prevalence study). Beitchman et al used the terms upper, middle and lower class and defined these from the income limits used in the national population census (e.g. those earning less than $20,000 were considered lower class – and this class made up 28% of their sample)
In Britain pupil's eligibility for free school meals has often been taken as a measure of the socio-economic conditions of a schools population. In 2004 the national average of pupils in England entitled to free school meals was 14.3% (www.healthedtrust.com/indicates/schoolmealreport.html)

Gender

Most literature on speech and language difficulties accepts the idea that there is a greater rate of difficulties amongst males than females, and support for this has been found in many prevalence studies. Law et al (2000) found that in their review of previous studies of prevalence of speech and language difficulty in children, the male to female ration ranged between 1.3: 1 and 2.3:1. Stevenson and Richman (1976), for example, as cited in Tomblin et al (1997) reported "a male to female ration of 2:1 for language disorder within the 3-year-olds studied. When children with mental retardation were eliminated, the ratio declined but still favoured the males. Likewise, in the study.....by Fundudis, Kolvin and Garside (1979), as well as another study by Silva (1989), a 2:1 male to female ratio was found for language impairment."(Tomblin et al 1997 p1247)

Whilst taking these gender ratio's into account when looking at the prevalence data for children with language difficulties, it must also be stated that it is generally agreed that "girls develop a range of linguistic abilities earlier than boys, though there is a large degree of variation amongst both groups" (Bornstein et al 1998), This is particularly important to bear in mind when assessing the younger aged children e.g. reception class age, who are still developing their language skills rapidly.

Some assessments take into account the gender differences when giving standardised scores. For example, the Linguistic Concepts sub-test of the pre-school CELF (Wiig et al 2000) uses standardised scores split not only into age group but also gender, as it was recognised during standardisation that the boys assessed were gaining scores significantly lower than the girls.
In contrast the Renfrew Action Picture Test (RAPT) (Renfrew 1988) is only split into age groups for the purpose of standardised scores. This is because "in each age group the norms for boys were very slightly below those for girls but in no case was the difference statistically significant."(Renfrew 1998 p 17).

SLT referrals

When investigating prevalence data of language difficulties in a given population, it is interesting to note the percentage of children in that population who receive or have received speech and language therapy.
There has been no previous study which directly compares the prevalence rate with the number of referrals from that population to SLT services.
However, in Broomfield and Dodd's (2003) study they investigate the nature and severity of impairments that children referred to SLT services present with, along with age and source of referral.

Their study covers the paediatric SLT service of Middlesbrough Primary Care trust, and although only a study of one trust, is of value because there is no current national incidence data available for paediatric speech and language disorders. The incidence rate in this study was calculated as 4.5% for receptive language disability and 3.7% for expressive language disability, which gives a total incidence rate of 8.2% for children with some kind of language difficulty.(Broomfield and Dodd 2003). This was calculated by using the number children who were referred to SLT and attended the initial appointment in a single year, and the average number of annual live births in the local population. Unfortunately no study has been done to compare this incidence rate of referrals, with the prevalence rate of children with speech and language difficulties which has been gained by screening a sample of the same local population. Therefore while the data is of some use, it is not possible to give an indication of how many children with speech and language problems actually get referred to SLT and by what age. It is also necessary to note that the figures in Broomfield and Dodd cover the whole paediatric age range from 0 – 16 years old.

The incidence rate data only included those children who had attended for their initial assessment. There are many children each year who may be referred to SLT but do not attend their initial appointments. Some reasons for this suggested by Broomfield and Dodd, include SLT having a low priority due to other circumstances the family have; difficulties using public transport to

access clinics and lack of information about SLT given to the parents. Broomfield and Dodd state that it is estimated that 12.5% of people fail to attend outpatient hospital appointments, which can give some indication of the percentage of people who do not bring their children to the initial SLT assessment once referred.

SLT service provided to school age children

Edwards et al (1989) (as cited in Broomfield and Dodd (2003), found that children with expressive language difficulty were most likely to be referred during school age.

A study by the Department of Education and Employment, Department of Health and the Welsh assembly found that speech and language therapy services vary greatly in size and in their SLT: child ratio, with a mean of one SLT to 4257 of the child population. The survey also found that the caseload was highest for children aged 5 to 10 and that prioritisation was usually by severity of need. (Lindsay et al 2002)

A study of the prevalence of language difficulties and speech input processing deficits in reception age children in a mainstream school and of how many of these children are known to SLT services.

This study aimed to find the prevalence of language difficulties and speech input processing deficits in reception age children in mainstream school. It also looks at how many of the children found to have difficulties are known to Speech and Language therapy services. Whilst, some of the previous studies that have been discussed have incorporated speech difficulties into their prevalence figures, or have been testing children older or younger than reception age, this study is only concerned with reception age children who have speech input processing difficulties and/or language difficulties. The previous prevalence figures, therefore, are interesting figures but it must be remembered that can not always be a direct comparison between certain previous prevalence study outcomes and the outcomes of this study

Method

Design

A number of different research questions were being addressed in the design of this experiment. They were:

1) Out of all the participating children, what is the prevalence of a) Poor speech input processing, b) poor language skills, c) Poor speech input and/or language skills (i.e. overall prevalence of children with a), b) or both.)

2) Of the children who were more than -1.5 std away from the standardised norm, how many with a) poor speech input processing and b) poor speech input and language processing , are known to SLT services.

3) Of the children identified as having poor language skills, will there be more boys than girls?

