Dyslexia, Multilingual Speakers and Otitis Media

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Abstract

Current theories for the underlying causes of dyslexia highlight the role of phonological difficulties in the period of initial schooling. Both magnocellular and cerebellar deficit theories attempt to explain these difficulties in terms of abnormal brain function at birth. However, there is a dearth of evidence relating to the pre-school years. Intrigued by the difficulties of my own children, who had otitis media (OM) at an early age, I determined to assess the incidence and impact of OM in bilingual and multilingual children with reading difficulties. Over a period of eight years, data was collected for the first study on a sample of 1000 bi/multilingual children and adults who were referred for assessment due to identified difficulties along the dyslexia continuum. Of these, 703 had experienced serious bouts of OM and 297 had not. A 70% rate of occurrence is far beyond other incidence figures internationally - a highly significant finding.

Having identified the existence of OM in the cohort, in the next two studies I investigated the impact of the condition. The studies were based on work with 63 of the 1000 families, and the teachers of their children. In no case was a connection made between hearing difficulties at a young age and later learning problems. This was echoed in conversation with those working in ENT who advised GPs on outcomes. There were several findings, which were highly significant for the OM group as opposed to those without OM considering the fact that the group, as a whole, was dyslexic. These were in areas of reading, writing, speed of processing, rote learning, lack of hearing in ax noisy background, anxiety and poor behaviour. It became evident from the results of the studies that there is a prospect of identifying needs of dyslexic children, if there is a background of OM. A fourth study was directed at 74 dyslexic adults from a bi/multilingual background and asked for their perspectives based on specific difficulties experienced by them in the learning process.

The findings are novel in that they suggest that there is a potentially large group of dyslexic children who may not suffer from abnormal brain function at birth, but rather suffer from a phonological and speed disorder that is actually acquired in early childhood via OM. The research has significant implications at theoretical, diagnostic and policy levels.

Preview

Personal Reflections

As Education Director of the British Dyslexia Association (1994 to date), it is a major part of my role to identify and encourage expansion in areas which have been under researched and as a result have led to the exclusion of specific groups of dyslexic people from both the learning process and ultimately successful life skills. Having worked with researchers, my role is then to pursue changes in national and local policy leading to more effective and efficient practice.

At a policy level, my role has led to membership of the government's Literacy and Numeracy Strategy groups as well as membership of Special Educational Needs (SEN) committees in a range of government agencies and work with education authorities. I am additionally senior consultant to the government's flagship program 'Leading for Inclusion', for the National College for School Leadership. The College is responsible for the content and delivery of training courses for head teachers in England. I am attempting to encourage greater understanding through curriculum development of a range of SEN and other inclusion issues for those who are practising head teachers and those who are intending to take up the role in the future.

Having worked in the education system in this country and abroad as a teacher, teacher trainer, assessor and government advisor for over twenty five years, it has become evident to me that although much research and practice has taken place relating to the world of the monolingual dyslexic learner experiencing language and literacy difficulties, very little has been carried out in relation to those dyslexic people who are also bi- or multilingual. This may well be due to the complexities of the compounding factors. Researchers and practitioners need to see this as a hurdle to cross not as a barrier to success. Governments need to see the financing of this as an equal opportunities issue; any other treatment of the condition is questionable.

Furthermore little has been done to investigate the impact of Otitis Media on educational success which affects so many in the early years – the years that are so crucial for language learning and later literacy acquisition. This again was possibly due to the funding regime that until recently kept separate the areas of speech and language and education. Now that this has changed at national level, there is a great need for the expertise of both to be brought together. An example

of working together is the following. Under the guidance of Professor Joy Stackhouse of Sheffield University, formerly of UCL, the BDA worked with AFASIC recently to produce a package aimed at Early Years workers linking speech and language with early success in literacy. As a result, this highly effective package of training is being used in a cross-disciplinary way. Such joint working of health and education specialists should be encouraged to investigate the impact of OM on language development and into the education world. This paper will highlight the strong links between OM and literacy weaknesses in addition to weaknesses with the speed of processing skills that are so necessary for success in the academic world.

At the time of writing I am holding meetings with government ministers and administrators at the Department for Education and Skills discussing the issues of the needs of those bi/multilingual learners who experience dyslexic type difficulties. Appropriate assessment tools and remediation packages for schools need to be designed and made available. Authorities openly admit that they currently do not know where the expertise lies.

In June 1999, I spearheaded the first International Conference on Dyslexia and Multilingualism raising the issues of the need for research, policy and practice in this hitherto mainly unexplored area. Five hundred people from over thirty countries attended the conference – many overseas delegates expressed their experiences and challenges as being very similar to those being discussed in the UK.

In Washington 2002, there will be a second International Multilingual and Multicultural Dyslexia Conference run by the International Dyslexia Association. As a member of the steering group I am aware of the recognition of the level of need expressed by those working in the United States and beyond.

In 2000 together with Dr Gavin Reid of Edinburgh University, I co-edited a book entitled Multilingualism, Literacy and Dyslexia: A Challenge for Educators. In this text there are chapters from international contributors looking for answers, sharing practice and contributing to the little that is known and being done in the field to effect change. In the book I stated the following:

> *'Teachers and psychologists have tended to misdiagnose or ignore dyslexia experienced by multilingual students because of the multiplicity of factors that seem to be causes for failure. Reasons often cited include home background,*

different or impoverished language skills, inefficient memory competencies, unusual learning profile, emotional stress, imbalanced speech development, restricted vocabulary in one or all languages, leading to reading, spelling and writing weaknesses; sometimes numeracy is affected. However educators are often aware that these students are very different from others who experience difficulty, as they are often bright and able orally or visually. The difference between their abilities and the low level of written work is very obvious. There are similar concerns regarding pupils who have specific difficulties while attempting to acquire a modern foreign language.'

Peer and Reid (2000a)

What I hope this thesis will do is add to the limited amount of understanding there currently is in the field of Dyslexia and Multilingualism. I will furthermore highlight the substantial need for funding and expertise in another under researched area, that is the link to Otitis Media.

As I stated in my keynote talk at the First International Conference on Dyslexia and Multilingualism (June, 1999, Manchester) I will continue to suggest ways forward in research, policy and practice which will be determined by two imperatives:

- What we believe *must* happen on ethical and moral grounds relating to equity and human rights; and

- What our knowledge, skills and understanding tell us *can* happen.

(Peer, 1999)

My interest in these particular subject areas has been enhanced by personal experience with my own three bilingual, dyslexic children, all of whom were affected by OM. Watching them grow and documenting their strengths and areas of weakness, it became clear to me that there must be many children experiencing similar difficulties. They were perhaps, my original case studies. Initially my eldest daughter, now aged 23, reading social policy; then my son, the statemented dyslexic boy now aged twenty one and reading architecture; then later my youngest daughter, aged sixteen. The youngest experienced struggles which were quite profound due to significant bouts of ear infection and OM. This is my youngest daughter, Dana whose difficulties and progress I have closely monitored throughout her life. Her learning pattern of strengths and

weaknesses was significantly different to that of 'normal' children. (See Appendix 1). She seemed to have specific characteristics in common with many children I had seen and taught who had experienced similar difficulties, yet had not been identified as SEN. Furthermore, similar frustrations and reactions were evident in some that were considered to be significantly dyslexic.

This research shows that there are high incidence figures among dyslexic learners who have suffered from OM as young children. The sub-group that is bi/multilingual has generally not been identified when young, due to the perception that it is the 'other' language(s) that have caused the problems. As these children's needs have not been identified, they are often left to fail and by default, over the course of time fall into the SEN group. I firmly believe that there is much that can be done at an early age to facilitate success before waiting for unnecessary failure. There are many who, given the appropriate support should never reach the SEN register.

Unknowingly, Dana has undoubtedly been the best teacher anyone could have had. She has given me deep insight as a parent, educationalist and researcher into a condition that is common, yet greatly misunderstood. I hope that her trials and tribulations will have had a purpose, in that through her, many others will have their needs better understood allowing them to succeed without the unnecessary pain and frustration experienced in schools. That is my job.

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1 Section One:

The Changing Face of Dyslexia

Over the past few years there has been rapid growth in the understanding of dyslexia due to knowledge gained in a wide range of areas. When I originally started gathering data for this thesis at the end of the 1980s thinking was predominantly related to the phonological deficit hypothesis - and very little more than that. Even within that area however, no-one seemed to have questioned then or now as to why there was such a deficit; only its existence and ways of attempting to overcome the difficulties. Even today in 2002, whilst other theories are propounded, the phonological deficit hypothesis is still considered to be one of the most significant theories in the fields of research and practice.

1.1 Definition or description:

Over the course of time, research and practice have highlighted the various facets of dyslexia, which in varying circumstances seem to take precedence over one another. It is clear that the definition used will determine research groupings, methodologies and interpretation of results.

Throughout the world, particularly in the U.S.A. and the U.K., debate has taken place, the aim of which is the construction of one definition of dyslexia that meets all needs. It may however be that a 'description' of dyslexia may be more productive than a definition, as it can then be adjusted for use in a variety of circumstances. These may range from research needs, to effective practice or demands for change in policy. In a sense the use of a description rather than a definition makes it not quite so final. Miles (1995) states the following:

> *'Dyslexia is not the sort of concept that can be summed up in a single formula: for different purposes different facets of dyslexia need to be mentioned. As all these may be valid, 'description' may be a better term to use than definition.'*

In relation to research she goes on to say:

> *'There is confusion as to how the word is actually used in practice, and this has affected research.'*

Dyslexia was considered solely a reading problem, until relatively recently (Williams, 1991). At various times a range of hypotheses have been put forward to explain the condition: visual weaknesses – congenital word blindness (Hinshelwood 1917), strephosymbolia (twisting of symbols) (Orton, 1937), auditory deficits, poor parenting, emotional stress, absence from school, social opportunity or even mediocre teaching - depending on the stance of the researcher/practitioner. Even though the first case of dyslexia was recorded in the British Medical Journal in 1896 (Morgan), it has taken until very recently for research to identify the substantial links with patterns of brain function, which have unequivocally verified its existence. This has led to new thinking in terms of research, policy and practice.

Critchley's definition of dyslexia was of immense value in the 1960s and 1970s, but despite being so influential it took a long time after its publication for practitioners and researchers to alter the accepted perception of the condition as it was understood at that time:

> *'The condition is cognitive in essence, and usually genetically determined. It is not due to intellectual inadequacy or to lack of socio-cultural opportunity, or to emotional factors, or to any known structural brain-defect. It probably represents a specific maturational defect, which tends to lessen as the child grows older, and is capable of considerable improvement, especially when appropriate remedial help is afforded at the earliest opportunity.'*
>
> *Critchley and Critchley (1978)*

The Critchley definition had three major aspects of great significance:

- Dyslexia is a difficulty in learning to read.
- Conventional teaching is inadequate for dyslexic children.
- Dyslexia is related to underlying fundamental cognitive difficulties, which are probably constitutional in origin.

Later Miles (1983) discussed the extent of the difficulties relating to dyslexia, which he exemplified in the Bangor Dyslexia Test. Again, Miles concentrated upon reading and literacy as the main focus of the difficulty. Hornsby (1984), expressed the fashionable post-Critchley trend to regard dyslexia as a difficulty in reading and related literacy skills. As they were closely related to those developing materials and methodologies for teaching and supporting dyslexic learners, Miles and Hornsby gave credibility to the assumption that the major problems of the dyslexic learner are in early literacy skills. This had a great effect upon education provision for dyslexic learners, which for a long time was deemed only possible in individual or small group settings. Teachers have tended to concentrate their efforts in 'remedial education', upon improving dyslexic pupils' literacy skills, without consideration of the integrity of the underlying learning skills, a situation which is still common in many contexts today. The results of these limitations have been inconsistencies and inefficiencies in teaching and learning for many dyslexic students. Hornsby and Miles' perspectives on Dyslexia are in accord with the question posed by Liberman (1983):

'Should so-called modality preferences determine the nature of instruction for children with reading disabilities?'

This very influential paper shaped opinions into the 1990s. It makes many valid points, stressing the importance of dyslexic learners being taught employing multisensory approaches to learning.

Liberman argued that reading was the only skill of any significance for dyslexic children. The assumption that dyslexic learners needed only to be taught how to read precluded the development of a range of other higher information processing skills that others later showed to be so important.

For some time, descriptions of the name of the condition were also under debate. In the U.S.A. the accepted term was 'learning disabilities' or 'specific learning disability'. In the U.K. the term accepted by many Local Education Authorities for a long time was 'Specific Learning Difficulties' (SpLD), the name 'dyslexia' being totally unacceptable. Today however, research has advanced so far, that Specific Learning Difficulties have been subdivided into several areas each with their own descriptions and 'treatments'. Areas such as dyslexia, dyspraxia, ADD and ADHD are now recognised in their own right, as specific learning difficulties. Practitioners are increasingly aware of the overlaps of symptomology in the various conditions. U.K. governmental policy has changed, from not recognising the condition to being influenced greatly by cognitive research and the results of effective practice. The Code of Practice (DfEE 1994) employs the term specific learning difficulties (for example dyslexia). The government's Green Paper (DfEE, 1997) uses the term 'specific learning difficulties (such as dyslexia)'. What is of the most significance is that there is clearly no longer any query as to its existence, which was a major issue for debate not too many years ago.

A report by a Working Party of the division of Educational and Child Psychology of the British Psychological Society (1999) sought to draft a definition that would be acceptable as a working definition, not as an operational definition. The working party favoured the basis of the working definition that was produced by the Committee of the Health Council of the Netherlands (Gersons-Wolfensberger and Ruijsseenaars 1997):

> *'Dyslexia is present when the automization of word identification (reading) and/or spelling does not develop or does so very incompetently or with great difficulty.'*

It was felt by both working parties that this definition fulfilled the following criteria. That is, it should be:

- descriptive with no explanatory elements
- specific enough to identify dyslexia within the whole of the severe reading and spelling problems

- general enough to allow for various scientific explanatory models and any developments those models might undergo
- operationalisable for the purposes of research
- directive for statements concerning the need for intervention and applicable to the various groups involved.

(Gersons-Wolfensberger and Ruijsseenaars, 1997)

For the use of a range of stakeholders in the U.K., the working Party changed the word 'automization' as it was considered confusing as it is a term used in causal explanations in work carried out by Nicolson and Fawcett (1995). It was therefore decided by the U.K. working party to 'substitute the term with a phrase referring to fluency and accuracy.'

Therefore the current BPS definition (1999) is:

> *'Dyslexia is evident when accurate and fluent word reading and/or spelling develops very incompletely or with great difficulty.*

This focuses on literacy learning at the 'word level' and implies that the problem is severe and persistent despite appropriate learning opportunities. It provides the basis for a staged process for assessment through teaching.'

The working party stated categorically that the definition should only be considered as a 'working definition', not as an 'operational definition'. This is due to their awareness of the complications that misuse of the definition were likely to cause when authorities needed criteria by which to work in the provision of resources for dyslexic learners.

However despite their best efforts, the definition caused consternation among those working in the various fields related to dyslexia. Those attempting to change policy felt that it was a retrograde step as it limited the understood breadth of the condition. Their claim was that as a result of this definition effective practice and provision for those with dyslexia would be limited. Educational Psychologists as a group felt that it

was a helpful definition as they then had a succinct definition to which they could work when reporting on individual cases. This conflict might be considered an affirmation of some of the difficulties to which Miles referred earlier when a group attempts to produce a definition, which will answer the needs of all stakeholders.

The Code of Practice (DfEE, 1994) whilst supporting the need for provision for dyslexic learners, only refers to the needs of those from monolingual backgrounds. In fact the only reference to the difficulties of children who speak another language is to those who speak Welsh. (Code of Practice 3.61). This oversight is highly significant as it does not take into consideration the needs of thousands of Multilingual students generally and those who are dyslexic specifically, who have literacy weaknesses, and who belong to ethnic minority groups, having a range of diverse language backgrounds. Multilingual dyslexic learners are consistently misunderstood within the framework of the education system today. Peer (1999) Peer and Reid, (2000b):

> *'Teachers and psychologists have tended to ignore the difficulties in learning experienced by these students, because of the multiplicity of factors which are apparently relevant: a non-supportive home background resulting in different or impoverished language skills; unusual learning profile; apparently low intelligence (which sometimes arises out of insensitive testing); unbalanced speech development; and restricted vocabulary in one or more languages. These are assumed to be the relevant factors; that there might be a biological basis for children's reading, writing and spelling retardation is sometimes overlooked, with disastrous consequences.'*

1.1.1 <u>For the purposes of this study:</u>

Research has highlighted differences between 'acquired' and 'developmental dyslexia'. For the purposes of this study, I am referring only to those who fall within the description of 'developmental dyslexia' - that is, where there is no known neurological damage, which has caused weaknesses in the acquisition of literacy skills.

Bearing in mind the limitations of any of the current definitions, I have chosen to use my own description as a basis for discussion in this thesis. It focuses upon both abilities and difficulties and looks at implications for success across the curriculum and beyond:

> *'Dyslexia is best described as a combination of abilities and difficulties which affect the learning process in one or more of reading, spelling, writing and sometimes numeracy. Accompanying weaknesses may be identified in areas of speed of processing, short-term memory, sequencing, organisation, auditory and/or visual perception, spoken language and motor skills.*
>
> *Some children have outstanding creative skills, others have strong oral skills, yet others have no outstanding talents; they all have strengths.*
>
> *Dyslexia occurs despite normal intellectual ability and conventional teaching; it is independent of socio-economic or language background.'*
>
> *(Peer, 1999, 2000, 2001a, 2001b)*

This description is particularly relevant when describing the difficulties experienced by dyslexic learners of English as an Additional Language:

- the speed of processing weaknesses that come from a range of sources including:
  - the stress of the overload of language exacerbated by short term memory weaknesses e.g. translation; information demanded at speed
  - the stress of attempting to remember the shapes and patterns of letters which are specific to particular languages, then produce them at speed

- Tallal, Miller and Fitch, (1993) have looked at speed of processing and time delay. (I believe that the effects of high levels of Otitis Media amongst this specific group will contribute to a time delay in the processing of spoken and often written language.)