The answer to the first two questions was calculated using the percentages of children in each group e.g. percentage of children with poor speech input processing and percentage of those children who are known to SLT services etc.

For the third question, the chi-squared test was used with the dependent variable being children with poor language skills and the independent variables being 1) boys and 2) girls.

There was one experimental hypothesis, which was:

H1 - Of the children with poor language skills there will be a significantly higher number of boys than girls.

H0- Of the children with poor language skills there will not be a significantly higher number of boys than girls.

Participants

The participants in this study were English speaking children in reception classes in mainstream schools. The schools were all in West Sussex LEA.

8 Schools in the area were contacted and agreed to take part in the study. Information about the study along with consent forms was then given to the parents of the children in the school's reception classes. Only children with returned consent forms participated in the study.

As far as can be known the children taking part in the study did not have any learning disabilities or English as an additional language, which may have influenced their test scores, however accurate information regarding this was not obtained from the school or parents due to time constraints involved in the study.

However, the area the schools are in is not noticeably multi-cultural area and only one child was suspected by the testers to have English as an additional language. There was also one child who would not or could not co-operate with testing and the teacher then revealed the child had a statement of special educational needs and due to the child's lack of cooperation did not appear in the assessment results. There may well have been children with some form of learning disability (though not severe as they would not have been at the mainstream school) who did take part in assessment, but as the study is simply a study of the prevalence of children in mainstream reception classes with language difficulties then this is acceptable and the children tested can be considered to be a representative sample of reception age children in the West Sussex area.

It was not possible to gain specific information on the individual socio-economic status of the participants in this study. However, to gain an idea of the socio-economic status of the population in the schools from which they come, the percentage of pupils at the schools entitled to free school meals was gained from the Pupil Level Annual Schools Census (West Sussex LEA).

The percentage of full-time pupils in each school entitled to free school meals ranged from 4.85% to 15.19%.
The mean percentage of pupils from all schools in the study entitled to receive free school meals was 10.8%.

255 children completed the study. None of these children were known to the researchers.

The children were each assigned a number which was then used to link the child with their age, gender, assessment results and whether they were known to SLT services once they had been assessed by the researchers.
The children were all aged between 4.04 years and 5.42 years and there were 121 girls and 134 boys assessed.

Materials and Stimuli

The participants were assessed using the Linguistic concepts sub-test of the Pre-School CELF (Wiig et al 2000), the Renfrew Action Picture Test (Renfrew 1988), the Children's Non-word Repetition Test (CNRep) (Gathercole and Baddeley 1996) and the Assessment of Speech Input Processing in Children (SIPc).

The CELF, RAPT and CNRep are all widely used, standardised assessments for school age children.
The SIPc is a new assessment developed by Dr Maggie Vance of the Department of Human Communication Science, University College London to assess children's speech input processing.
The CELF linguistic concepts subtest involves stimulus of a book of pictures which the child looks at and points to various items in the book when asked to be the test giver. For example, on a page with various animals, the child will be asked to "point to the cat and then to the bird".
The RAPT involves the child being shown a series of picture cards and being asked questions such as "What is the girl doing?" and "What has been done to the dog?". The grammatical phrasing of the questions means that the child

is being tested on their ability to answer the question in the correct tense as well as give the correct information about what is going on in the picture.
The CNrep involves the child listening to some non-words (e.g "blonterstaping") (traditionally on a tape but a computer was used in this study to play back the words to the child through headphones). The child then has to repeat the words as best they can and their responses are tape recorded.

SIPc presents to the child a series of tasks of speech discrimination via computer. There are two tasks available on SIPc – the Picture Name Recognition Task and the XAB Non-word Discrimination Task. For the purposes of this study only the XAB Non-Word Discrimination Task was used. This is a computer presented task for which the child wears headphones for to hear the sound. The child is required to identify which one out of two stimuli (A or B), matches a third (X). "The task is presented as a game. The format is of aliens in space ships, in which the child hears one alien say X, e.g. 'fol' and then hears two further aliens say A and B, e.g. 'gol' and 'fol' and identifies which one of these two stimuli matches the first. All sets of stimuli differ by one phoneme and the minimal contrasts between the stimuli vary in terms of anticipated difficulty of discrimination."
(www.ucl.ac.uk/~sslymag/Listening/sipc.html)

The task is presented with no background noise and then against a background noise of multi-talker babble at a sound/signal ration of 2 dB. The task is presented exactly the same under the two conditions with the only variable being the background noise. This enables a direct comparison of the child's performance under each condition, and this can then be compared against normative data to see whether the child is having more difficulty than would be expected of a child of the same age in one or both conditions. Over the practice and task blocks in the XAB Non-word discrimination task, 75 responses were needed from each child. The items are presented in blocks, with 15 responses being needed in each task block (e.g 15 responses for block 1 normal condition, 15 responses for block 1 noisy condition and the same for block 2, making a total of 4 blocks within the task and 15 responses needed for the practice block which is done in normal conditions.

Procedure

The data collection was carried out by 9 different researchers. Each participant was seen once as long as there was time to complete all the assessments at that time. Some children completed the assessments on different days either due to time constraints and fitting around the school day (i.e. break and lunchtimes) or because the child lost attention and it was considered more appropriate to do the assessment battery in two parts for those children.

Each child was taken individually from his/her class to a quiet area within the school. The area differed from school to school with some designated areas being quieter than others. For example one school had a separate room just for the researcher and child, whereas another school gave the researcher a curtained off section of the school library next to the school hall where P.E lessons were going on. In two schools where two researchers were occasionally carrying out assessments on the same day the same room was used for both researchers and the children they were assessing.