- the sequencing weaknesses which will be affected by differing language structures

- the inability to 'hear' specific sounds which are new – leading to problems with speech and spelling – auditory perception

- organisational weaknesses exacerbated by demands from differing linguistic codes

- motor skill weaknesses exacerbated when languages are written in an unfamiliar way e.g. letters not joined; words written in the opposite direction to that which they are used; the movement of the hand to write symbols above and below the letters in addition to the left – right or vertical flow

When multilingual dyslexic children do not appear to be functioning effectively in school, investigation should take place. All too often there are preconceived notions about the ability (or lack of ability) of specific cultural groups; or decisions are made about individuals without an attempt to understand the effects of the specific linguistic background. Furthermore when these children are affected by a history of recurrent episodes of Otitis Media it would appear that even more strain is placed upon the processing system.

1.2 Phonology and Dyslexia

One of the major theoretical achievements of dyslexia research in the past decade was the demonstration that many reading-related deficits were considered attributable to a disorder in phonological processing (Vellutino, 1979; Bradley and Bryant, 1983; Snowling et al., 1986; Stanovich, 1988). Some of the strongest evidence for a phonological awareness deficit derives from a seminal study of sound categorisation deficits in children with dyslexia (Bradley and Bryant, 1978), in which the

experimenter presented a series of words, such as sun, sock, see and rag (with rag the odd one out on the basis of the first letter sound), and the subject had to say which is the odd one out. On all the tasks presented, the children with dyslexia were significantly worse at judging which was the odd one out than were younger children who had reached the same level in their reading. In a later training study (Bradley and Bryant, 1983), which involved pre-readers with deficits in rhyming skills, they investigated the comparative effectiveness of training in rhyming and alliteration skills ('sound categorisation') versus training in semantic categorisation. The group who were trained in sound categorisation made significantly more progress in reading, but equivalent progress in mathematics, providing evidence for a causal link between early phonological awareness skills and acquisition of reading. A series of further studies have confirmed and extended Bradley and Bryant's results both for normal readers (e.g. Hatcher, Hulme and Ellis, 1994) and for children with dyslexia (e.g. Rack, 1985) and have linked the ability to rhyme to knowledge of nursery rhymes, (Bryant et al. 1990).

Phonological awareness is a metalinguistic skill involving knowledge about the sounds that make up words. Three levels of phonological awareness may be distinguished - syllabic knowledge, onset and rime and phonemic knowledge. At the syllabic level, which is the simpler, awareness is measured by a variety of tasks, including tapping out the number of syllables, counting syllables, and deleting syllables. The development of awareness at the phonemic level (e.g. that cat is /c/ /a/ /t/) is far more difficult to acquire (Adams, 1990), and is measured by counting phonemes, dividing words up into a series of phonemes, deleting phonemes, and substituting phonemes. The ability to divide words into onsets and rimes (e.g., that cat may be broken down into /c/, the onset, and /at/, the rime) falls midway in difficulty between syllabic and phoneme awareness. Whilst this theory describes a typical progression of phonological awareness development as from large units to small units, there are others who might offer an alternative view in relation to this issue. For example Seymour et al (1999) and Snowling and Nation (1997) suggest that phonemic awaress, rhyming and learning by analogy are vital components to successful early literacy. They suggest that the issue is how best to facilitate

development of relevant relationships (e.g. phonemes and graphemes, larger meaning units and morphemes).

In terms of the acquisition of phonological awareness skills, the ability to count the phonemes in a word develops around first year reception for normal readers, but the ability to manipulate these phonemes is developing up to secondary school level (Adams, 1990). A typical progression would be, first, syllable recognition at around three or four years; then an intermediate stage based on recognition of onsets and rimes; and finally recognition of individual phonemes after the age of 6 (Goswami and Bryant, 1990). It is no coincidence that these skills develop at this time, in that early phonological awareness skills provide the foundations for the acquisition of higher levels of metaphonological skill. Data from illiterate adults (Bertelson et al., 1989) suggests that these higher level skills are to some extent acquired through learning to read, and themselves form the foundation of spelling skills.

Within the general category of phonemic awareness, there are considerable differences in the level of ability each task demands. The sound categorisation tasks, particularly rhyming and alliteration, are amongst the simpler phonemic awareness tasks (Bradley and Bryant, 1978; Stanovich et al., 1984), because the children do not require much knowledge of how to segment phonemes, and the task is simply dependent on the ability to compare and contrast words in terms of similarities and differences in their onsets and rimes. The easiest phoneme deletion task (Stanovich et al., 1984) is deletion of the initial phoneme (for example, say cat without the /c/), with the most complex being phoneme substitution (for instance, replacing the /c/ of cat with /s/ to make sat). The slow development of phonemic awareness has been linked to the memory organisation, perception and lexical representation necessary to support phonemic segmentation, which is developing for normally achieving children up to the age of seven or eight (Fowler, 1991). From this age onwards, Fowler (1991) notes that highly familiar items should have become fully specified in the lexicon and difficulty for poor readers will therefore be more evident with novel or nonsense words.

Phonological awareness skills play a critical and reciprocal role at all levels of reading acquisition - alliteration and rhyming ability are implicated in early reading, and

phonemic segmentation and deletion are required for becoming a fluent reader. Furthermore, training in segmentation and spelling in first grade has been extremely successful in improving reading of both real and nonsense words (Uhry and Shepherd, 1993). It is likely that reading and spelling skill becomes increasingly more important in phoneme deletion and other more complex phonological awareness tasks (Mann, 1986).

The ease or difficulty with which phonological awareness is induced by pre-reading experience may well be the critical variable underlying correlations between early phonological awareness and progress in reading (Wimmer et al., 1991). It is possible that a significant characteristic of some dyslexic children is the difficulty in attaining phoneme awareness under normal instructional conditions.

There is clear evidence for a phonological awareness deficit in younger children with dyslexia in the tasks described above (e.g., Bradley and Bryant, 1978; Rack, 1985). It might have been expected that direct training of phonological awareness skills would have benefited dyslexic children. However, training has been less successful in both children with dyslexia and disadvantaged children with poor pre-school language experience than with other groups. An early study by Rosner (1974) attempted to train disadvantaged pre-readers in phoneme deletion skills, but whereas the children quickly learned to break words down into syllables, even a year's intensive training had no effect on phoneme deletion skills for children below 5 years. Adams (1990) concluded that, in view of the central importance of phoneme deletion skills to reading, the difficulty in teaching them to children with poor skills is particularly disturbing. More recently, it has been found that indirect training of phonological awareness skills may also be unsuccessful, in that training in reading skills for children with dyslexia does not transfer to phonological awareness skills (Manis et al., 1993) even in older children. An important issue therefore, is the extent to which phonological awareness skills improve with age and reading experience for children with dyslexia.

There is also strong evidence for deficits in phonological awareness in adults with dyslexia. However, the majority of this evidence is for problems in complex tasks, which demand higher levels of metalinguistic skill. Olson (1985) suggested that

children with dyslexia may differ from normal readers in terms of the level of segmentation that their phonological awareness skills support, so that for instance they might cope with segmentation at the syllable but not the phoneme level. Olson and his colleagues (1989, 1991) showed that the phonemic substitution skills of children with dyslexia (mean age 15 years) were worse than 10 year old controls matched for reading age. The tasks they presented were complex, as appropriate for children of this age range, and included phoneme deletion in nonsense words and 'pig Latin' (in which the first letter of the word is moved to the end, and the suffix 'ay' added, turning the word 'pig' into 'igpay', for example). The pig Latin task highlights an important issue in skilled performance, namely that phonological awareness alone is not sufficient to support skilled phonological performance. The pig Latin task requires several stages - stripping off and storing the onset (p) and the rime (ig), combining the onset with ay (pay), then blending the rime with the augmented offset igpay; loading the corresponding speech sounds into the articulatory buffer, and then articulating them. It is a complex task, dependent not only on phonological awareness, but also processing speed (each subtask must be accomplished in the context of a rapidly fading memory trace), working memory capacity and/or general processing efficiency. A child may, with conscious effort, be able to decide that the onset is 'p' but the effort required would interfere with the efficient storage of that information. It is therefore important that the phonological skill be fluent and without effort, that is, automatic.

It is now clearly established that children with dyslexia suffer difficulties in processing speed (Nicolson and Fawcett, 1994), in working memory (Gathercole and Baddeley, 1990), and in automatisation of skill (Nicolson and Fawcett, 1990). It is therefore not clear whether the pig Latin deficit does imply a phonological awareness skill deficit over and above a working memory deficit. Whatever the issues of phonological deficits, it still remains for the question to be asked as to why there is a problem and the reason for its aetiology. I maintain that there is a significant link between those children who have experienced Otitis Media and functioning in language and literacy. This affects memory, phonological processing and other areas as I will describe in this work. This link seems not to have been made.

1.3 Causal Theories for Dyslexia

The major theories behind our understanding of dyslexia today are the following:

1.3.1 (i) The Phonological Deficit Hypothesis.

As described above, this hypothesis has been the dominant explanatory framework for dyslexia. It is argued that neurological abnormalities in the language areas around the Sylvian fissure lead to failure to develop phonological awareness skills at the age of five, thereby interfering with the learning of phoneme-grapheme and grapheme-phoneme conversions, critical requirements in learning to read. There is evidence that phonological awareness deficits persist through life; that proactive training of 'at risk' children on phonological awareness leads to relatively normal acquisition of reading; that there is abnormal brain activation when dyslexic adults process phonological stimuli; and of neuroanatomical abnormality in the peri-Sylvian regions (for reviews see Rack, 1994, Snowling, 1995). Nonetheless, as Frith concludes (1997, p11) 'the precise nature of the phonological deficit remains tantalisingly elusive'.

1.3.2 (ii) The Magnocellular Deficit Hypothesis.

Lack of fluency in reading is a key characteristic of dyslexia, but there is extensive evidence of difficulties in sensory processing of almost all stimuli. Lovegrove (1994) has claimed that dyslexic children are less sensitive to (visual) flicker. Tallal and her colleagues (1993) have claimed that, like language disordered children, dyslexic children require longer to process rapidly changing auditory stimuli. Neuro-anatomical abnormalities have been identified (Galaburda, Menard and Rosen, 1994) in both visual and auditory magnocellular pathways to the thalamus. EEG studies (Fawcett et al., 1993) have established direct evidence of abnormal pre-attentional auditory information processing. Stein (1997) suggests that magnocellular pathway abnormality may cause visual persistence, which would in turn lead to specific difficulties in reading. Both Stein and Tallal argue independently that there is a pan-sensory magnocellular abnormality that leads to difficulties in most types of rapid processing.

1.3.3 (iii) The Double Deficit Hypothesis

Speed of processing deficit theories

Lack of fluency in reading is a key characteristic of dyslexia, but there is extensive evidence of difficulties in speed of processing for almost all stimuli, including those for which sensory delay is an unlikely contributor. The earliest demonstrations derived from the 'Rapid Automatized Naming' technique (Denckla and Rudel, 1976), in which the child has to say the names on a page full of simple pictures (or colors).

Children with dyslexia show robust speed deficits on these tasks. It has also been demonstrated that children with dyslexia are slower in their choice reaction to an auditory tone or visual flash, in the complete absence of phonological task components (Nicolson and Fawcett, 1994). Even more direct data derives from an EEG study (Fawcett et al., 1993) that established direct evidence of slowed auditory information processing for a pure tone in that the P3 event-related potential wave was of longer latency in an 'oddball' paradigm. Yap and van der Leij (1993), established that children with dyslexia needed a longer exposure time to read a known word than normally achieving children matched for reading age. Recently, van der Leij and van Daal (1999) have argued, on the basis of speed limitations, that children with dyslexia have difficulty in automatizing word recognition skills, and, further that this may lead to a strategy for processing large orthographic units in reading. Finally, in a synthesis of phonological and speed problems, Wolf and Bowers (1999) propose an alternative conceptualization of the developmental dyslexias, **the double-deficit hypothesis**, which holds that phonological deficits and processes underlying naming-speed deficits represent two separable sources of reading dysfunction, and that developmental dyslexia is characterized by both phonological and naming speed 'core' deficits.

1.3.4 (iv) The Dyslexic Automatisation Deficit (DAD)

Nicolson and Fawcett (1990) raised the issue of looking at dyslexia in alternative ways, based on their findings related to automatisation. Fawcett and Nicolson (1992) have demonstrated that dyslexic children show problems in the gross motor skill of

balance in addition to experiencing phonological and/or visual deficits. They concluded that when the child was performing one task only, there was little difficulty. However when dual-tasking or by having visual cues removed, significant difficulties were experienced. The dyslexic children in the studies were either incapable of fulfilling the set tasks or they took many more times longer to complete them. This is highly significant for children and adults who are struggling to make sense of linguistic structures in more than one language and are required to perform at the same rate and speed as the others of the same chronological age when consistently dual tasking.

In order to be effective learners, competence has to be established within an area of automaticity - automaticity being the process by which learning and responses become automatic. E.g. the ability to drive a car without thinking about each move; in the classroom, the ability to spell well without having to consider each letter. The skills need to become internalised and automatised rather than having to be re-learned and rehearsed each time they are needed. Whilst Fawcett and Nicolson did not specifically discuss multilingual issues, the implication of their argument is that dyslexia should be viewed within a specific but broader definition than hitherto, thus allowing for educators and diagnosticians to use a broad base for identification. It is clear that functioning for this sub-group is going to be significantly impaired; as such there needs to be further research and consideration given to learning needs in terms of policy, research and effective practice.

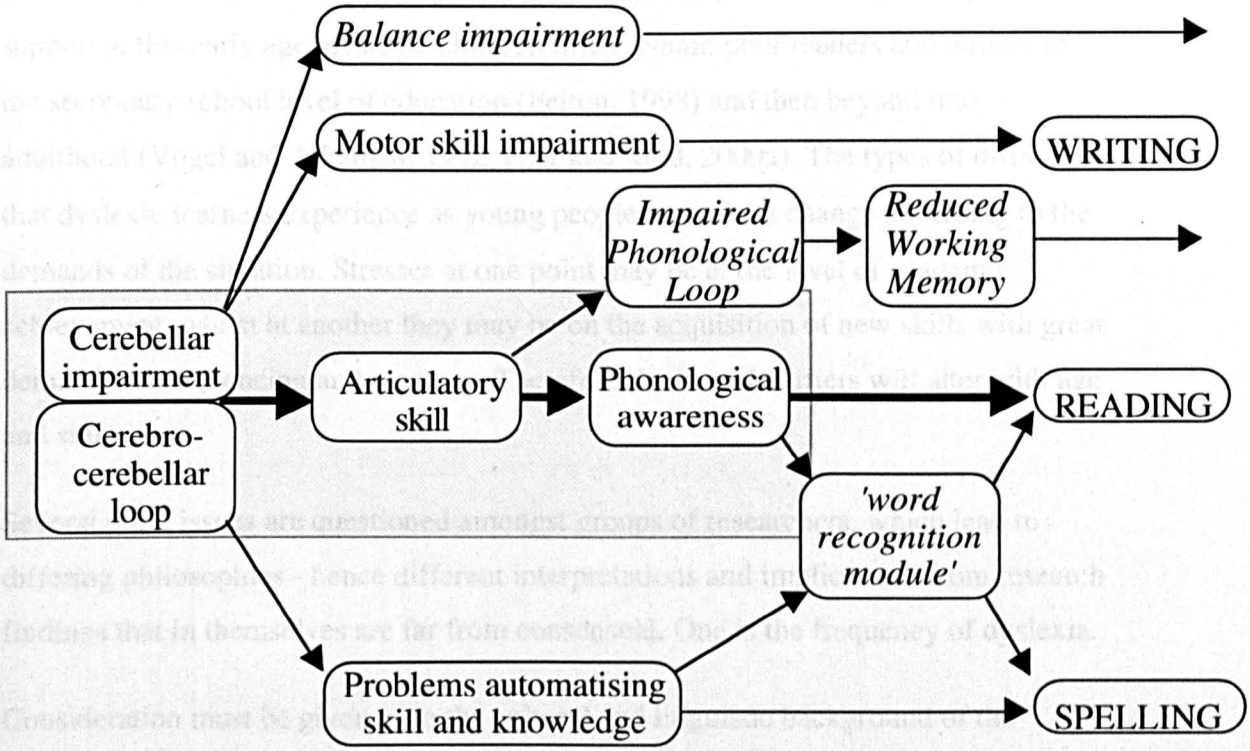
1.3.5 (v) The Cerebellar Deficit Hypothesis.

In a dyslexia study assessing a range of skills (Nicolson and Fawcett, 1994) severe deficits were found in balance, motor skill, phonological skill and rapid processing. This pattern of difficulties is consistent with the dyslexic automatisation deficit hypothesis, which states that dyslexic children will suffer problems in fluency for any skill which should become automatic via extensive practice. The hypothesis accounts neatly for the problems in acquiring phonological skills, in reading, and in the non-cognitive skills, but does not specify an underlying neurological structure. Problems in motor skill and automatisation point to the cerebellum, and there is now

increasingly clear evidence that the cerebellum is also involved in language and cognitive skill (Leiner et al., 1999). Cerebellar deficit therefore provides a parsimonious explanation of the range of problems suffered by dyslexics. Work has been undertaken which has established extensive multi-disciplinary evidence directly consistent with the cerebellar deficit theory. First, it was demonstrated that dyslexic children show a dissociation claimed by Ivry and Keele (1989) to be specific to patients with cerebellar damage between time estimation and loudness estimation (Nicolson, Fawcett and Dean, 1995); and, second, that dyslexic children showed a range of classic cerebellar signs (Fawcett and Nicolson, 1999). Recent studies have established direct evidence of neuro-anatomical abnormality in posterior cerebellar cortex (Finch, Nicolson and Fawcett, 1999), and also abnormally weak cerebellar activation when performing a motor sequence learning task (Nicolson et al., 1999).