The assessments were presented to each child in a random order. The CELF linguistic concepts subtest was administered as a language screen, in accordance of the guidelines in the assessment manual. The RAPT was administered in accordance with the guidelines of the assessment manual; the child's responses were tape-recorded for later data analysis and scoring. The CNrep was administered according to the manual guidelines, however instead of tape-recorded words being played to the child for them to repeat, the words were recorded onto a computer programme which the child listened to through headphones and repeated the words after hearing them. The child's responses to the CNrep were tape-recorded for later analysis, however for the purposes of this particular study, looking at the prevalence of children with speech input processing difficulties and language difficulties, the results of the CNrep were not analysed as the CNrep highlights speech difficulties as well as auditory memory difficulties, neither of which needed to be considered to answer the research question.

The SIPc was carried out in accordance with the instructions given by the developer of the assessment, Dr. Maggie Vance, during a training session for all the researchers on how to administer the test. Some participants undertook the mouse test prior to starting the SIPc assessment, which required them to manipulate the mouse to move and click on a bouncing baby on the screen. This was to ensure that the choices they made during the assessment were the choices they intended to make and not due to poor mouse control. It became clear however that this was a time consuming part of the procedure as was allowing the participant to use the mouse themselves during the complete assessment. Therefore for some participants, the researchers changed the procedure so that the participant could point to the computer screen and the researcher would use the mouse to click the choice made by the participant.

Prior to the actual tasks where the scores were recorded automatically by the computer, the participants were required to undertake a practice test which enabled the researchers to ensure that the child understood the aim of the task and to give further explanation if necessary before the actual recording of test scores began.

Due to the length of the SIPc assessment, the blocks of either quiet or noisy conditions (which were again chosen randomly for each child) were often separated either by a few minutes free play with toy animals, or by switching to another assessment due to time constraints. The assessment which was done in between the parts of the SIPc involved doing something very different as a change for the child and to regain their attention.

The results for each child's assessments were scored at the end of each day and any remaining scores and score standardisation was completed within the following two weeks. The results were scored in accordance with the assessment manuals. The CELF linguistic concepts subtest yields a raw score which was then converted to a standard score based on the child's age and using the test manual. The RAPT scores were standardised using charts in the manual after calculating the Z scores. In the case of SIPc, the results

were automatically recorded by the computer throughout the assessment in a separate file for each participant – marked with the participant's number so as to remain anonymous.

Results

The results of the assessments were analysed in order to answer the research questions, previously listed in the methodology. The CNrep results were not used for this particular study, and whilst they are included in the appendices alongside the other assessment results they have not been used in any resulting statistics.

Descriptive statistics

The following descriptive statistics are based upon all 255 children that took part in the assessments.

	N	Minimum	Maximum	Mean	Std. Dev
Age (years)	255	4.04	5.42	4.830	.2917
CELF standard score	254	3	16	8.69	3.249
RAPT standard score	250	-3.35	1.94	-.1105	.953
SIPc - quiet condition Raw score	250	9	30	23	4.67
SIPc – noisy condition Raw Score	250	11	27	18.4	3.28
Valid N (listwise)	249				

Table 1 Descriptive statistics for the scores of the CELF, RAPT and SIPc

Full statistics of each child's assessment scores and each child's age, gender and whether in receipt of SLT treatment were also documented.

The descriptive statistics table shows that the mean age for the 255 participants was 4.8 years, with the youngest participant being 4.04 years and the oldest participant in the study being 5.42 years.

The table shows that the CELF standard scores ranged from 3 to 16, with the mean being 8.69. This was out of 254 participants as 1 participant did not complete the CELF assessment.

The RAPT standard scores were completed for 250 participants, with 5 participants either not completing the RAPT assessment or having their data lost due to researcher error during tape recording, however as this is only a small number of participants it should not affect the study outcome.
The minimum standard score for the RAPT was –3.35 and the maximum score was 1.94.

The SIPc data shows the raw scores for both quiet and noisy conditions. The minimum score in the quiet condition was 9 and the maximum was 30 (this was a score out of 30). The mean was 23.
For the noisy condition, the minimum score was 11 and the maximum was 27. The mean was 18.4.

Overall prevalence of a language difficulty, speech input processing difficulty or both.

The following table (Table 2) shows the numbers and percentages of children failing different assessments out of the total number of 255 children who were assessed.

	Number of children	Expressed as a percentage of the total number of children
Overall prevalence of a language difficulty, speech input processing difficulty or both. Criteria = failing one or more assessment	62	24%
Prevalence of children with poor language skills. Criteria = Failing RAPT and/or CELF but passing SIPc	41	16.07%
Prevalence of children with poor speech input processing skills only. Criteria= Failing SIPc but passing CELF and RAPT	21	8.24%

Table 2 - prevalence of a language difficulty, speech input processing difficulty or both.

Table 2 shows that the prevalence rate for children with a language difficulty, speech input processing difficulty or both combined is 24%.

This figure was reached by using the scores of the RAPT, CELF linguistic concepts sub-test and SIPc. A fail in an assessment was counted a score of –1.5 standard deviations or less in the RAPT and SIPc and the equivalent of

–1.5 standard deviations or less in the CELF sub-test which was a standard score of 5 or below.

Prevalence of children with poor language skills

Table 2 also shows the prevalence of children with poor language skills, as 16.07% which was calculated by a failure of the RAPT and/or CELF either in isolation or in combination with a failure on SIPc.

Prevalence of children with poor speech input processing skills only

Lastly, table 2 shows the prevalence in this study of children with poor speech input processing skills only (and normal language skills), as 8.24% which was calculated by a failure in SIPc but passes for the RAPT and CELF.

Percentage of children failing one assessment only who are known to the Speech and Language Therapy Service

The total number of children known to Speech and Language therapy was 51 out of the 255 children assessed. 28 of these children known to Speech and Language therapy passed all the assessments.

Table 3 shows children who have failed one assessment only (either RAPT, CELF or SIPc), who are known to Speech and Language Therapy Services. That is to say, the children will appear on a database of clients attending therapy or on a waiting list for therapy. It will not show up any child who had been referred for Speech and Language Therapy but who did not attend their initial assessment appointment. It shows 25% of the children who failed one assessment only were known to SLT services.

Number of children (out of 255 participants) failing **one assessment only**	Number of children failing one assessment only who are known to SLT service	Number of children failing one assessment only, who are known to SLT service – expressed as a %
36	9	25%

Table 3

Percentage of children failing one or more assessments who are known to the Speech and Language Therapy Service

Number of children (out of 255 participants) failing one or more assessment	Number of children failing one or more assessments who are known to SLT service	Number of children failing one or more assessments, who are known to SLT service – expressed as a %
62	23	37.1%

Table 4

Table 4 shows that 37.1 % of children who have failed one or more assessments are known to Speech and Language Therapy Service.

Percentage of children failing two or more assessments who are known to the Speech and Language Therapy Service

Table 5 shows children who have failed two or more assessments (either RAPT and CELF, RAPT and SIPc, SIPc and CELF or failure of all three assessments), who are known to Speech and Language Therapy Services.

Number of children (out of 255 participants) failing 2 or more assessments	Number of children failing 2 or more assessments who are known to SLT service	Number of children failing 2 or more assessments, who are known to SLT service – expressed as a %
26	14	53.8%

Table 5

Percentage of children only failing SIPc who are known to the Speech and Language Therapy Service

Table 6 shows the percentage of children who failed SIPc (speech input processing assessment) but passed both the language tests (RAPT and CELF) who are known to SLT services.

Number of children (out of 255 participants) only failing SIPc	Number of children only failing SIPc who are known to SLT service	Number of children only failing SIPc , who are known to SLT service – expressed as a %
22	4	18.2%

Table 6

Gender

The following hypothesis was tested by carrying out a chi-squared statistical analysis.

H1 - Of the children with poor language skills there will be a significantly higher number of boys than girls.

The analysis can be seen on the following page and is labelled as a whole as table 7.

TABLE 7

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
gender * failed or not failed	255	100.0%	0	.0%	255	100.0%

gender * failed or not failed Crosstabulation

			failed or not failed		
			failed	not failed	Total
gender	male	Count	43	91	134
		Expected Count	32.6	101.4	134.0
	female	Count	19	102	121
		Expected Count	29.4	91.6	121.0
Total		Count	62	193	255
		Expected Count	62.0	193.0	255.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.279[b]	1	.002		
Continuity Correction[a]	8.410	1	.004		
Likelihood Ratio	9.502	1	.002		
Fisher's Exact Test				.003	.002
Linear-by-Linear Association	9.242	1	.002		
N of Valid Cases	255				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 29.42.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.191	.002
	Cramer's V	.191	.002
N of Valid Cases		255	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Poor language skills in this case is determined by a child failing one or more assessment out of CELF linguistic concepts, SIPc and the RAPT.

The Chi-squared analysis on page 35, shows that all 255 children were taken into account. There were 134 boys in total and 121 girls in total.
43 boys out of the 134 failed one or more of the assessments. The expected count of boys failing was 32.6.
19 girls out of the 121 failed one or more assessments. The expected count of girls failing was 28.4.

In analysis of the chi-squared results, it was checked that less than 25% of the cells had an expected count of less than 5.
Pearson Chi-square is X^2 = 9.279, the degrees of freedom (df) is 1, and p=.002.
Therefore as p=.002 and is significant, we can accept H1, and say that of the children with poor language skills there is a significantly higher number of boys than girls.

Many previous studies have expressed a ratio of boys with language difficulties to girls with language difficulties, as has been discussed in review of literature. In this study, the ratio of boys to girls has been calculated as 2.49:1
This was calculated by obtaining the percentage of boys failed out of the total number of boys (57%) and the percentage of girls failed out of the total number of girls (23%) and then turning these percentages into a ratio. A comparison and comments regarding this ratio and those from previous studies will be made during the discussion of this study.

Discussion

Accounting for the difference in prevalence rates of language difficulties in children

The results of this study showed 24% of the participants were assessed as having a language difficulty. This is a higher rate of children doing poorly on the assessments than might have been expected and is also a higher prevalence rate than previous studies of similar aged children have found. The closest prevalence rate to the 24% found in this study being 12.6% found in Beitchman et al's (1986) study and 10.4% found in Silva et al's (1983) study of 5 year old children with language delay.

There are many possible reasons as to why such a high prevalence rate was reached in comparison to other studies. One major reason is likely to be the inclusion of SIPc only failures. None of the other studies included a test of speech input processing. Had they done then their prevalence rates would most likely have increased. In this study 8.24% of children failed only on SIPc, meaning their only language difficulty was that they had poor speech input processing skills. If we take the participants who failed only SIPc out of the statistics, we are left with a figure of 16.07%, which represents children who have either receptive or expressive language difficulties or both. This figure of 16.07% is much closer to Beitchman et al's 12.6% prevalence of language difficulties and Silva et al's 10.4%.