Uniquely of the causal models for dyslexia, Nicolson and Fawcett attempt to outline the way that the underlying problems lead through the pre-school years to the symptoms shown – their 'ontogenetic causal chain' analysis (see Figure 1 below). They suggest that in the pre-school period a number of symptoms (unrelated to reading) should be identifiable, and could form the basis for an intervention strategy. Birth is shown at the left hand side of the figure, with time moving along the x axis - about 8 years being the right hand side.

Figure 1: Dyslexia: An Ontogenetic Causal Chain



Nicolson and Fawcett (2001)

1.3.6 Other problems in dyslexia

Today, there are still those researchers who consider dyslexia to be solely a reading problem, but the majority sees it as a wider issue. Grigorenko (2001a), reports findings in cognitive development (e.g. Benson, 1994); developmental (e.g. Scarborough, 1998a, 1998b) and educational psychology (e.g. Blachman, 1997, Oakhill and Beard, 1999; behaviour genetics (e.g. Olsen, 1999); molecular genetics (e.g. Grigorenko, Wood, Meyer and Pauls, 2000); and neuroscience (Wood and Flowers, 1999). What has become clear is that the aetiology of dyslexia is complex and therefore more co-ordinated research in a range of areas is needed for further understanding of the condition.

Researchers and practitioners need to be looking at the developmental changes, which take place over the various phases in life, if practice and policy are to change in order to benefit the lives of dyslexic individuals.

Dyslexia is most often identified in primary schools due to poor reading development (British Psychological Society Report, 1999). However, even when given specialist support at this early age, dyslexic children often remain poor readers and writers in the secondary school level of education (Felton, 1998) and then beyond into adulthood (Vogel and Adelman, 1992, Peer and Reid, 2000a). The types of difficulties that dyslexic learners experience as young people and adults change according to the demands of the situation. Stresses at one point may be at the level of academic achievement, whilst at another they may be on the acquisition of new skills with great demands on sequencing and memory. Therefore the key identifiers will alter with age and situation.

Several other issues are questioned amongst groups of researchers, which lead to differing philosophies - hence different interpretations and implications from research findings that in themselves are far from consensual. One is the frequency of dyslexia.

Consideration must be given as to the cultural and linguistic background of the dyslexic children involved in any test situation. The percentage of children in different countries who are dyslexic seems to change from place to place. Tarnopol and Tarnopol (1981) found in their survey that the range was as low as 1% in Japan and China to 33% in Venezuela with a median of 7%. My personal research in Israel suggests a figure of around 15%. (Peer 1991, unpublished). I would suggest that there are two major reasons that might explain the varying incidences of dyslexia in various countries:

Definitional differences or educational practices e.g. there are no characters in Chinese or Japanese that refer to the term *reading disability*. Grigorenko (2001) suggests that in Asian countries, for example, reading problems are more likely to be attributed to inexperience, insufficient effort, inadequate education or lack of motivation, rather than to disability. She cites LeFebvre (1978) who states that French psychologists have suggested that the major causes of dyslexia are motivational and cultural rather than linguistic. (This would fit with anecdotal evidence internationally by many in the field.)

Language and orthography play an important role in reading disability. It is not surprising that the highest level of reading difficulty is observed in English speaking

countries. Despite 86% regularity if the rules are known, English is considered by many researchers and educationalists to be highly irregular, which leads to major difficulties with the reading and writing processes. The task of teaching the rules is onerous and still does not lead to the level of transparency that is inherent in other languages.

Those languages that are more transparent cause fewer literacy difficulties for the dyslexic learner. A major problem arises out of this issue and that is the one of identification of weaknesses common to dyslexic learners. The traditional dyslexia indicators (DfEE, 1999) are less obvious when researchers and practitioners are solely looking for identification within the parameters of literacy. For example misspelling of words; sequencing difficulties (when in some languages word order is different to that of English e.g. the adjective may appear after the noun rather than before it.)

1.4 Dyslexia as a developmental disorder

One of the most common weaknesses experienced by dyslexic learners of all ages is that of poor short-term memory. It is beyond the scope of this thesis to devote a chapter to this specific issue, however, reference to the debate would be most appropriate.

For many years much research has been dedicated to the influence of the phonological system on poor reading in those with dyslexia. However, Swanson (1993) contended that dyslexic learners may have deficits in the executive component of working memory that are independent of phonological processing weaknesses. Furthermore his contention was that these memory weaknesses may be able to help explain the poor reading acquisition noted in dyslexic learners. Baddeley (1992) made the assumption that the central executive is a general processing system. McNamara and Wong (2002) hypothesised that if that is indeed the case, there would be an expectation that executive processing problems would manifest themselves in both reading and non-reading tasks. In their study, they found that dyslexic students found significant difficulty both in reading and in comprehending text. Beyond difficulty related to phonological tasks, they noted that the learners had significant difficulties retrieving everyday information. They hypothesised that this was due to poor working

memory processing. They specifically noted that recall difficulties occurred in tasks that included processing academic, episodic, procedural and common object information. This wide range of tasks suggests that a common functional mechanism, the central executive, underlies performance difficulties in dyslexic learners.

Gathercole and Pickering (2000) also concluded that complex working memory skills are closly linked with children's academic performance in the early years of school. This will have clear implications both across the academic curriculum as well as in daily living.

Clearly within a bi- or multilingual environment one might hypothesise that poor memory recall will have a greater impact on language performance that those who are monolingual. I would therefore suggest that assessment of working memory skills may offer a valuable method for screening young children likely to be at risk of poor scholastic progress as well as those who are continuing to find difficulty due to dyslexic-type characteristics.

Another issue is that of the age at which one can identify dyslexia. This has been an issue of great concern over the course of time due to the relationship between the identification of dyslexia and the resulting educational support offered to the learner. Dyslexia is a developmental disorder where symptoms change with age, as such appropriate support will change over the course of time. The view held by education authorities was that dyslexia was to be considered a 'difficulty with words'. As such, children should be left to significantly fail with words before any assessment and intervention was put in place. In practice this meant that children were in many cases left to fall three, four or even five years behind their peers before intervention. The effects of this were failure, frustration and lack of self-esteem - with a strong likelihood that such children would never develop effective strategies enabling curricular access and entry into the successful flow of the school. As a result behaviour was often problematic. Where schools particularly put an emphasis on academic achievement as being the indicators of success, dyslexic children were greatly undervalued and never given the opportunity to flourish. Much research effort has been directed at attempts to identify dyslexia very early in the developmental process and put into place preventative measures that would support the child with the

necessary pre-requisites for learning long before failure was allowed to take place e.g. McPhillips, (2001).

There is a clear association between short-term memory weaknesses and dyslexia. Pennington, Van Orden, Kirsen and Haith, (1991) have reviewed the literature. Stanovich (1982) and others have documented the links between short-term memory weaknesses and reading. Baddeley (1986) has described the links between difficulty in working memory and the relationship with the failure of language learning where he sees working memory as a process rather than a structure. Chasty (1989) analysed four main functions in the process of working memory:

- The provision of short-term storage in strategy dependent systems related to the five major sense areas which may be used in learning, but particularly auditory, motor and visual information processing.

- The facilitation of the encoding of incoming information for effective storage and retrieval in long-term memory using the strategies preferred by the learner.

- Enabling the recall of already learned material from long-term memory and facilitate perception and problem solving using the child's past experience.

- Facilitating the automatic control of a previously learned skill, while other incoming or recalled information is processed simultaneously in the alternative sub-systems.

The causal link for this weakness, however, has not yet been determined. Although I have seen no documented links between recurrent episodes of Otitis Media and dyslexia, I believe that there is a direct connection between those who have had difficulties with the processing of spoken language due to repetitions of hearing infections, including Otitis Media, when young. This will be investigated in this study.

1.5 Cognitive Perspective

Cognitive psychology deals with the internal representation of information, which includes thinking, memory, perception and language. People attend to stimuli in the

environment, code them in various ways using cognitive systems such as memory, feature analysis, retrieval, lexical access and so on (Thomson, 1997). When attempting to identify dyslexia in a learner, there is an assumption, that specific deficiencies will be evident, e.g. coding or in memory patterns for letters or words. In terms of single word reading, one might see weaknesses in the processing of visual features, the phonological features, its semantic features or its articulatory features or any combination of them. This kind of approach is represented in Mackworth's model of reading below:

Figure 2. Reading as an information processing task

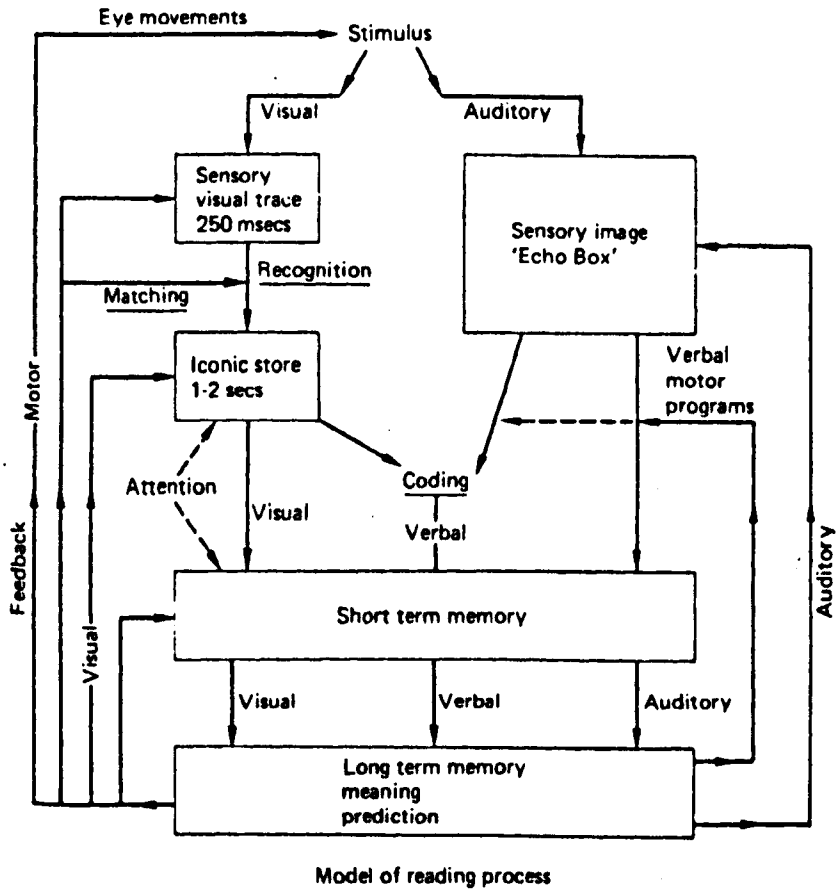


Figure 3.4 An information processing model of the reading process (Mackworth, 1971)

(Taken from Thomson, 1997. p.87)

Mackworth suggests that during a single fixation pause of 250 milliseconds, a sensory visual trace of the stimulus element involved is created. Recognition of this input results from matching it to a memory trace of the word leading to an iconic image lasting for a second or longer.

There is an automatic match to an exact or approximate articulatory verbal representation if the reader is aware of the language. This then gives meaning to the written word. From the iconic store words are coded into short-term memory by a verbal motor program. This short-term memory may be erased after a few seconds or minutes when new input erases it. If the information in short-term memory is not stored immediately into the long-term memory system, it is lost. For many dyslexic learners, this is the hurdle at which they fall. For those working in a language in which they are not verbally competent, e.g. for some of the multilingual dyslexic learners, the process becomes even more complex, as the struggle with words in a new language puts immense pressure onto a memory system which is already strained. Add to that the exacerbated difficulties of a learner who has residual hearing and language processing weaknesses due to repeated bouts of OM and the stresses are clear. Once information is stored in the long-term memory system, the reader will use that information to predict what might be read next. This will have a direct influence on eye movements in relation to fixations and processing of information. There is similar input in relation to auditory material, which needs to be encoded.

Thomson also quotes another model, which he calls the stage analysis approach. In this model there is an assumption that one can look at reading in terms of 'bottom-up' or 'top-down' approaches. See model below:

Figure 2: Stage analysis model of the reading process.

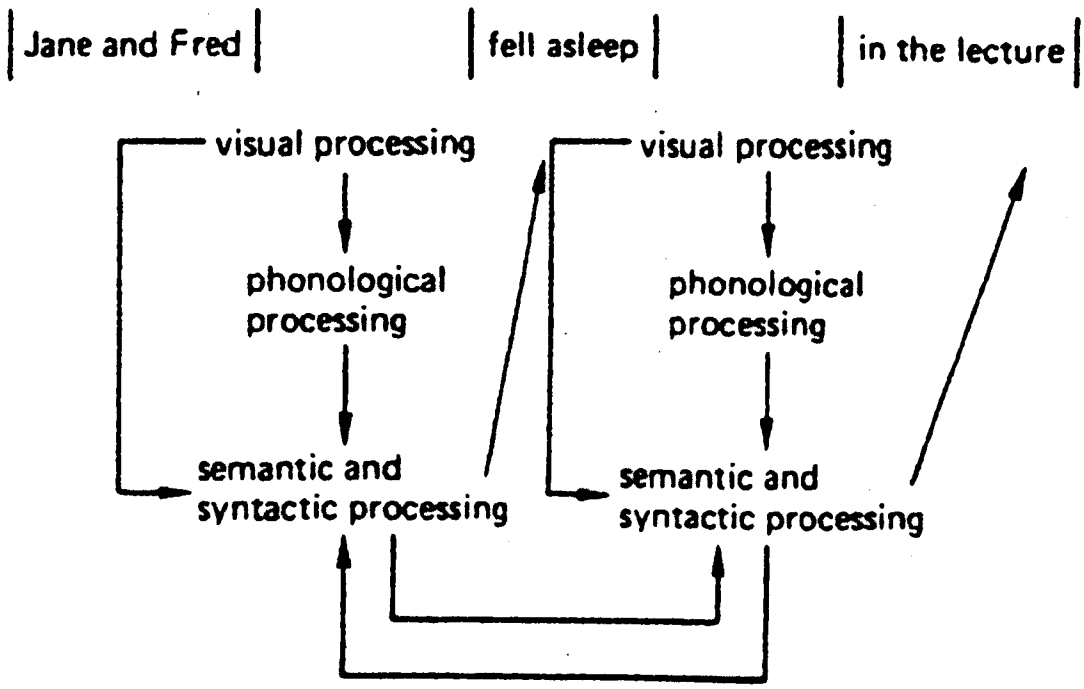


Figure 3.5 Stage analysis model of the reading process

(Taken from Thomson, 1997, p 88)

The 'bottom-up' approach implies that the learner attempts to extract visual information from the text. An attempt at the phonological code and finally an attempt to access semantic meaning in terms of higher-order language elements, follow the original stage.

In the 'top-down approach', there is an assumption that there is a knowledge of the language involved and this knowledge is then imposed upon the subject matter. In this model, for a proficient reader, the reading matter can involve direct access to meaning. However, for a struggling reader or for a particularly difficult text, a mediational code is used – in this case, phonological processing.

1.6 Auditory Perception

There are many children with learning difficulties who have subtle difficulties in hearing, such as a high frequency hearing loss such as 's' or low frequency loss in difficulty recognising vowel sounds or consonants such as b. However 'auditory perception' does not refer to hearing or acuity problems, but to levels of auditory discrimination and coding. Wepman (1960), whose tests are still used today in some places, suggested that auditory discrimination difficulties were due to developmental lags of speech perception and partly dependent on auditory acuity. Typically a child might find difficulties discriminating between pin and pen. Imagine the problems for the bilingual Hebrew-English speaking child whose first language has only one sound for the three soft vowels: a, e, u. Is therefore the incorrect encoding a problem of learning disability, auditory perception or linguistic confusion?

Miller and Tallal (1995) have proffered rapid temporal perception as being a root cause of dyslexic type difficulties. It is suggested that such problems might encompass different modalities, not just auditory perception. Tallal suggests that children who have a weakness in this area are at a disadvantage in tasks which require the perception of brief or rapid acoustic events. Her theory assumes that a rapid auditory processing deficit impairs speech perception in dyslexic children leading to significant incompetences in the development of language. Tallal and her colleagues propose that dyslexic children are impaired in their ability to perceive auditory stimuli which are brief and occur in rapid sequences (Tallal, 1980; Tallal, Miller, Jenkins and Merzenich, 1997). They believe that the impairment applies to all auditory input. It is considered to have a critical impact on the perception of syllables containing stop consonants (e.g. /ba/ and /da/). In these syllables, changes in the first few milliseconds of voicing contain much of the distinguishing information. Tallal relates the difficulties dyslexic individuals have in speech perception, phonological processing and phonological awareness to a lower level auditory processing impairment.

A direct challenge to this theory was made by Studdert-Kennedy and Mody (1995) following the investigation of the rapid auditory processing skills of poor and good readers where they claim that poor readers do not show a general deficit in processing

rapid auditory information, but have poorly represented phonemic categories. The phoneme, the smallest meaningful segment of language, is the fundamental element of the linguistic system. English has 44 phonemic combinations that produce every word in the language. Before words can be identified, understood, stored in memory or retrieved from it, they must first be broken down, parsed, into their phonemic units by the phonological module of the brain (Shaywitz, 1996). The process occurs automatically in spoken language, at a preconscious level once people have been exposed to it. Reading reflects spoken language and must be learned at a conscious level. The task becomes one of transferring graphemes into their corresponding phonemes. The ability to do this depends initially upon the individual's understanding of the phonological structure of spoken words and then the understanding that the orthography represents the phonology. In some dyslexic children, it is this last stage that is impaired, therefore supporting the phonological deficit hypothesis. In practice, this impairs the decoding of words preventing word identification. This in turn prevents access into the higher-order linguistic processes necessary for the comprehension of meaning from text. In some cases it can also affect speech. Even compensated dyslexic adults find that decoding remains laborious; they often find that throughout their lives, reading remains a laborious task. They are neither fluent nor automatic in their ability to identify words. They report being tired and very slow at functioning when performing roles that require those skills.