However, if we consider poor speech input processing to be a language difficulty worth including in the prevalence (which is the case), then the actual prevalence rate found of language difficulties in this study remains at 24%. It is then, however, difficult to compare directly to other similar previous studies.

The criteria for being included in this rate and being seen as having a speech and language difficulty was failure by at least –1.5 SD of one or more assessments. The standard deviation cut-off was the same or higher as

previous studies and so it is unlikely that the cut-off point alone can be seen as the cause of the high prevalence rate.

The cut off of –1.5 standard deviations was chosen because this is generally the cut-off used in clinics when assessing children for language difficulties. The cut off of a fail in only one assessment or more than one assessment was chosen because of the nature of the screening assessments. The three screening assessment results being analysed (RAPT, CELF linguistic concepts and SIPc) all target different difficulties that a child may have, with the RAPT targeting expressive language, the CELF targeting receptive language and the SIPc targeting speech input processing. Therefore had the cut off been failure of 2 or more assessments then children who had done very poorly in only one assessment would have been missed.

Beitchman et al used a liberal cut-off point of –1 SD for the first stage of the assessments. For the second stage (further assessing children who had failed the first stage) a standard deviation of –1 on any assessment was the criteria for failure. In this stage however a score of – 2 SD or below on any subtest of the TOLD (even if the whole assessment was passed) was counted as a failure. While these cut-offs appear more liberal than the cut-off point for failure used in our study, the resulting prevalence rate was 12.6% for language difficulties which is almost half of the prevalence rate that our study found. Tuomi and Ivanoff (1997) who found a prevalence rate of 6-7% in 5 and 6 year olds, used a first screen that did not have any statistical cut-off point but instead entailed undergraduate speech and language therapy students judging a child's response to the question "What do you do at home?" This has obvious flaws concerning the undergraduates subjective views, and means that although interesting to note, a direct comparison between our studies prevalence rate and Tuomi and Ivanoff's cannot be made.

Beitchman et al used failure of one assessment or more (or one subtest of the TOLD) as the criteria for being considered to have a language difficulty. This is the same criteria used in our study. The justification for using failure of one

assessment or more as a criterion is that all three assessments used target very different aspects of children's language development and possible difficulties. The RAPT targets expressive language, while the CELF linguistic concepts targets receptive language and SIPc targets speech input processing. Therefore it would not have been valid to raise the failure criteria to two or more assessments as a child can quite easily have only a problem with expressive language; only a problem with receptive language or only a problem with speech input processing. These factors may have contributed to the relatively high prevalence rate that was found.

Another reason for a different prevalence rate to previous studies (which in turn differed from each other) is the type of screening test used. As mentioned in the introduction, Beitchman et al (1986) used the Bankson Language Screening Test (which assesses expressive language including semantic knowledge, morphology, syntax, visual perception and auditory perception.) and the Screening Test for Auditory Comprehension of Language (STACL) for stage one of their assessment. This was followed in stage two by the Test of Language Development (TOLD) (which measures receptive and expressive language and covers phonology, syntax and semantics); The Peabody Picture Vocabulary Test and The Goldman-Fristoe-Woodcock Auditory Memory Tests (Memory for content and Memory for Sequence subtests).
Arguably these tests cover a wider range of language aspects combined than the CELF linguistic concepts and RAPT which were used in our study. This is just an example and comparison of one other study to our own study but could account for some of the difference in prevalence rates.

Gender

The ratio of boys to girls in this study was calculated as 2.49 : 1 .This is comparable to the ratios found by previous studies, for example Stevenson and Richman et al (1976) as cited in Tomblin et al (1997) found a ratio of 2: 1, as did Silva (1989).
This shows that although the current study has found a higher prevalence rate to previous studies the ratios of boys to girls has remained at the same level.

This is as would be expected because even if the higher prevalence rate is partly due to cut-off criteria; different types of assessment used; or the introduction of a test of speech input processing; both the girls and boys in the study were assessed under the same conditions, given the same failure cut-off points and same assessments and therefore whilst the prevalence rate may be higher than previous studies have found, the girl to boy ratio has stayed the same.

Socio-economic status

The measure of socio-economic status used in this study was the percentage of pupils in the schools participating in the study entitled to free school meals. Pupils are entitled to free school meals if "their families receive income support or income based job seekers allowance or support under Part VI of the Immigration and Asylum Act 1999. From 6 April 2003, children whose families were in receipt of Child Tax Credit with an annual taxable income of £13,230 or less were also eligible for free school meals" (National Assembly for Wales 2003 – www.statistics.gov.uk)
The average percentage in this study was 10.8% which is below the national average for England of 14.3%. as stated in a report by the Health and Education Trust (www.healthedtrust.com/indicates/schoolmealreport.html). In previous studies on deprivation and from statistics stated on the National Statistics website (www.statistics.gov.uk) schools where 30% of pupils or more were entitled to free school meals were categorised as being deprived. Therefore the schools in our study were not only well below the figure for deprivation but also below the national average, therefore deprivation and the theory of it's connection with early language cannot be a factor in the high prevalence rate of language difficulties recorded in these schools.

Participants known to SLT services

37.1% of children who failed one or more assessments were known to Speech and language therapy services and only 25% of children who failed only one assessment were known to SLT services. There are a number of

possible reasons why these figures are not higher. Firstly, it must be noted that if we look at the percentage of children who failed two or more assessments and are known to Speech and language therapy services it is significantly higher at 53.8% than the percentage of children who failed just one assessment (25%) who are known to SLT services.
This could indicate that either the children who failed just one assessment have more subtle difficulties that have not yet been picked up on by teachers or parents, yet have been discovered by these screening assessments; or that some of the participant's results were false positives. It is possible that a child failed who is actually within the normal range for language, failed on just one assessment due to any number of factors, for example poor attention that day, feeling unwell, being distracted (this is especially true of the participants who were tested in a room with another participant) and other methodological reasons that will be discussed later. If the child is actually within normal range and the failure of an assessment is a false positive then this would explain why they have not been seen by a Speech and language therapist.

However, it must be stated that although the figure increases to 53.8% of participants who have been seen by SLT services when we look at those participants who have failed two or more assessments, this still represents only just over half of the participants judged to have language difficulties by the assessment scores. As these participants have failed two or three out of the three assessments it becomes less likely that these scores are false positives. There may therefore be other reasons why these children have not yet been seen by SLT services.

These children are in reception classes and the youngest child was just 4.04 years. It is possible that at this relatively young age parents may not have realised that their child has difficulties and did not raise their concern with anyone. If they did not access pre-school services then this may be even more likely as teachers or nursery staff who are used to gauging children's abilities would not have been given the chance to pick up on any difficulties.

Other possible reasons include that "the child's language may have been good enough for them to manage at home with family and friends, but not to cope with the demands and expectations of school life." (Speake 2003 p9).
A child may have been referred to a speech and language therapist but did not attend the initial appointment and therefore was not listed on the SLT database as being known to SLT services.
There is also the possibility that "a child who was identified earlier (by a health visitor for example) as 'delayed but progressing normally' may have become 'stuck' so that the gap between the speech and language skills they have and the skills expected has begun to widen." (Speake 2003 p9).

One final reason for the gap between number of children assessed as having language difficulties and number of children being seen by SLT services is the use of SIPc as an assessment.
22 children only failed SIPc, whilst passing the RAPT and CELF. These 22 children make up 61.1% of the number of children who failed on only one assessment. This figure could have a number of implications. It is possible that SIPc has picked up children who have real difficulties with speech input processing but due to their receptive and expressive language being within normal range have not been referred to SLT services. Speech input processing skills are known to have an impact in later language development and the emergence of literacy skills, therefore at reception age these problems may not have become apparent. If this is the case, then it adds value to SIPc and creates a case for SIPc or a similar speech input processing assessment to be used in SLT screening assessments in order to mark out children who may not have particular difficulties currently but who may be at risk later for difficulties which will be affected by their poor speech input processing skills.

The other possibility regarding SIPc accounting for 61.1% of assessment failures when only one assessment was failed by a participant, is that SIPc is creating many false positives. The possible reasons for these false positives, will be outlined in the following section regarding reliability and validity of the study and assessment procedures.

Validity and reliability of the study

There were a number of factors concerning the which could possibly have affected the outcome of this study.

In regards to SIPc, there may have been a small amount of data which did not accurately reflect the child's abilities but instead reflected the fact that they keyboard on the laptop computer used to administer SIPc was sensitive and occasionally the child would hit the keyboard or press it accidentally when pointing to the screen and this would record automatically a score that the child had not intended or it would invalidate that particular item score. Similarly, some children insisted on using the computer mouse rather than pointing to the screen and became uncooperative if they were not allowed to use the mouse themselves. The use of the mouse themselves however did sometimes cause errors when, although able to move the mouse around the screen correctly they accidentally clicked the mouse button at the wrong time and clicked on a choice they had not intended on making. For future use, a way of allowing the researcher to delete a particular item score and re-do that item would be beneficial. However, this should only be used in real errors not just when the child has changed their mind or later thinks they may have got it wrong, instead it should only be used when the child immediately states that they clicked the mouse on a choice they did not mean to make.

Another factor which may have affected the outcome of SIPc, and another possible reason for the high prevalence figures for failing this assessment is the large number of items used in the assessment. Many children complained of being bored or began to get restless and inattentive to the tasks after about 30 items (i.e. two blocks). The researchers often made the decision to break for a while and come back to the assessment but this meant that time restraints were even tighter. Participant's poor attention to the SIPc assessment could well have affected their assessment scores.

Another factor is that no cognitive skills criteria were imposed on the participants in our study. This was because it was a study simply of the prevalence rates in a mainstream reception class and so therefore

incorporated any child who was in the mainstream school. It was not a study of SLI prevalence rates where learning disabilities and other factors had to be excluded. However, we know that in a mainstream school such as the ones in the study there were no children with severe learning disabilities as they would have attended a special school in the area. Other children with more mild difficulties that do affect their language may however have been part of the study. This may again partly explain the difference in prevalence rates to previous studies that used a criterion for excluding children below a certain cognitive ability.

Other factors which could have affected the outcomes of the study include the cases where two researchers were assessing children in the same room as each other. This was distracting for some of the children especially when the children were doing different assessments at different times, and this could have led to some children performing poorly due to inattention rather than actual language difficulties. This only affected a relatively small number of the children assessed, however inattention or loss of attention in general was a problem with other participants, most likely due to their age and the number of assessments being administered in one session.