The debate continues as to the aetiology of the condition and to its component effects. Within this piece of work, it is clear that a large number of the cohort have a problem with speed of processing information that I believe contributes to weaknesses in effective functioning within the learning process. For the cohort in this study, stresses upon the system that supports speed of processing are exacerbated by a bi- or multilingual background - and in some cases additionally by residual OM.

Having examined the various hypotheses currently under scrutiny within the academic world, I am still left with my concern that no-one seems to have gone far enough in examining the physical root causes of dyslexia; the underlying causes are not yet known. There is undoubtedly a link with auditory perception, speed of processing and phonological skills for many people, which have a direct impact upon language and learning. By default there is an impact upon motivation, self-esteem and behaviour.

However, until we identify the physical root causes for this complex condition, particularly in the bi/multilingual sub-group, we will be limited in our ability to provide effective remediation. Not only do none of the theories recognise OM as a root cause, they make no reference to the condition. The key to understanding what causes dyslexia in many cases, I believe, sits between health and education in the OM arena.

1.7 Visual Processing

Whilst phonological weaknesses were considered to be the underlying cause for dyslexia for many years, of more recent times there have been a growing number of researchers who have been looking at the role of eye movements as a plausible explanation for those experiencing difficulty in literacy acquisition of a dyslexic-type nature. Attention has been given to the visual systems that are involved in the reading process. There have been suggestions that binocular co-ordination, faulty scanning and various other ocular motor deficits might be involved. Within my cohort, the vast majority of those studied, read and write in at least two languages. These specific languages are totally dissimilar to each other in direction and demands on eye movement. Each language is processed visually in a totally different way. (See section on the differences between Hebrew and English.)

Stein and Fowler (1981) argue for a visual form of dyslexia characterised by unstable ocular motor dominance. This was based on the findings of the Dunlop test (1972) where the ocular motor and retinal signals are linked causing a dominant eye. The argument is that for dyslexic readers, there is a neurologically based failure to develop ocular motor dominance, giving rise to abnormalities of eye movements. A link is made between the failure of co-ordination of eye position and retinal signals to a lack of dominance, leading to weaknesses in the reading process.

'Normal' reading involves a series of movements from left to right (in English) involving very few regressions back across the text. There is a suggestion that some dyslexic learners experience difficulties in the return sweep and generally make a large number of such regressions (Pavlides, 1978; Pirozzolo and Rayner, 1978).

Figure 3. Eye Movements in dyslexics and normals (Pavlides, 1978)

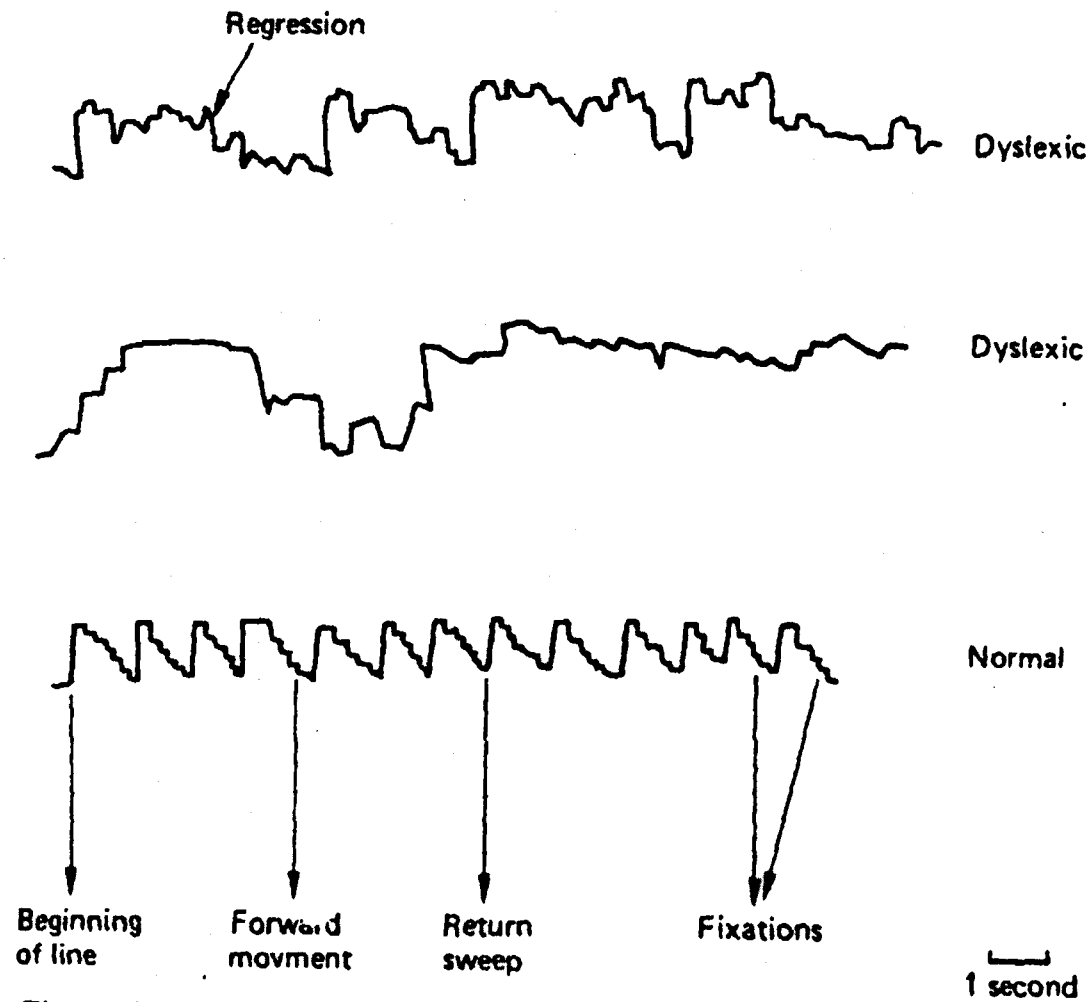


Figure 3.6 Eye movements in dyslexics and normals (Pavlides, 1978)

(from Thomson, 1997, p.97)

There seems little doubt that many dyslexic learners do show abnormal eye movements when reading. Children and adults often lose their place, regress to earlier parts of the line or read the line above for a second time; they may even skip a line when reading text. Young dyslexic children may attempt to read from the right-hand side of the page to the left-hand side (in English). Reversals and confusion of word order is not uncommon.

Zangwill and Blakemore (1972) believed that the confusions outlined above might occur as the result of scanning from right to left. There are however researchers who

argue that faulty eye movements are a result of poor reading (Simon and Ward, 1978). This argument follows the line of thinking of those educationalists who suggest that it is because dyslexic learners do not read a great deal that they do not have the physical experience that makes the eyes as effective as they might otherwise be.

When normal readers find a text complex, it is common for them to move back across the page in a left-right direction, checking on a word or phrase that is new or complicated for them. Accepting that this is usual behaviour for normal readers, it is clear that dyslexic readers will do it more regularly as they are very often faced with reading tasks at or above their ability levels. In other words, even age appropriate reading tasks for them are complex.

When deliberating the two views above, we must take into consideration the fact that if eye movement difficulties were causal in dyslexia, one would expect to see difficulties in tasks other than when reading. This does not seem to occur. Adler-Grinberg and Stark (1978) found normal rapid saccadic eye movements when dyslexic learners fixated a meaningless target. Another argument against eye movements being the root cause of dyslexic weaknesses in reading is the recognition of the many other difficulties that dyslexic learners experience that are independent of the visual modality. For example, speed of auditory processing and short-term memory weaknesses. Furthermore when investigation is made into dyslexic children and adults who learn to read and write in a language that appears from right to left on the page (Hebrew), there appear to be no significant differences in the dyslexia profile.

It might therefore be suggested that for some dyslexic learners only there are some difficulties concerning eye movements.

More recently Eden, Stein, Wood and Wood (1993) carried out a study where they concluded that they supported Stein and Fowler's original hypothesis (1989) that children with reading problems often suffer both phonological and visuo-spatial problems.

Griffin, Christenson, Wesson and Erickson (1997), optometrists specialising in learning disabilities in the USA, believe that:

'dyslexia is not a homogeneous disorder, but rather consists of separate validated types... Dyslexia is a separate entity and is not caused by visual dysfunctions, but visual dysfunctions can contribute to the RD (reading difficulties) of a dyslexic individual, as they do in non-dyslexic individuals who have RD due to other factors. In some instances the main cause of an individual's reading problem may be inefficient visual skills or visual-perceptual-motor dysfunctions.'

They cite Tinker's (1965) work, where learning to read is described as a complex developmental process following specific stages. The stages are as follows:

- decoding skills in word recognition
- decoding vocabulary is increased
- knowledge of concepts and comprehension of ideas emerge
- the older child increases the capacity to grasp meaning and appreciate the style of written passages
- beyond the seventh grade, a mature reader should be able to interpret, evaluate, and reflect on the meaning of what was read.

They go on to describe reading as a two-staged process *decoding* and *comprehension* (See figure 4). This figure shows the relative importance in reading of decoding (bottom-up strategy) and comprehension (top-down strategy, such as contextual analysis and the reader's previous knowledge of the subject being read). They maintain that decoding according to this paradigm includes both phonetic (syllabic) and eidetic (whole-word) decoding. They describe intervention as an appropriate response for an optometrist at all stages up to that of aspects of reading comprehension. In the earlier stages they see intervention as being through the training of visual and perceptual motor skills so that learners can be helped to become more effective readers. From then on they see that as being in the educational realm rather than through any form of vision therapy.

Figure 4. Relative importance in reading of decoding (bottom-up strategy) and comprehension (top-down strategy, such as contextual analysis and the reader's previous knowledge of the subject being read.)

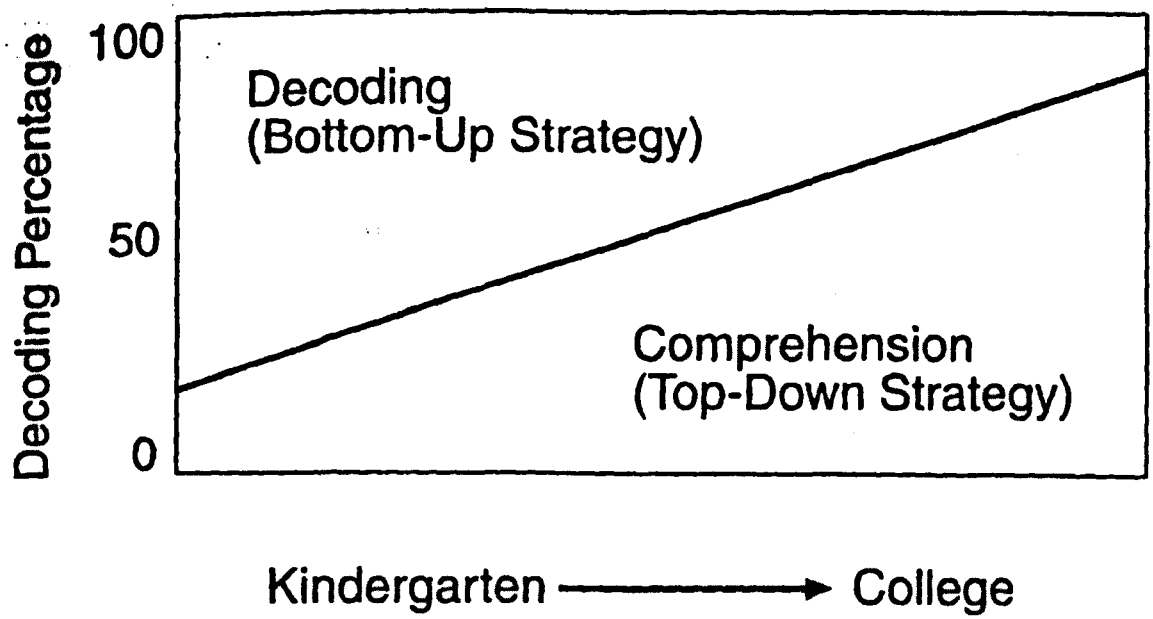


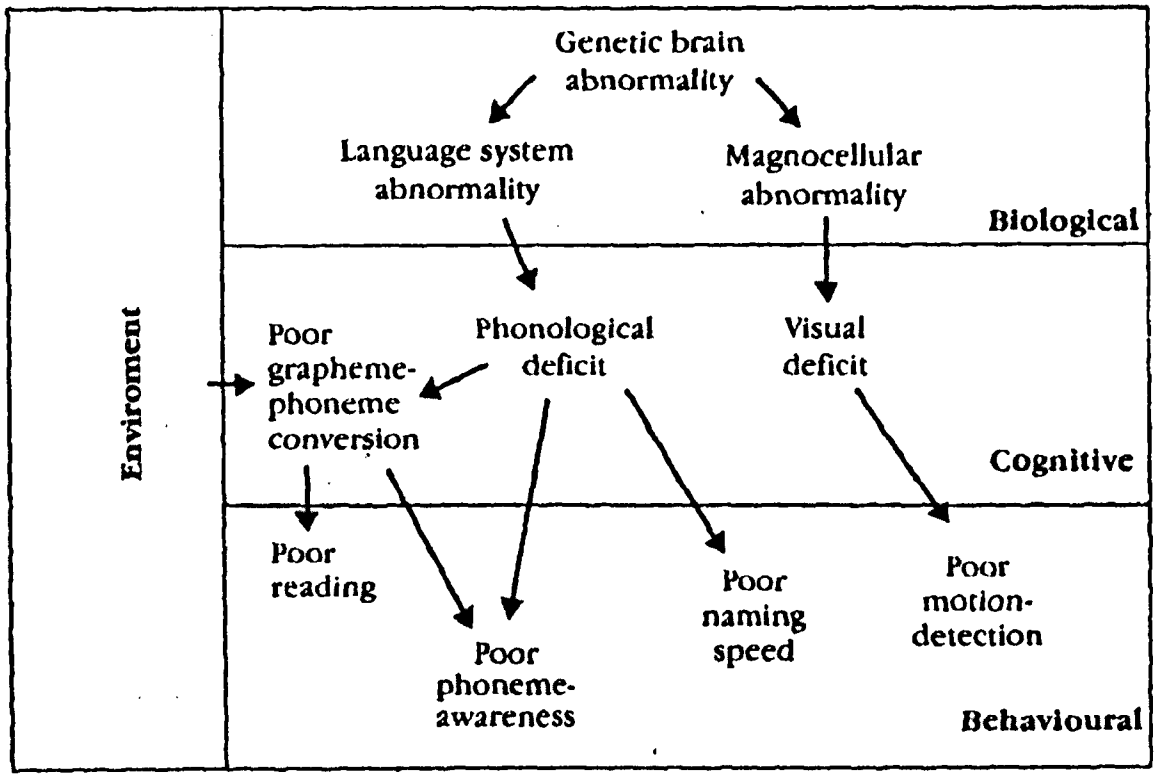
FIGURE 2.4 *Relative importance in reading of decoding (bottom-up strategy) and comprehension (top-down strategy, such as contextual analysis and the reader's previous knowledge of the subject being read). We believe decoding in this paradigm includes both phonetic (syllabic) and eidetic (whole-word) decoding. (Modified from HD Simons. The reading process and learning to read. J Am Optom Assoc 1987;58:883.)*

It would seem that for the majority of dyslexic learners, visual weaknesses are not the primary cause of dyslexia. Moreover, visual problems do not affect all dyslexic learners. For many of those with visual difficulties, they seem to be a secondary factor within the complexities of the learning process and not the causal factor.

1.8 Two models to explain the causes of dyslexia

More recently two models have been produced which offer explanations for the different areas of cognitive dysfunction in dyslexia. The first is an example of causal modelling of dyslexia as a deficit in both visual and phonological systems based on the findings by Eden et al (1996). The visual deficit is illustrated to lead to a marker symptom: poor motion detection. The link between a magnocellular deficit and impairment in motion detection is shown in the diagram below as separate from the phonological deficit and not directly involved in the origin of reading problems.

Figure 5. Example of causal modelling of dyslexia as a deficit in both visual and phonological systems.

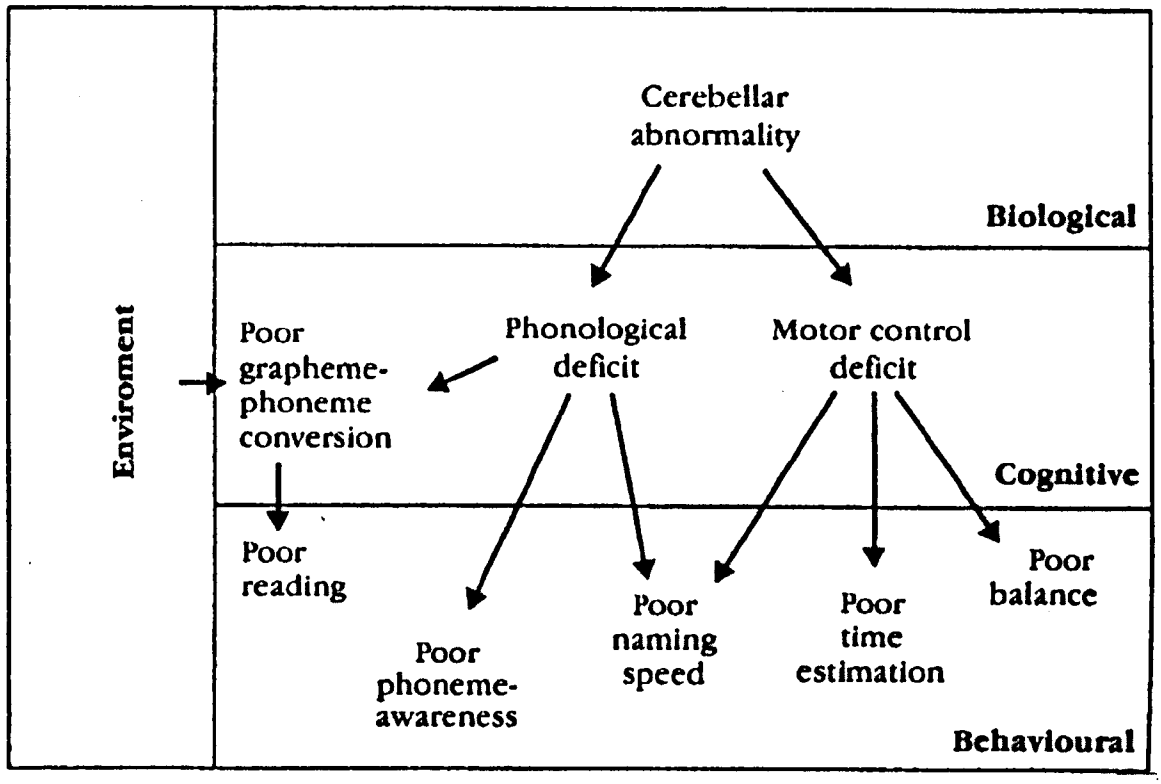


(Frith, 1996, p 14)

In my view speech motor deficits are important and have been omitted from this model. This is covered in the model presented by Fawcett and Nicolson (see figure 6).