The last factor which may have affected the prevalence rates and study outcome is the training of researchers. Nine different researchers administered the assessments in different schools and it was the responsibility of each researcher to analyse and score the results of each child they tested. There was a short training session for all researchers administering the assessments before the study began which focused on how to administer SIPc and to check that the researchers were familiar with the RAPT and CELF linguistic concepts and understood how to administer this. Written instructions were also given detailing how to administer SIPc. All the researchers were in the end stages of their SLT training and had had previous experience of administering the RAPT and CELF linguistic concept subtest. The factor which may have affected the statistics gained from the study is the scoring of the assessments after they had been administered. Although the manual was adhered to, certain tests such as the RAPT have small amount of leeway to

allow researchers to give points where they think they are deserved even if the particular words have not been used by that child, but instead something similar. This could be quite subjective and had the researchers all been tested on scoring one particular child it is possible that the scores would have differed. For a future study, more focus on training the researchers to ensure they are all scoring the assessments in a similar fashion and where there is leeway given on how to score an assessment, to ensure that all researchers are scoring in the same way may help validate the results.

In conclusion, an overall prevalence rate of 24% was found for children with a language difficulty and/or speech input processing difficulty.
The hypothesis that "Of all the children with poor language skills there will be a significantly higher number of boys than girls" can be accepted as a gender ratio of 2:49: 1 males to females was found.
The study also found that of the children categorised as having a language difficulty by the screening tests administered 37.1% were known to Speech and Language Therapy services. This percentage increased to 53.8% when taking into account only children who had failed 2 or more of the assessments.

Word Count : 9398

References

Adams, C., Byers Brown, B. and Edwards, M. (1997) Developmental disorders of language, 2nd Ed, Whurr Publishers Ltd, London

Beitchman JH, Nair R, Cleg M, Patel PG. (1986) *Prevalence of speech and language disorders in 5 year old kindergarten children in the Ottawa-Carleton region.* Journal of Speech and Hearing Disorders, Vol 51, 98-110

Bishop, D. V. M. and Edmunson, A. (1987), *Language impaired four-year-olds. Journal of Speech and Hearing Disorders*, Vol 52, 156-173

Bornstein, M. and Lamb, M (Ed), (1998*) Developmental Psychology – An advanced textbook*, 2nd Edition, Lawrence Erlbaum Associates Inc, UK

Broomfield, J. and Dodd, B. (2004) *Children with speech and language disability: caseload characteristics.* International Journal of Language and Comunication Disorders.Vol 39, 3, 303-324

Edwards, M., Cape, J., Foreman, D. and Brown, D., (1989*) Patterns of referral for children with speech disorders.* Child Care, Health and Development Vol 15, 417-424

Enderby, P. and Phillip, R.,(1986) *Speech and language handicap: knowing the size of the problem.* British Journal of Disorders of Communciation, Vol 21, 151-165

Gathercole, S.E and Baddeley, A.D (1996), *The Children's Test of Nonword Repetition,* Psychological Corporation, UK.

Law, J., Boyle, J., Harris, F., Harkness, A. and Nye, C. (2000) *Prevalence and natural history of speech and language delay: findings from a systematic review of the literature.* International Journal of Language and Commuincation Disorders, Vol 35, No. 2, 165-188

Law, J., Boyle, J., Harris, F., Harkness, A. and Nye, C. (1998), *Screening for Speech and Language Delay: A systematic review of the literature.* Health Technology Assessment, Vol 2, No. 9, 1-184

Lindsay, G., Soloff, N., Law, J., Band, S., Peacey, N., Gascoigne, M. and Radford, J. (2002) *Speech and Language Therapy Services to Education in England and Wales.* International Journal of Language and Communication Disorders, Vol 37, No 3, 273-288

Renfrew, C.E., (1988) Action Picture Test (revised), Bicester, Winslow Press

Silva, P.A., McGee, R., and Williams, S.M., (1983) *Developmental language delay from three to seven years and its significance for low intelligence and reading difficulties at age seven.* Developmental Medicine and Child Neurology, Vol 25, 783-793

Speake, J (2003) *How to identify and support children with speech and language difficulties* , LDA Publishing, UK

Stevenson, J., and Richman, N. (1976) *The prevalence of language delay in a population of three-year-old children and its association with general retardation*. Developmental Medicine and Child Neurology Vol 18, 431-441

Tomblin, J. B., Records, N., Buckwalter, P., Zhang, X., Smith, E. and O'Brien, M., (1997) *Prevalence of specific language impairment in kindergarten children.* Journal of Speech, Language and Hearing Research, Vol 40, 1245-1260

Treiman, R., Borderick, V., Tincoff, R. and Rodriguez, K. (1998). *Children's phonological awareness: Confusions between phonemes that differ only in voicing*. Journal of Experiemental Child Psychology, No 68, 3-21

Tuomi, S., and Ivanoff, P., (1977) *Incidence of speech and hearing disorders among kindergarten and grade 1 children*. Special Education in Canada, Vol 51, 5-8

Vance M. (1994) *Phonological processing, verbal comprehension and lexical representation*. Proceedings of NAPLIC Annual Conference, Birmingham.

Watson, C.S., Kidd, G.R, Horner, D.G., Conell, P.J. (2003) *Sensory, Cognitive and Linguistic Factors in the Early Academic Performance of Elementary School Children: The Benton-IU Project*. Journal of Learning Disabilities, Vol 36, No 2, 165-197

Wiig, E.H., Semel, E and Secord, W. (2002) *Clinical Evaluation of Language Fundamentals – Preschool.* San Antonio, TX. The Psychological Corporation

ACTION PICTURE TEST

The Renfrew Language Scales — Scoring Form

NAME [redacted] Track 7.