Another theory that suggests weakness in motor control and time estimation, functions thought to be under the control of the cerebellum. Nicolson and Fawcett (1995) suggest that these could also affect the motor and time aspects of speech processing. They suggest that phonological impairments could be explained as consequences of a more general deficit, which also affects balance. The theory is illustrated below

Figure 6. Example of causal modelling of dyslexia as a cerebellar abnormality.



(Frith 1996, p 15)

This brain abnormality affects speech processing as well as more general motor control processes including time estimation. The effect of the abnormality on reading acquisition is illustrated as mediated by a phonological deficit which in turn is a consequence of a speech motor deficit.

1.9 Dyslexia in different linguistic systems

When discussing dyslexia in different linguistic systems, Grigorenko (2001) makes the point that the concept of dyslexia was initially developed and verified in studies of English-speaking populations. We know that English is a language that is particularly difficult due to its irregularities in the area of phoneme-grapheme relationships. This is unlike Hebrew, the second major language of this work, which is highly regular.

As noted previously, Tarnopol and Tarnopol (1981) conducted a survey of data collected in 26 countries in an attempt to try to ascertain the percentage of school children who are dyslexic. The results ranged from a low 1% in China and Japan to a high 33% in Venezuela. Glezerman (1983) noted that children with reading difficulties in English speaking countries registered at about 20%, whilst those in Scandinavia were 10% and those in Germany 5%.

Grigorenko cites three hypotheses to explain the varying incidence of reading problems in different countries:

- Definitional differences or educational practices. E.g. there are no characters in Chinese or Japanese whose meaning is equivalent to the term reading disability. In Asian countries, it is more likely that reading problems would be credited to inexperience, insufficient effort, inadequate education or lack of motivation rather than to disability (Stevenson et al, 1982). French psychologists have suggested that the major causes of dyslexia are motivational and cultural rather than linguistic (LeFebvre, 1978).

- Language and orthography play an important part in reading disability. It is recognised that the highest level of reading disability is observed in English-speaking countries. This is not surprising as English is not a transparent language with great regularities.

- The third hypothesis is related to 1 and 2 above. It has four lines of converging evidence:

  - The majority of modern models of reading, most of which were developed for the English language, put phonological processes at the centre of them. Grigorenko asserts that the assumption that phonological processes are universal aspects of becoming literate in phonological writing systems has been supported in a number of languages. She cites researchers such as Perfetti and Bell (1991) who have obtained evidence for an early and strong influence from assembled phonology in conducting any lexical operations.

- Grigorenko asserts that there is now compelling evidence, such as that by Cardoso-Martins (1995), that an individual's understanding of the phonological structure of words is an important predictor of success in learning to read in many other alphabetic orthographies besides English.

- A certain consensus has been formed around the converging evidence that phonological impairments play a causal role in the genesis of difficulties in mastering reading in English (Bryant and Bradley, 1993 and Torgeson, 1999).

- A number of studies have investigated the role of phonological impairment in the genesis of reading failures in languages which have writing systems that are easier than English e.g. Hebrew (Meyler and Breznitz, 1998). Two observations were noted from these studies:

> Developmental dyslexics in more shallow languages show significantly lower error rates than dyslexics in phonologically deeper languages but still differ from their matched normally reading peers in reading speed, and
>
> The best predictor of reading performance in poor readers is the quality of their non-word reading, which is considered to be an indicator of phonological ability.

These lines of convergence outlined above suggest that phonological abilities constitute a metalinguistic ability (or a core set of reading-related processes predictive of both accuracy and speed of reading) the manifestation of which is determined by any given linguistic system.

It would be useful at this point to remind the reader of Wolf's Double Deficit theory (1999) where it is suggested that phonological deficits and processes underlying naming-speed deficits represent two separable sources of reading dysfunction, and that developmental dyslexia is characterized by both phonological and naming speed

'core' deficits. This is of clear importance when referring to dyslexia in a range of linguistic systems.

Grigorenko reaches the conclusion that the third hypothesis regarding the varying incidence of dyslexia in different languages is as follows:

> *'...it appears that the mechanism leading to difficulties associated with the mastery of reading is universal in all languages and is related to the metalinguistic ability to decompose words into sounds, link phonemes to graphemes and to automize these skills. The manifestation of reading problems, however, will be different in different languages, depending on the phonological demands imposed by a given linguistic system.' (p 96)*

This thinking clearly explains why the incidence of dyslexia in different countries and among different languages is so diverse. Not only is it highly likely that definitions are different, but the identification of dyslexia may well be carried out earlier and more easily in one place than in another.

We must consider the very large group of dyslexic people across the world who have to function in more than one language. Most of them have not had their dyslexia identified; we are facing an educational and employment problem of huge dimensions. Add to this the high numbers of those with the residual effects of OM and what do we have?

- There are many hundreds of thousands of people who have not been identified as dyslexic, who live with unexplained failure additionally experiencing one might assume, low self-esteem.
- The number of under-employed and unemployed in this group can only be speculative.
- The number of those caught up in penal systems internationally, whose lack of functional numeracy and literacy have prevented them from working has been estimated at approximately 70%. Temptations and/or frustrations leading them

down anti-social routes in a world where manual labour is fast on the decline and they have been prepared for little else.

- The number of children in schools across the world who have not had their needs addressed must be countless. A massive number of people suffering frustration and low motivation; people living permanently with low self-esteem.

We must look at ways of changing policy and practice in order to address these needs.

2. Section Two

2.1 The Relationship between spoken and written language

McNeill (1972) in his paper, 'The Creation of Language' makes clear in a few words the immensity of the achievement that the child makes in developing a language structure.

> *'At the age of about one, a normal child not impaired by hearing loss or speech impediment, will begin to say words. By four years he will have mastered very nearly the entire complex and abstract structure of the English language. In slightly more than two years, therefore children acquire full knowledge of the grammatical system in their native tongue. This stunning intellectual achievement is routinely performed by every pre-school child but what is known about the process underlying it?'*

Perhaps one way of attempting to understand the process of the development of language is to look at language acquisition in feral children (children who have been abandoned and who have fended for themselves in the wild. It is known that they invariably have language deficits). It is true that very little is known about their early upbringing, how long they have been left alone and to what extent they were cared for prior to abandonment.

Curtiss (1977) followed the case of Genie, born April 1957.

Genie:

> *'From the age of twenty months, Genie had been confined to a small room...she was physically punished by her father if she made any sounds. Most of the time she was kept harnessed into an infant's potty chair: Otherwise she was confined in a home-made sleeping bag in an infant's crib covered with wire mesh.'*

(Curtiss, Fromkin, Krashen, Rigler and Rigler, 1974. p. 529)

It would appear that Genie was fed by a mother who was blind, in what can only be described as a highly routinised way. The father and brother allegedly never spoke to her. At age fourteen, Genie was discovered and at that time was not able to converse at all.

Genie's language developed at a much slower pace than would have been expected by other children of her age. Examples given were:

- Negatives in early language are expressed such as: "No want go." Most children pass through this stage quickly, but Genie used this form for two years.

- At around two, children with normal language development use 'wh' words in sentences such as "Where mummy?" Genie did not master this structure. Whilst her attempts were ungrammatical, she acquired vocabulary to the age of a three year old.

When she was eighteen years old Curtiss (1977) wrote a follow-up account of Genie. He noted that she spoke in short sentences whose grammatical structures were primitive. However her knowledge of speech, including word order seemed fine. He stated that her knowledge of syntax in sentences was limited – and believed that this would not improve. Her comprehension appeared to be unaffected by her years of deprivation.

Best (1989) maintained that 'some innate linguistic predispositions can survive a traumatic and deprived upbringing...other specialisations, including those that enable people to acquire syntax, can apparently be destroyed if the individual doesn't have adequate opportunities to use them.'

Best (1989) p.328

It is clear that there are various stages of language development through which normal children pass. There will however be long term effects on both language and literacy acquisition when there is interference due to unusual circumstances, such as in the

case of Genie. Most children fortunately do not suffer to the extremes of feral children, however there are large numbers of children who do experience speech and language difficulties. Those who are dyslexic and those who have a history of OM will be among them; add to that a multilingual background and it would not be unreasonable to predict serious consequences.

2.2 Milestones of Language Development

Note: the table below refers to those children from a monolingual background. I have found no equivalent for multilingual backgrounds.

Table 1: Milestones

Language Stage:	Beginning Age:
Crying	Birth
Cooing	6 weeks
Babbling	6 months
Intonation patterns	8 months
One-word utterances	1 year
Two-word utterances	18 months
Word inflections	2 years
Questions, negatives	2.25 years
Rare or complex constructions	5 years
Mature speech	10 years

(Aitchison, 1983)

The ages are to be seen as approximate, bearing in mind that there is variance in normal child development.

Language is about conveying ideas:

- orally through sounds in the speech system or
- through motor movements which are part of the written language system.

Linguists have long appreciated the importance of the relationship between spoken and written language. In spoken language the primary skill is one of face to face communication, in which the child develops his individual, sometimes idiosyncratic knowledge of structure, rule systems and vocabulary which enable the construction of meaning from the sample of language available to him in his background. Parameters leading to the establishment of a phonological structure are essential. A central aspect of phonological awareness is the link between the speech children hear with the utterances they produce (Snowling, 1996). Recurrent bouts of Otitis Media will interfere with this. There is a vast body of research focusing on the phonological processes involved in the acquisition of literacy and the development of language skills. Stanovich (1988) has gone as far as to suggest that a major key to the failure in the development of the reading process for some students is a weakness in the phonological processing system in the learning of grapheme-phoneme correspondences. Studies have been carried out highlighting the association of phonological processing and reading progress in primary schools (Stanovich, Cunningham and Cramer, 1984; Stanovich, Nathan and Vala-Rossi, 1986). Longitudinal studies have linked pre-readers' phonological skills with their later acquisition of reading. (Bradley and Bryant, 1983; Torgensen, Wagner and Rashotte, 1994). Catts (1993) highlighted the importance of defining how measures of ability in reading are established. The study showed that receptive and expressive language skills were predictors of reading comprehension and that phonological awareness and rapid naming skills were better predictors of word recognition. It is clear that there is a close relationship between the spoken and the written word.

A further point to note is that there is a 'critical age hypothesis' proposed by Bishop and Adams (1990). In it they suggest that if there has been a resolution of speech

difficulties by approximately the age of five, there is every likelihood that reading and spelling will progress normally, notwithstanding other learning difficulties or other language interference.

Stackhouse (1996) maintains that although there are some visual deficits that may affect performance in reading, verbal skills have by far the greatest influence in development in literacy. Whilst maintaining that spoken language skills have the greatest effect on written language abilities, she recognises that the relationship is a complex one:

> *'Language problems affect comprehension and semantic development and are likely to restrict the use the child can make of contextual clues to develop reading skills. Speech difficulties affect spelling development in particular....'*

She goes on to say:

> *'...phonological processing skills play a major role in the development of reading and spelling. Without intact* input phonology *a child cannot discriminate and sequence what he or she hears. This auditory processing problem will have a knock-on effect to how words are stored in the child's lexicon. Fuzzy lexical representations will be problematic when the child needs to name or spell.* Output phonology *is particularly important for rehearsing verbal material in memory and for reflecting on the structure in preparation for speech and spelling. Problems with rehearsal affect the child's ability to develop phonological awareness – a necessary skill for literacy to develop satisfactorily. Literacy success is dependent on coupling these phonological processing skills at the* input, representation and output levels *with alphabetic knowledge gained through orthographic experience.'*

Stackhouse (1996) p29 - 30

When considering the implications of Stackhouse's views for those with dyslexia and who speak more than one language, there are major implications for identification, assessment and remediation at a young age. For those who in addition to this, have a history of OM, there is a critical need for support at the earliest age possible.

Programmes have been developed which include the training of phonological skills demonstrating that the progress made by students with difficulties in the acquisition of reading skills can be substantially enhanced. (Hatcher, Hulme and Ellis, 1994).

However a major shortcoming is that none of these programmes have looked at the specific difficulties experienced by the dyslexic learner who communicates in two or more languages. What is the effect of a different set(s) of phonological structures? Are the number of languages spoken an influence on functioning across the curriculum? Is spoken language different for this group? Is the ability to access literacy different from that of monolingual dyslexic peers? What is the effect of excess stress caused by the need to work in more than one language on learning? What we do know is that the learning patterns of this very large group of people are affected - with implications for the educators who are struggling to support them. The ramifications for individuals and societies are immense, as considerable talent is lost through the inability to recognise the aetiology and subsequent provision for this group of learners.

2.3 Development of receptive and expressive speech and the particular role of the representative function of language in learning

The knowledge of structure, rule systems and vocabulary enables the child to listen to, and process increasingly complex utterances. Knowledge and skills in the reception of ideas communicated to the child by others through speech are greatly increased over time. With improved abilities in phonology, construction of expressive language becomes more precise. These skills provide the essential linguistic base required for success in the reading process. The knowledge of vocabulary, structure, and rule systems derived from receptive and expressive speech usage is critical in the development of reading and becomes essential at a later point in the use of language in written form to express ideas and thinking coherently across the curriculum. Even

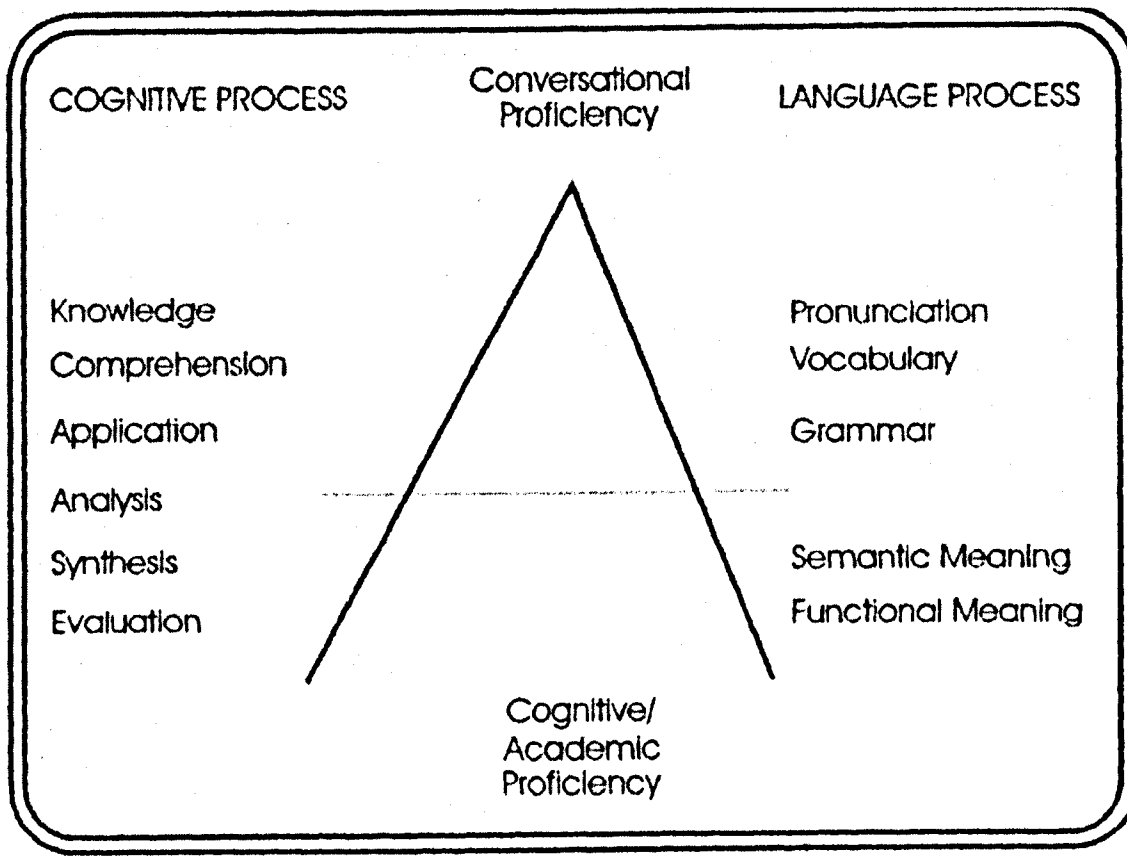
though early speech has been described as a very basic communication or chat system, it is of great importance in the development of thinking. Cline and Fredrickson (1991) analyse these matters in great detail in their consideration of what constitutes language proficiency. They indicate that the ability of the learner to use language can be considered from five different perspectives:

- competence in phonology and syntax
- competence in semantics
- pragmatic competence
- conversational competence
- socio-linguistic competence

Cline and Fredrickson consider that the proficiency of a bilingual speaker is best understood if all five of these factors are taken into account. A speaker's proficiency is not comprised solely by knowledge of language and skill in listening and speaking. Additional essential factors are the speaker's attitudes and feelings about the situations in which each language is used. They firmly state that a proficient bilingual speaker requires not just competence, but also confidence across a wider range of situations than a monolingual speaker will ever face.

Cline and Fredrickson's key points are derived from the views of Cummins (1984) who distinguished between Basic Interpersonal Communicative Skills (BICS) and Cognitive Academic Language Proficiency (CALP). To illustrate his ideas Cummins used the illustration originated by an earlier linguist, Shuy (date and place unknown) of purposes in language being expressed in the form of an iceberg (see figure 7).

Figure 7: Surface and deeper levels of language proficiency.



Cummins hypothesised that it is the CALP aspects of language, which are vital for educational success. BICS, whilst important, is not enough on its own. The learner must be able to use language for analysis, synthesis and evaluation of ideas. In practical terms Cummins points out that a learner who begins a second language after school admission may quickly (within 24 months) acquire an effective level of fluency, in everyday conversation (BICS). However, one unreferenced Canadian study quoted by Cummins suggests that it may take very much longer (60 to 84 months), before bilingual children catch up with their average monolingual peers on CALP. Whilst BICS and CALP seem to be well based and valid for many, there is a need to investigate the pattern further. Cummins assumes that this pattern is the norm for all bilingual learners. He asserts that there could be unexpected difficulties for learners who evidence a different pattern of language acquisition. For example, one who is relatively fluent in English but experiences academic difficulties in his curriculum studies (CALP) may be assumed to have learning difficulties. He

considers this an incorrect assumption. How then it is possible to differentiate between these those with and those without learning difficulties? Having analysed the underlying assumptions supporting the view that monolingualism is the norm, and that bilingualism is a possibly risky deviation, Grosjean (1985) reflects upon a more holistic perspective. He suggests that bilingual speakers are advantaged in being able to maintain a flexible communicative competence through different situations and in the face of changing demands from their two languages. Whilst code switching can be a feature of monolingual speakers from two social backgrounds, it can also be seen as a useful example of bilingual language proficiency which indicates the complexity of the learner's representation and expression of ideas. Code switching occurs when two languages are mixed in a single sentence or conversation. This is often regarded as evidence of confusion, but is really a stage that bilingual learners go through. Switching languages may be used to signal a change in intimacy, as an 'in-group' reference or sentiment; to give meaningful emphasis to important language, such as the punch line in a joke; or to compensate for the lack of a precisely suitable word in one of the languages. It is common for very young bilingual children to code switch at syntactically inappropriate points in a sentence. However, more mature speakers will select the boundary of a relative clause or the beginning of a verb phrase for the change. This practice can be a rich variant in the representational repertoire of the bilingual speaker, which is much too frequently disparaged by those accepting the monolingual stance as the prestige viewpoint.

Although there are indications that behaviour and speech form vary across social and cultural groups, even in a single language, this does not adequately represent the fundamental changes across a very much wider range of variables affected by the bilingual switching from one language to another. Significant representational effects are evident in the clearly apparent differences in rhythm, pitch and tone of speech. Background behaviours accompanying the speech may well change dramatically. Further significant differences in speech and communication patterns relevant to the assimilation into another culture and set of language rules, have been investigated by linguists such as Levenston (1970), who questioned Hebrew and English speakers on the speech techniques used in the correction of the errors of others.

The problem posed was quite specific. "You are discussing with a close friend the best way to get from A to B. He or she suggests changing at C and taking a number 10 bus. You know the number 10 does not go anywhere near C. What do you say to correct this mistake?"

The situation clearly calls for a response. A few English speakers wrote that they would say nothing. It is culturally and linguistically significant that none of the Israelis opted out in this way. Levenston analysed a range of responses from a range of internationally varying English speakers. These all phrased their response in an unassertive questioning way, e.g. "Are you sure the number 10 goes that way? Maybe I'm wrong but I think it goes through D." In marked contrast, the typical Hebrew replies would seem to English speakers to be direct, assertive and aggressive bordering upon rudeness. E.g. "You're wrong. Number 10 doesn't go past there."

In Levenston's study, 60% of English speakers qualified their response with a polite phrase such as, "I think"; "I seem to remember"; or "I'm sure" whereas only 12% of Hebrew speakers qualified their correction in this kind of way. Levenston concluded that an accurate English translation of "You're wrong" (in Hebrew) is, "Are you sure?" (in English). When an Israeli speaking English, says "You're wrong", he is not being rude, he is simply mistranslating.

This has significant implications for a study of Multilinguals who must subconsciously be aware of their expressions, expletives, movements, gestures, pitch and tone, when communicating in different languages. This is also evident in written language contexts.

2.4 Language as a means of exercising cognitive control

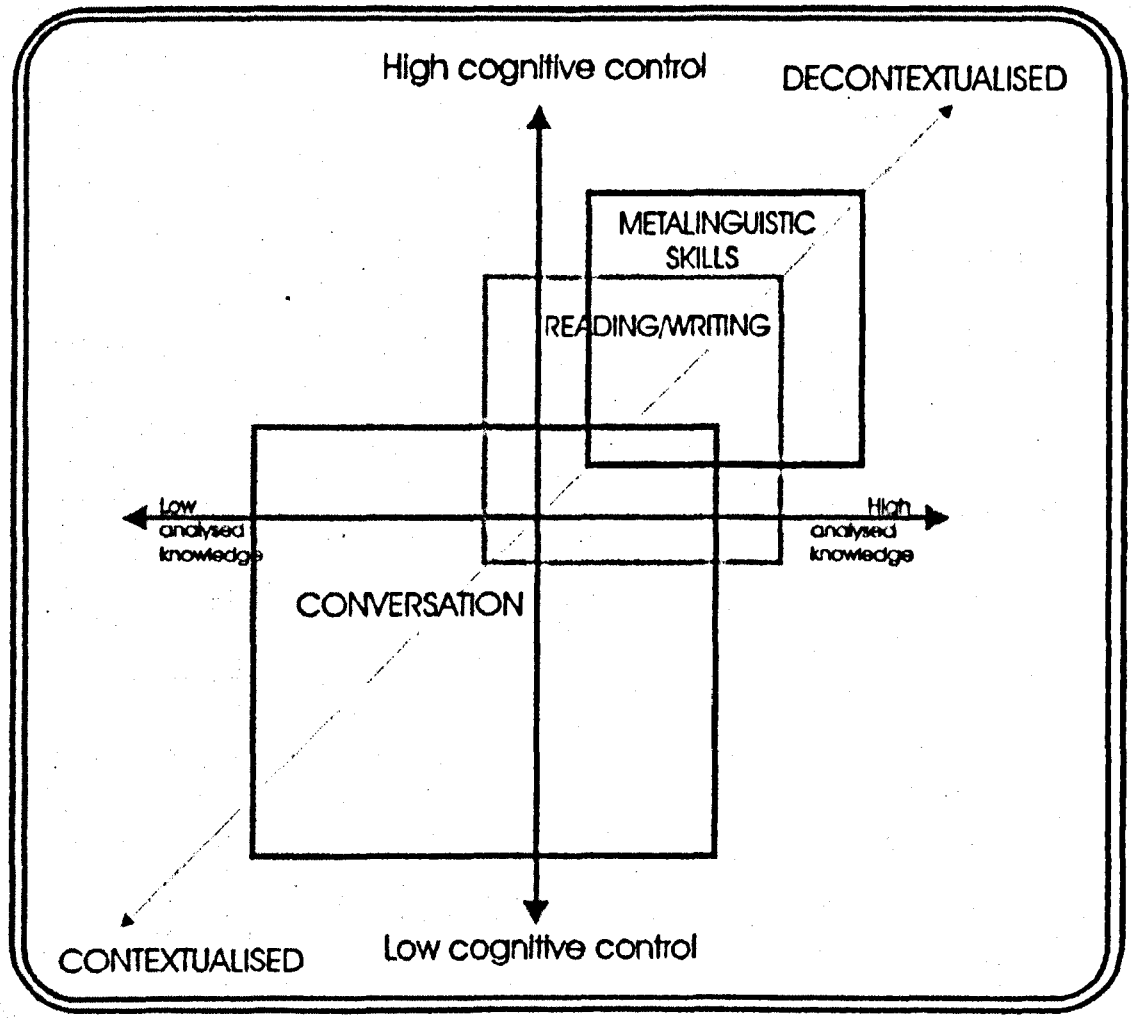
Language provides more than a means of representation. It offers a system of control over the evolving thought processes, as described in Vygotsky (translated by Kozulin, 1985). It also provides the essential foundation upon which the hierarchical structure of higher language, literacy, representational and thinking skills is established.

In simple BICS communication situations, learners develop their language skills in contextualised situations, where child and the adult respondents use linguistic units

for which the referent is present. As the child increases in maturity and becomes more skilful in the use of language, the form used becomes increasingly decontextualised. In these circumstances language becomes more of a thinking tool and is used actively in the organisation of thought processes. Decontextualised language, i.e. language in which the transmission of meaning depends upon linguistic rather than situational information, finds its ultimate realisation in written texts.

In language learning, the child builds upon his conversation skills, progressing from little analysed knowledge, and limited cognitive control, to more analysed knowledge on which he gradually exercises greater cognitive control, in terms of attention, selection and priorities. (See figure 8)

Figure 8: Schematized model of the cognitive dimensions of language processing



(Adapted from

and Ryan, 1985)

In learning language, the child builds on his conversation skills, progressing from little analysed knowledge, and limited cognitive control, to more analysed knowledge on which he gradually exercises greater control, in terms of attention, selection and priorities.

In learning language, the child builds upon his conversation skills, progressing from little analysed knowledge and limited cognitive control, to more analysed knowledge

on which he gradually exercises greater cognitive control, in term of attention, selection and priorities.

Hamers and Blanc (1989), deal very effectively with the theoretical aspects of this complex section of linguistic development. Some of the practical issues they touch on are of great significance for the teacher. They suggest that:

- an adequate model must be present in the environment: decontextualised language must be used around and with the child
- development seems to be promoted through a number of shared, language related activities concerned with problem solving between adult and child, such as extended conversations about meanings that are made explicit; being read to; looking at and talking about books
- familiarity with decontextualised oral language seems to be of the utmost importance for the learning of written skills

In the above figure, progression from conversation through reading and writing, leading to metalinguistic and metacognitive development is clear. The shift from contextualised speech to decontextualised language is also apparent. For the learner, developing language and cognition means progressing from only minimally analysed knowledge and limited cognitive control to highly analysed knowledge on which the child exercises increasing control in terms of attention, selection and priorities. The more detailed the analysis of language, the greater the divergence of that language from ordinary day to day conversational forms.

In language learning, the child must use appropriate social language around him, use cognitive processes to analyse and control it and deliver the analysed language in a communicable form. Representation of language must include all the functions of language used. Whatever the pattern or form of language used by the bilingual learner, he must acquire three competencies: communicative, analytic and metalinguistic.

While the use of speech for simple communication is of great importance in school and gives much pleasure and reassurance to teachers as well as students, the

knowledge system maintained by schools quickly brings about the major changes referred to above in the language purposes of the learner. The child must begin to use language to represent his ideas accurately. This representative use of language is a vital skill, which depends upon:

- appropriateness of the child's phonological structure
- individual working memory competencies of the learner
- the ability to represent and access ideas and more complex thinking processes effectively in words.

2.5 Importance of language background

Following the controversial work of Basil Bernstein in the 1960s and 1970s, psychology and education in England became preoccupied with the relationship between environmentally determined language codes and achievement within the education system. Much of this work was carried out at London University's Institute of Education, which at that time led the world in the study of the interaction between social structures and language codes.

Bernstein (1971), postulated the differences between what he saw as two culturally determined kinds of language which were eventually called 'restricted' and 'elaborated' codes. Bernstein described restricted and elaborated codes as arising in different social environments, i.e. working class and middle class settings. Working class children had access solely to the restricted code, but middle class children had access to both codes. The codes differ in their degree of structural predictability, and condition the way in which the speaker expresses himself and conceptualises. A wide range of researchers and writers have investigated and commented upon the failure of the working class child in the school system to use elaborate code. Bernstein's theory provided a great impetus for research, but facts thrown up by the research process and difficulties encountered in using his theory to help restricted code users with their language 'problems', indicated that the ideas were in essence, an oversimplification of the situation. Coulthard (1969) in a critique of Bernstein's work stated in a prophetic tone:

'It seems possible that the codes will be abandoned.... and some more general idea of linguistic depression will be introduced to link a child's environment with the extent to which he fails below his potential linguistic ability.'

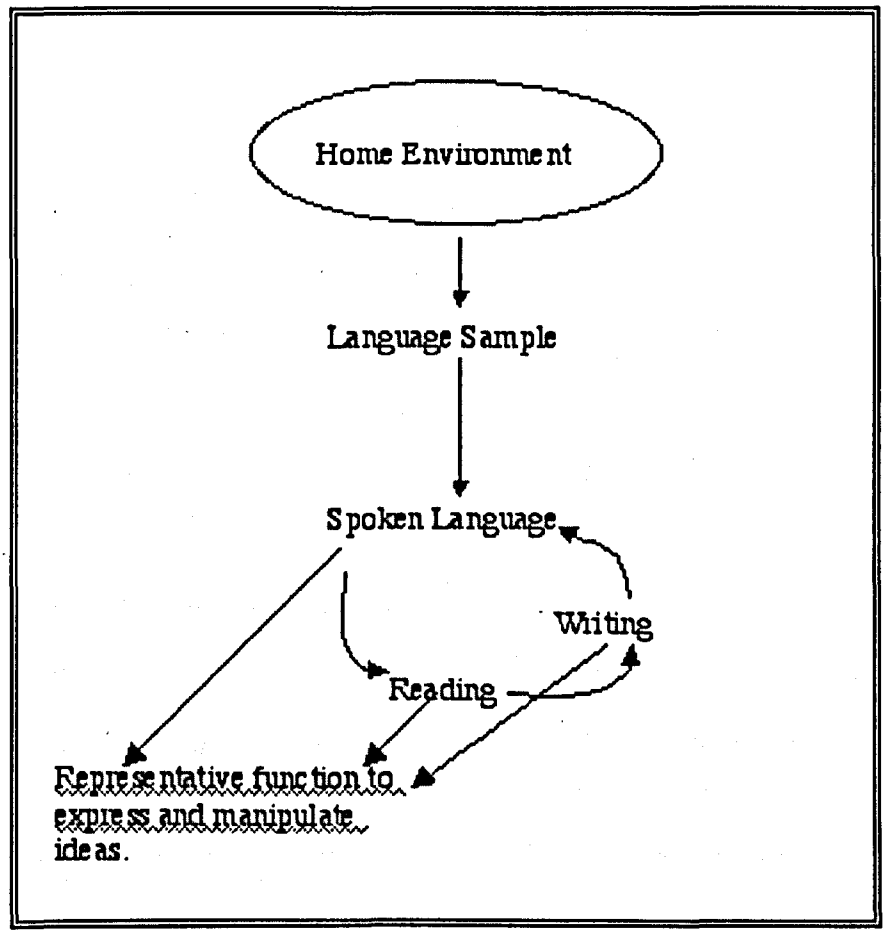
The major reason Coulthard saw for the demise of Bernstein's theory of 'Codes' was that despite much hard work by very skilful teachers, no effective teaching programme had been devised to transform a restricted code user into an elaborated code user. Today we see children from disadvantaged homes entering higher educational institutions and succeeding. There is no doubt however, a need to look at individual factors in the home that have profound effects upon the learning of children from that home. Clearly one factor of significance is bilingualism or multilingualism in ethnic minority children. Hess and Shipman (1965), using an analysis of the individual communication/teaching styles of the mothers, highlighted the relationship between this highly individual essentially classless factor, and the learning styles and information processing strategies of their children. They believed that:

'The meaning of deprivation is a deprivation of meaning.'

They point out that the depriving environment is one in which behaviour is not mediated by verbal cues, or by teaching which relates events to one another in a meaningful way. Hess and Shipman therefore see the deprivation which so limits learning and later achievement in school as arising from failure to understand and use language to facilitate a cognitive structure which enables parent and child, teacher and student, to represent and control the social and learning environment. The factors they highlight as being important can be classified as cognitive and relate to the representation of ideas rather than to crude social class factors. It might broadly be stated therefore that the effects of the child's background upon his learning stem largely from his language competencies and the skill with which he can use these in the representation and mediation of ideas. (See figures 9, 10 and11.) In Multilingual children, or children whose primary speech code differs significantly from the form of language used in school, the expression systems for delivering the learner's thoughts and ideas through speech or writing are more complex and difficult to control.