SCHOOL [redacted]

ADDRESS

DATE OF BIRTH 12/10/99

AGE 5:2

DATE OF TEST 4/1/05

NAME OF TESTER

COMMENTS

SSI - 0.39

SSG - 0.70

PICTURE NUMBER	RESPONSES	INFORMATION SCORE	GRAMMAR SCORE
1.	cudding the bear	2	1
2	PUt the little girls books on	3	1
3.	tied up @ wood	2	1
4.	riding a horse - going over a gate	3	1
5.	Got the mouses	1	1
6.	Fallid over on the stairs - dropped the glasses	5	2
7.	lift the little one up @ passing	2	0
8.	climbing up to get the car @ up on the chimney	3	3
9.	crying - the dogs got his shoe	3	2
10.	The mummy's dropping the apples and the little boy's taking them up.	4*	1
	TOTAL	28	19
	GRAMMAR SCORE EXPECTED		

APPENDIX B

SIPc XAB task Child  Date

Order of presentation

Block 2 ✓	Noisy
Block 1 ✓	Normal
Block 2 ✓	Normal
Block 1 ✓	Noisy

	Normal	Noisy	Difference	
Block 1	11	11	0	
Block 2	14	11	3	
Total	25	22		

Linguistic Concepts

[redacted]

Picture Stimuli	Repetitions	Discontinue Rules
Stimulus Manual 1	None allowed	3 years: 5 consecutive zero scores (errors or no responses) 4–6 years: 4 consecutive zero scores (errors or no responses)

Familiarisation **Look at these animals. Let's see if you know them. Point to the cat** (pause). (Repeat and demonstrate, if necessary.) **Point to the tortoise. Point to the . . . [elephant, monkey, tiger].**

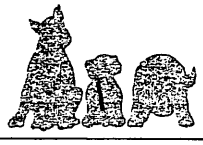
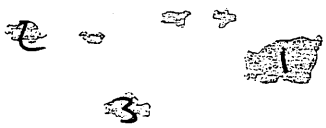
Familiarisation 1 cat, tortoise, elephant, monkey, tiger

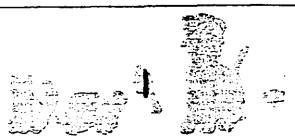
Familiarisation 2 bird, dog, giraffe, fish, bear

Trial 1 Point to the bird that is not flying.

Trial 2 Point to the dog and the monkey.

Circle 1 for a correct response, 0 for an incorrect response, or NR for no response.

			Score	
1.	Point to one of the bears.		1	0 NR
2.	Point to the elephant first, and then point to the giraffe. (The child must point to the elephant first.)		1	0 NR
3.	Point to either the dog or the bird.		1	0 NR
4.	Point to a dog, but not the one that is eating.		1	0 NR
5.	Point to a fish or a cat.		1	0 NR
6.	When I point to a tiger, you point to a giraffe. (The child must point AFTER the examiner points.)		1	0 NR
7.	Point to the cat and then to the bird. (The child must point to the cat first.)		1	0 NR
8.	Point to the elephant next to the giraffe.		1	0 NR
9.	Point to the bear, the tortoise, and the fish. (The child may point in any order.)		1	0 NR
10.	Point to the first elephant in the line.		1	0 NR
11.	After I point to a monkey, you point to an elephant and a giraffe. (The child may point to the animals in any order AFTER the examiner points.)		1	0 NR

		Score		
12. Point to the tortoise before you point to a fish. (The child must point to the tortoise first.)		1	(0)	NR
13. Point to the animal in the middle.		(1)	0	NR
14. Point to the monkey before you point to the tortoise and the cat. (The child must point to the monkey first, and then to the tortoise and cat in any order.)		1	(0)	NR
15. Point to all the animals except the bird. (The child may point in any order.)		(1)	0	NR
16. Point to the last bird in the line.		(1)	0	NR
17. Point to either of the monkeys and all of the tigers. (The child may point in any order.)		1	(0)	NR
18. Point to some of the tigers. (The child must point to two tigers.)		(1)	0	NR
19. Before you point to the bear, point to a tiger. (The child must point to a tiger first.)		1	(0)	NR
20. Point to the giraffe after you point to an elephant and a monkey. (The child must point to an elephant and a monkey in either order before pointing to the giraffe.)		1	(0)	NR
		Raw Score	15	

55 = 9.

Item Analysis for Linguistic Concepts

Category								
					Items			
Coordination and	9	**11**	**14**	**17**	**20**			
Inclusion/Exclusion	1	3	4	5	**15**	**17**		
one, either/or, but not, or, all except, either								
Spatial next to, first, middle, last	8	10	13	16				
Temporal Relation/Order	2	6	7	**11**	12	**14**	19	**20**
first, and then, when, after, before								
Quantitative all except, all, some	**15**	**17**	18					

Commands								
					Items			
One-Level	1	3	4	5	6	8	10	13
	15	16	18					
Two-Level	2	7	11	12	17	19		
Three-Level	9	14	20					

Item Analysis for Recalling Sentences in Context

Category				
			Items	
Simple	active	3	9	
	with noun modification	7	8	**18**
	with negation	**12**	**16**	**18**
	with coordination	5	14	17
	with infinitive	**12**	**18**	
Complex	with relativisation/subordination	13	15	**16**
Imperative		1		
Interrogative	what/where	2	4	6
	with noun modification	10		
	with coordination	11		