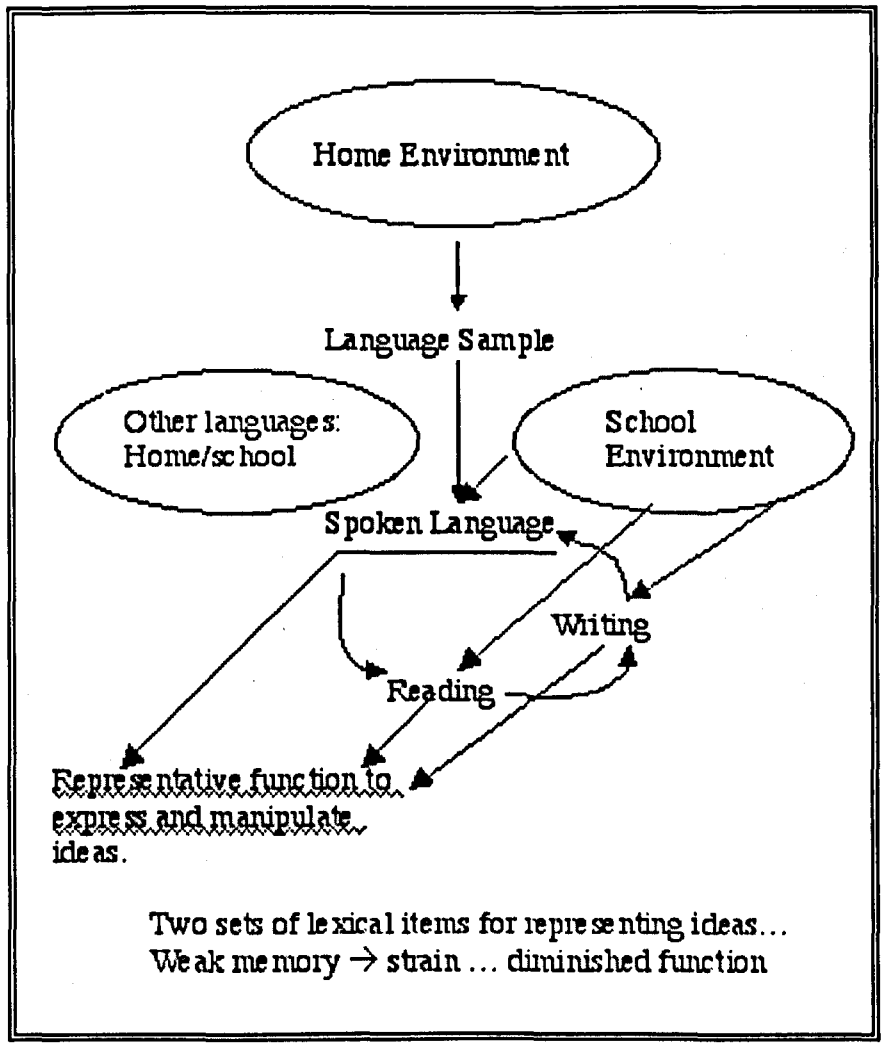
Therefore the language background – monolingual, bilingual or multilingual - will determine many of the complexities with which children have to deal.

Figure 9: Language and the monolingual



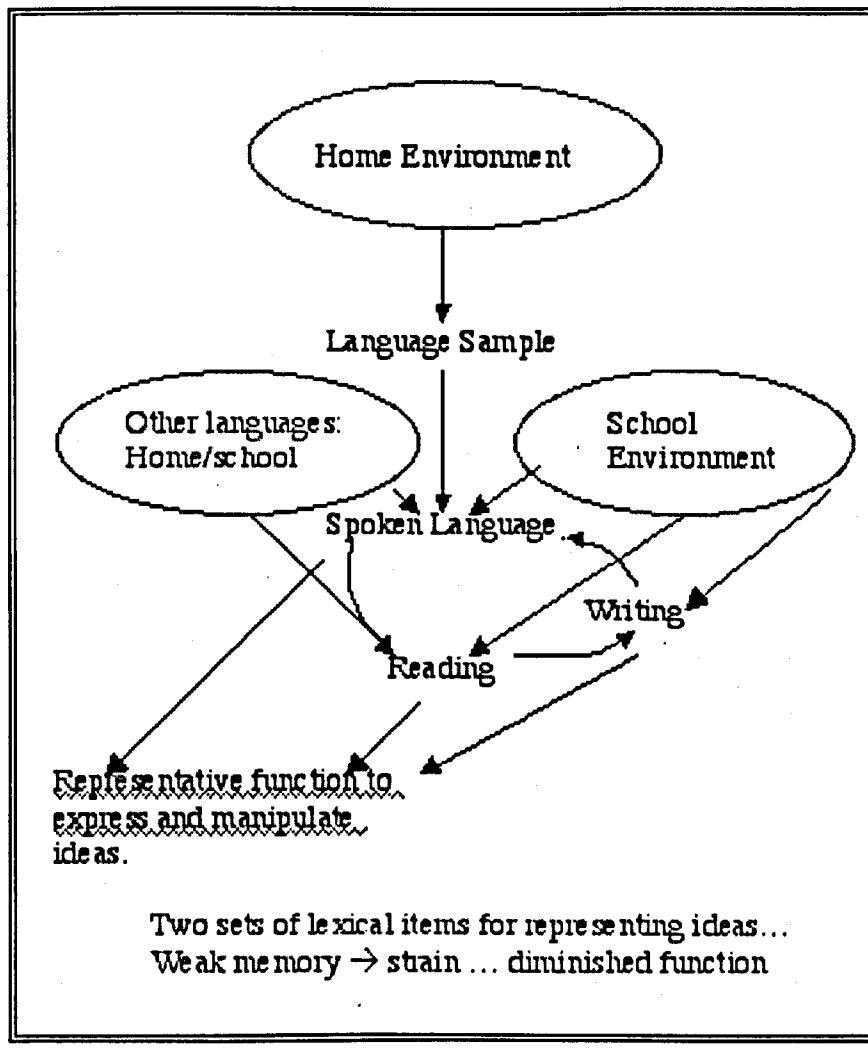
From Peer (1992)

Figure 10: Language and the Bilingual



From Peer (1992)

Figure 11: Language and the Multilingual



From Peer (1992)

While multilingual learners show some difficulty in controlling receptive and expressive language, they have more of a significant difficulty in controlling the representative form of language, where complex meaning has to be expressed with accuracy through the speech or motor system into writing. It is this factor which exacerbates a student's failure and later possible alienation in the education process.

Control over language used to express ideas in thinking involves the selection of one of the alternative link systems, between the shape of the word, its sound, its writing pattern and the understood meaning. These links which are the essential foundation of effective language learning, are also fundamental to the concept of the working

memory structure described by Baddeley in a series of important papers and books from 1976 to the present.

3. Section Three

Multilingualism and Multilinguality

3.1 Influences of bilinguality and cultural background upon learning.

Cline and Fredrickson (1991) point out that the various elements that create the context in which the child grows up i.e. the 'background variables' are of considerable significance in determining the efficiency of learning.

In their analysis, they specify three major background variables:

- society
- the learner's own community
- the learner's family

The learner beginning school brings a set of competencies and attitudes derived from the interaction between capabilities stemming from innate potential, temperament and the individual background variables. They describe this set of competencies and attitudes as 'child input variables'.

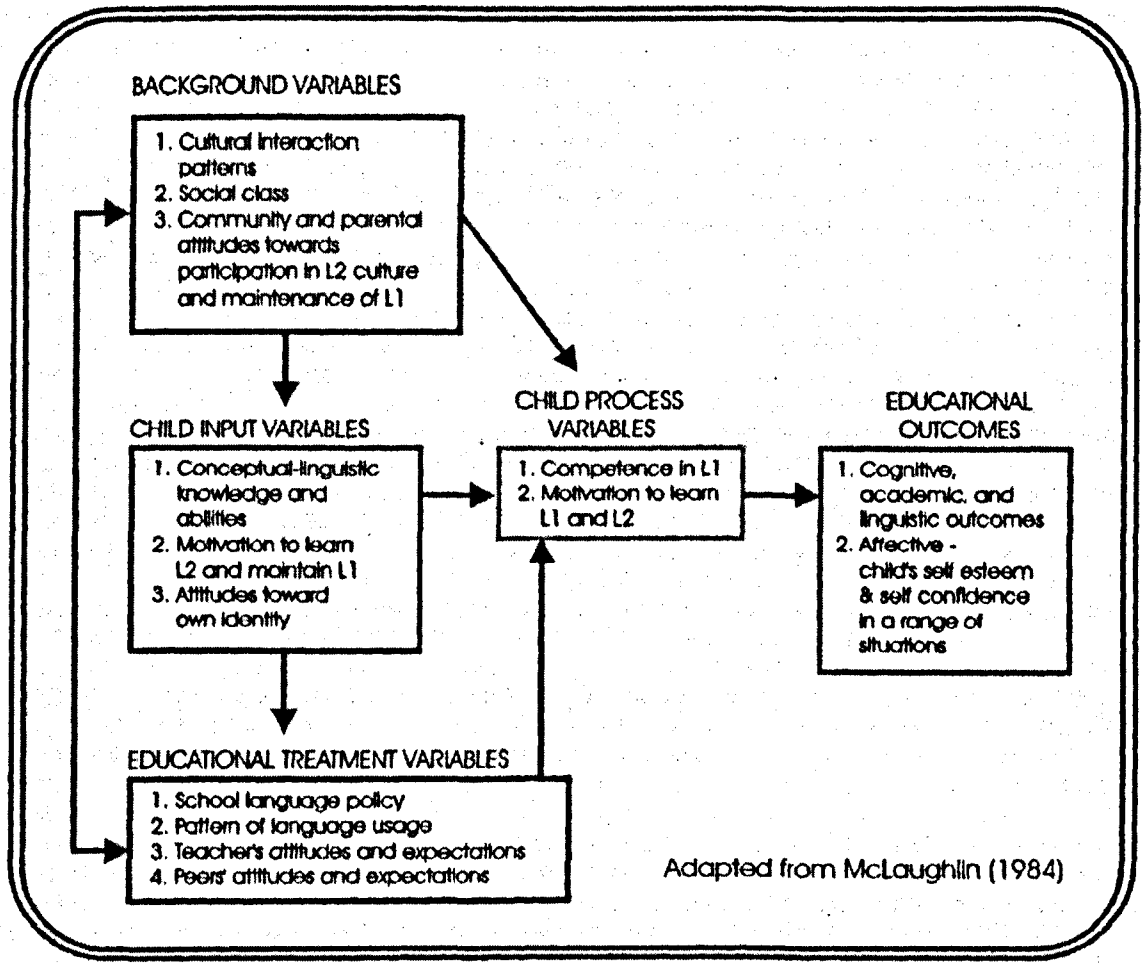
The learner in school will be greatly influenced by what they categorise as 'educational treatment variables'. They postulate that the key points are:

- the languages policy of the school
- the patterns of language usage in the classroom and elsewhere in the school
- the attitudes and expectations of peers and of crucial importance, teachers.

The background variables, child input variables and educational treatment variables as discussed by McLaughlin (1984) combine to influence both the learner's further

acquisition of L1 and L2 and ultimate educational performance. This complex interaction is depicted in the figure below:

Figure 12: Interaction model of bilingual education



(from McLoughlin, 1984)

3.2 Bilingualism and Bilinguality

Bilingualism has been defined by Hamers and Blanc (1989) as

> *'The state of an individual or community characterised by the simultaneous presence of two languages.'*

However, I believe that this is an overly simplistic definition as it is more accurate to assert that a range of bilingual conditions exist. For example, in Diglossic Bilingualism, a state of bilingualism is observed, in which two languages, each with

separate and distinct ranges of social functions co-occur. In contrast, in Territorial Bilingualism two or more languages co-occur which have official status within a designated geographic area. Another example is the coexistence of two or more unilingual areas within a single political structure as in the unilingual regions within a multilingual state.

Bilinguality is a more important concept which Hamers and Blanc (1989) define as:

> *'The psychological state of the individual who has access to more than one linguistic code as a means of social communication. This access is highly individual and will vary along a number of dimensions.'*

This gives additional dimensions of Bilinguality:

- Additive Bilinguality is defined as a situation in which the student derives maximum benefit for his cognitive development from the bilingual experience. This is often the case where the two languages are highly valued in the student's environment.

- Balanced Bilinguality is a state of skills development in which an equivalent competence is reached in both languages. It should be noted, however, that whatever the level of competence, the balance is not equally distributed for all domains and functions of language.

- Compound Bilinguality is a state of language development where two sets of linguistic signs are associated with the same set of meanings. This type of bilinguality is usually linked to a common context of acquisition.

- Consecutive Early Bilinguality is a form of Childhood Bilinguality in which the second language is acquired before age 5-6 years, but after the acquisition of basic skills in the mother tongue. L1 is developed and then L2.

- Dominant Bilinguality is a state of bilinguality in which competencies in one language are superior to competencies in the other. The dominance is not equally distributed for all domains and functions of language.

- Subtractive Bilinguality is a situation where the bilingual student's cognitive development is delayed in comparison with his monolingual peers. This sometimes occurs when the mother tongue is devalued in the environment.

3.3 Complexity of the sub-systems of language required by the existence of multilinguality

The multilingual child is born into a home where the parents choose consistently to use particular language options, which may include one, two or more languages, as appropriate for them. Differences are evident between the child who has access to two or more languages from birth, compared with the child who initially learns only one language, and has the other superimposed at a later stage. Within the home the pre-school child learns the phonological structure from the available speech sample. In homes where early literacy is considered a high priority, children will have been introduced to the written word at nursery age, before the commencement of school. The shapes of the letters are learned, their sequence within the language structure, the direction in which books are opened and the text processed. The child may even have been introduced to the written form or forms of language through copying.

When the child is enrolled in school he is expected to use a sophisticated language code to convey ideas. Almost certainly this will be different from the language code used in the home. All too soon he will be introduced by the teacher to the shapes of words in reading and will be expected to decipher a form of language, which is unfamiliar to him. In certain forms of bilinguality such as Hebrew-English, the languages spoken by the majority of the sample in this study, there will be a clear conflict between direction of processing for the two scripts. Motor movements of the musculature of the throat tongue and lips, giving rise to the organised sound patterns will be different. Even such basic factors as the procedures for expulsion of air are different.

The differences described give rise to significant retardation in the use of language to represent ideas. This may be further complicated in some cases by the introduction of

a third or more languages, which may need to be processed at speed ultimately at a high academic level. This may well lead to an overload on working memory, causing failure when measured in an academic sense. Dyslexic learners who are likely to have weaknesses in working memory, sequencing and direction will be particularly vulnerable.

Champagnol (1978), showed that working memory organisation for the bilingual student varies according to:

- the nature of the task. He indicates that recognition relies more on perceptual aspects of the process and recall of the semantic characteristics.
- the context of encoding relevant to the particular task, [Champagnol (1973) and 0'Neil and Dion (1983)]
- the non-verbal / verbal characteristics of the stimulus. [Saegert, Kazarian and Young (1973)]
- presence of the two languages in the task [Magiste (1986) and Hummel (1986)].

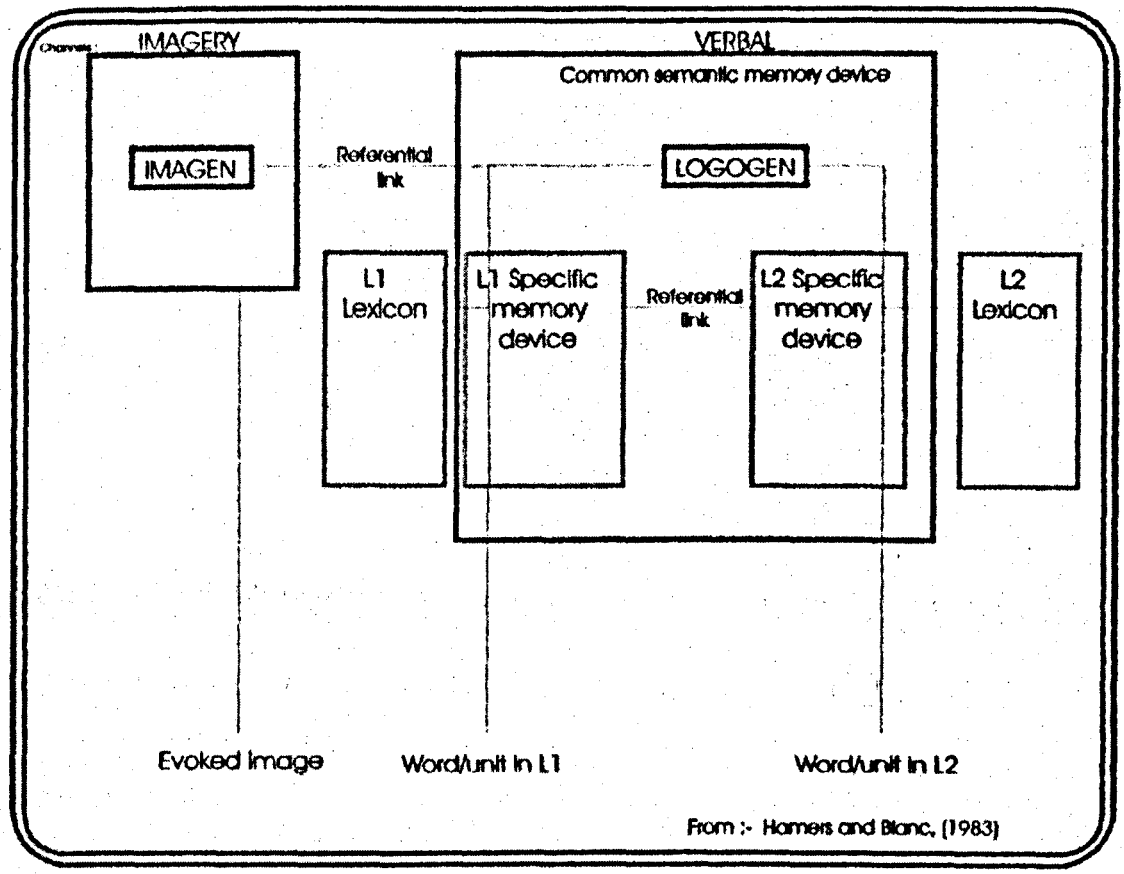
The findings of two separate studies, Tulving and Colotla (1970) and Champagnol, (1973) were consistent in concluding that the degree to which storage of the learned material is language specific varies with language acquisition history and competence in both languages.

Interesting differences of opinion arise in some aspects of the literature on working memory competencies in bilingual learners. Saegert, Kazarian and Young (1973), analysed translation errors (English-Spanish) in recall of bilingual paired associates lists. Half of the pairs used were common nouns and half were abstract nouns. The results showed that concrete items were more likely to be stored in a non-verbal form than the abstract terms. They concluded that concrete words are stored as images and abstract words as verbal representations. The two verbal channels appear to be independent of each other.

However, Magiste (1986) working with bilingual students in both Swedish-English and German-English, concluded that these bilingual learners were slower than monolinguals in decoding words in both languages. The difference between bilinguals and monolinguals was more pronounced with infrequent rather than frequent words. They therefore concluded that the experimental effect appeared to be determined by the degree of automaticity achieved by the learner in acquiring the frequent and infrequent words. Nicolson and Fawcett (1999) have shown that automaticity has indeed a significant part to play when investigating compounding factors in the learning process of dyslexic people - although there is no suggestion in the work of Magiste that dyslexia may be a cause of weaknesses.

The complexity of the working memory links is summarised and graphically illustrated by Paivio and Desrochers (in Hamers and Blanc,1983).

Figure 13: Double -coding model adapted to bilingual memory



As well as a surface level on which two separate registers store specific characteristics, including tagging and perceptual aspects, there is a deeper level of semantic storage which draws on both languages. The higher order language specific organisation, together with the imagining process, is then organised into concepts and prepositional representations. The approach is consistent with current trends in psycholinguistics and information processing.

They maintain that there are several access channels to representations, namely, imagery and two verbal channels. These two verbal channels join in a common semantic store and there is a referential link between imagery and the totality of the verbal representation structure.

For each verbal channel there is a language specific memory device which stores stimulus-specific features such as phonology and perceptual aspects, and possibly,

some limited lexical aspects. These are organised in language specific logogens in L1 and L2. These logogens, linked via the referent, are further organised into higher order semantic structures. This whole structure is related to the imagen through the referential link.

In order to explain the functioning of bilingual memory, imagery is an important component of verbal memory. They disagree that semantic memory is language specific and suggest that postulating a common semantic memory fed by the two separate verbal channels, each one with a surface memory device, is a better explanation for the existing evidence.

3.4 Cognitive advantages and negative consequences of multilingualism

Ben Zeev (1977) hypothesises that the bilingual child develops a strategy for analysing linguistic input enabling him to overcome the potential interference arising from the bilingual environment. He postulates four mechanisms for resolving the interference caused by bilingualism at the structural level of language:

- greater capacity for language analysis
- improved sensitivity to feedback cues from surface linguistic structure and/or verbal and situational contexts
- maximisation of structural differences between languages
- neutralisation of structure within the language.

The student will develop this range of cognitive competencies in response to the demands of his bilingual environment. Having developed the skills, these are now accessible to the student for other learning purposes and can be generalised to other information processing tasks thereby benefiting the overall cognitive growth.

Skutnabb-Kangas and Toukomaa (1976) postulated the condition of Semilingualism to describe the educational problems of the bilingual learner who fails to reach monolingual proficiency in literacy skills in any language, and is unable to develop

his linguistic potential or make use of his educational opportunities. To the casual observer, the student seems to cope in everyday situations quite fluently, but this fluency is apparently superficial, and masks a deficit in the knowledge of the phonological and morphological structure of both languages. I would postulate that the condition outlined above might well be a key to the identification of some bi/multilingual dyslexic students.

When half the population of the world is bilingual or multilingual and people travel across the world to work and live, it has to be said that if at all possible young learners should be given the opportunity of competence in more than one language. McWilliam (1998) suggests that bilingual children need a command of the English language equal to that of their monolingual peers if they are to achieve academic success. Furthermore it is suggested that success in learning across the curriculum is dependent upon the learner's active involement in developing a complex network of linguistic understanding.

Many working in the field of literacy would agree with Hutchinson, Whiteley and Smith (2000) who suggest that before children can begin the process of reading acquisition they have to learn spoken English (in the UK) to a minimal level. As they suggest, due to the lack of research it is difficult to determine whether any literacy difficulties experienced by these children are the result of a:

(a) specific learning difficulty such as dyslexia,

(b) developmental delay caused by English language – related difficulties, or

(c) difference caused by diverse patterns of literacy development in ethnic minority children and their monolingual peers.

It is therefore clear that identification and assessment of children who are failing to make progress with literacy acquisition, will be key factors in supporting them to overcome early difficulties in learning.

Where a child has dyslexic-type difficulties, the ability to reach fluency in the second (or more languages) will be key to effective functioning, achievement and self-esteem. A learner needs to be competent at various levels of functioning in a range of

languages in which they are required to perform. These include everyday 'chat' in addition to spoken 'academic' proficiency. Learners will also need to be proficient in some instances in written language, as well as in reading in relation to speed, accuracy and comprehension. These skills will determine achievement at school which will create a path if desired into further and higher education and subsequently into an appropriate career.

Cummins (1984) estimated that ethnic minority children require two years to develop peer-appropriate communicative language, but need between five and seven years to fully develop language proficiency. No-one has suggested equivalent figures for the same child who is also dysleixc. If a struggling bilingual dyslexic learner remains at the stage of an emergent learner and achieves little, there will clearly be great costs to the individual, to school achievement and ultimately to the community.

In countries where there is a requirement to function in more than one language, it is often found that there is a significant number of adults who are unable to cope with the academic rigours and employment expectations demanded of them, despite giving the impression that they are intellectually able. It is often due to diminished functioning that someone will begin an investigation leading to the identification of dyslexia.

4 Section Four:

Hebrew and English

4.1. Structural differences between Hebrew and English and the linguistic effects upon the dyslexic learner.

The majority of the multilingual subjects in this study spoke English and Hebrew as their first two languages. Many of them had in addition, a variety of other languages to which they had been exposed over the course of time, whether they were languages used at the simplest level for 'chat' or whether at the highest level, i.e. for academic purposes.

It seems most appropriate therefore to discuss some aspects of the Hebrew language that are of particular note and relate them to the dyslexic profile which is central to this study.

- Directionality and Eye Movements:

  - Hebrew is written from right to left.

  - Books open from right to left

- The majority of vowels are written below the consonants, necessitating a zigzag movement of the eyes. Most printed documents however, as well as books and other reading material read by children from third grade school and above are written without vowels at all. This means that the reader has to have a good idea of what is being written in order to comprehend the text.

- Vowels in Hebrew are very small, being represented by a series of dots and dashes. They can appear underneath, above or next to the consonants.

- There are two totally different scripts in Hebrew, which need to be learned for everyday and academic purposes.

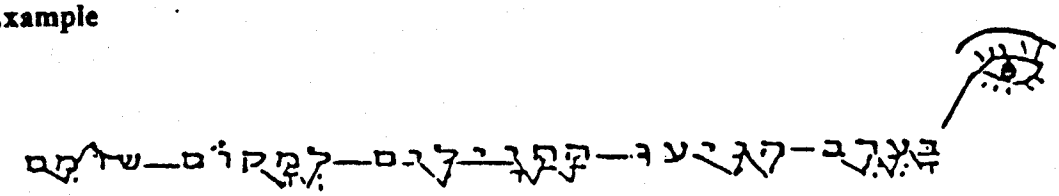
- All letters are printed and not joined, making it far easier for the reversal of letters than when joining letters as is possible in the English language.

In comparison:

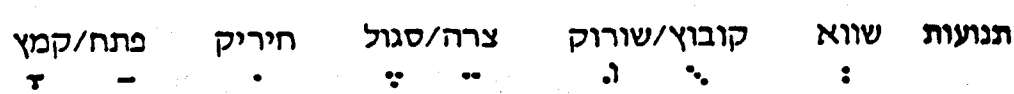
- English is written from left to right.
- Books open from left to right
- Vowels receive equal space on the horizontal continuum and always appear in written language.
- There is a smooth lateral sweep.

Figure 14: Comparison of Hebrew - English

Example



VOWELS



* As they appear without consonants in a typical 2nd grade line of text

In Hebrew, words are also visually contracted - making sentences shorter than in English. E.g. 'I am a boy' would translate as 'I boy'. Likewise, 'When I was...' would be written as one word, as would 'My mother-in-law...'.

4.1.1 Vocabulary:

During the period of the Renaissance, Baugh (1957) suggests that the whole of Latin vocabulary was potentially English. Writers could take Latin nouns ending in '-atio', add an 'n' and use it freely knowing that those with a classical education would understand. Similarly in Hebrew as it is used in modern times, there is a distinct similarity (Levenston 1970). There are many words taken from other languages (often English) and transliterated into Hebrew.

E.g. 'Exclusive flats' would read ' deerot exclusiviot'; a car might be described as being 'eleganti'; musical humour might be 'humour musicali'.

In academia one might meet the word 'text' in the middle of a Hebrew passage showing equivalence 'equivilanti' to something else.

Two kinds of error are sometimes ascribed to these type of words:

- The precise form of the English adjective cannot be predicted from the Hebrew, as many of these type of words end in 'i'. This may represent a curtailed 'ic' as in 'romantic', a curtailed 'ian' as in 'agrarian', a curtailed '-ious/eous' as in 'spontaneous'. This may lead Hebrew learners of English to invent words such as 'spontanic' or 'utopic'!

- More complicated than that are the words taken from another language (often French or English) into spoken Hebrew which do not have the same meanings as their phonological meanings in English. Examples such as the following exemplify the complications inherent in using language effectively:

  (a) The English word 'artist' sounds the same in Hebrew but means 'wise boy' or 'malingerer'.

  (b) The English word 'category' sounds 'categoria' but means 'accusation' or legal prosecution'.

  (c) The word 'novel' in English is 'Roman' in Hebrew – but is not necessarily a romantic novel!

(d) The word 'tramp' in Hebrew is 'to hitch-hike'.

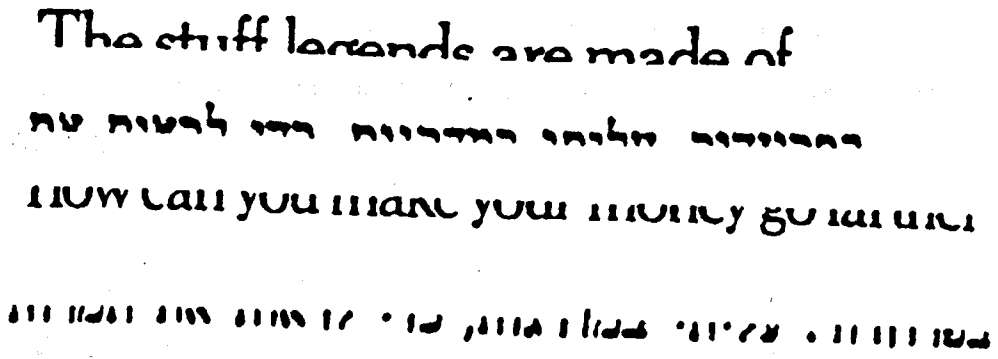
(e) The word 'pudding' in Hebrew refers specifically to 'blancmange'. Israelis have no conception of 'sweet desserts' and therefore there is no word for them!

4.1.2 Collapsing language:

There will be difficulty in acquiring more than one language for some people, when the specific languages are constructed differently to one another. When presenting a short story expressing the same information for translation in a range of 14 languages, it was noticeable when measuring the number of lines and word units to see how much space it took up, that Hebrew was the penultimate language, due to its collapsing nature.

There is also a difference in orthography between Hebrew and English. When presented a half-letter test as shown in the figure below, the reader familiar with both languages could identify without too much difficulty what is being said in English whereas great problems would be experienced reading the Hebrew, particularly when looking at the bottom half.

Figure 15: Hebrew – English: a half- letter test.



4.2. Auditory Factors:

In reading, sound is derived from the symbol. In Hebrew symbol-sound correspondences are highly consistent. In English, symbols make a variety of sounds. For example, in Hebrew, the letter g is 'g', the letter m is 'm' all the time. In English, the letter p can be 'p' or 'f' the letter g, 'g', 'f', or 'j'. However, in writing in Hebrew the sound-symbol correspondences are less reliable. For example, in Hebrew, you hear the sound 't' and have to make a choice between two letters, 'tet' or 'taf', as in English if you hear the sound 'f', when a choice has to be made between 'f', 'ff, 'ph' or 'ough'.

In Hebrew, there are 20 basic consonant sounds represented by 29 visually different symbols, including 5 'final' symbols, which appear only at the end of a word. However, it must be stated that whilst Hebrew allows for several sound-to-symbol choices, it is much less complex than English with its large number of irregularities in both sound-symbol and symbol-sound relationships. In English there are 18 sound equivalencies for the 5 vowels and a further 39 sound equivalencies for the additional vowel combinations. For example, the sound 'ay' (the long a) can be written as a, a-e, ai, ay, ei, ey, ae, eigh, whereas the letter 'a' appears in at least 10 combinations, all having slightly different sounds: a, ae, augh, aw, au, ai, oa, ar, ay, ea. Whilst these vowel combinations are complicated for the monolingual dyslexic learner, they are

very confusing indeed for the multilingual dyslexic learner attempting to function in two or more languages that are so vastly different one to the other.

There is clearly much to absorb and remember when coping with a range of languages. The underlying weaknesses experienced by dyslexic learners exacerbate their difficulties.

4.2.1 Auditory Discrimination:

Phonological awareness is believed to be essential for the acquisition of language, an area of weakness for many dyslexic children. There is a need to have the ability to discriminate between sounds, to analyse and synthesise words and to be able to rhyme. (Birmingham University Phonological Steering Group 1993-1996) When children who evidence such weaknesses are faced with the need to acquire another language with a different set of sounds, auditory confusion is quite common and the results can be highly significant. If the learner cannot 'hear' the difference between sounds, he will find it difficult to enunciate them correctly - leading to retardation in the effectiveness of spelling. In Hebrew there are difficulties as sounds do not directly translate from one language to another.

For example, the short, a, e, and u in English are three distinct sounds. In Hebrew they are one. It takes a great deal of time and familiarity with the language to begin to discriminate such sounds at a later age and stage of development. In the meanwhile, there will be many spelling errors, which may or may not have anything to do with learning difficulties.

4.3. Issues relating to Cross – Cultural Assessment in relation to Multilingualism and Dyslexia.

The need for testing and the linked evaluation of potential are vital components in the education system of today. Testing is of use not only for assessing achievement and

determining programmes for the majority of learners, but also for the identification and support of those with special educational needs. The focus on 'intelligence' and 'intellectual deficiencies' is still a primary application of psychological tests despite debate over the value of testing using I.Q. as a gauge for attainment.

The use of standard ability and achievement tests was originally motivated by liberal views that translated equal opportunity into identical treatment for all. However it is known that minority children, as a group, have traditionally scored lower on standardised tests than their counterparts. Kaufman (1994a, pp 158-161) cites several studies that highlight this discrepancy. He states:

> *'Regardless of why Hispanic, American Indian, and other bilingual children obtain relatively low Verbal scores, it is quite clear that Verbal I.Q.s or other indexes of verbal ability – although they may be meaningful for understanding the child better – do not reflect their intellectual potential...*the examiner is advised not to interpret the Full Scale I.Q.'

It is thought that those multilingual children who do score well on standardised tests tend to come from homes that convey the same values, aspirations, environmental circumstances and attitudes as the middle classes for whom the tests are ideally suited (Samuda, 1998). The tendency for a sub-group to score at a lower level on verbal scales needs to be borne in mind when using standardised tests for learners who are both dyslexic and multilingual.

Scarr (1977 p.73) contends that equal opportunity does not always ensue from identical treatment. She states that equality of opportunity is more likely to result from a 'different strokes for different folks' approach where individuals are treated according to the advantages or idiosyncrasies of their environmental, linguistic, cultural and ethnic background.

Over the years I have had discussions with countless psychologists and educationalists working in the field of multilingual and multicultural education and identified the following arguments against the use of standardised testing for this group of people:

- The results for minority children traditionally scoring below that of their peers, lead to negative social outcomes.
- Bias in the tests and test procedures causes failure.
- Depressed results reflect the fact that testing is carried out in a language which is not highly developed.
- Lower achievement is due to the fact that testing is not carried out in the language in which the child thinks.
- Children raised in countries or areas that are different to the majority culture may well be handicapped on a number of comprehension items.
- Some moral-emotional tests will be culture specific and not relevant e.g. when asking the child what they would do should they find a wallet in the street, the expected answer in the U.K. would be to return it to its owner. However for children living in Israel or Northern Ireland for example, they might well say that they wouldn't touch it as it might blow up! Cultural lifestyles need to be understood by the tester if meaningful results are to be noted.
- When testing for short term-memory using the 'digit span' sub-test, some multilingual children would experience significant difficulties not experienced by their monolingual peers. Testers need to be aware of the number of syllables contained within numbers in other languages, which in some cases may lengthen the amount of information to be stored in working memory.

Kaufman (1994b) points out that test performance is unusually susceptible to testing conditions that are less than ideal and is vulnerable to hearing impairment. This needs to be noted as results show that there are a significant number of children suffering from the effects of Otitis Media within any given sample of learners. The dyslexic sample with such difficulties in this study, number 70%.

Kaufman also states that average forward span:

'stays remarkably constant across the WISC-III range, averaging about 3 digits for ages 6-8, 4 digits for ages 9-12 and 5 digits for ages 13-16. In general, the average child has a forward span that is 2 digits longer than his or her backward span.'

He goes on to state that digit repetition is impaired more by state or test anxiety than by chronic anxiety. It is known that many dyslexic learners have a significant weakness with the digit span test, which affects their retention of information. This weakness is further exacerbated for those who speak more than one language.

4.3.1 Thinking about Assessment

There is no necessity in this dissertation for a discussion on the definition of 'intelligence', but suffice it to say that there is little agreement on what it actually is. The samples in my group were offered either psychometric or diagnostic testing, alongside language assessments, purely for the purpose of identifying their dyslexia and ultimately their educational needs. The use of the results from the sub-tests produced on the WISC-R or III tests (officially translated into Hebrew - translations used where appropriate) was considered of more value when designing programmes of learning and developing learning styles than the knowledge gained by securing verbal, performance and overall I.Q. scores. I felt that it was necessary to explain to parents and educators that when I.Q. scores were produced, the results were in fact only a recognition of that which the child had learned in specific areas up until the point of testing. Parents and teachers seemed more focussed on the figures as limiting factors to achievement rather than viewing them as the start down the road to improved potential and ultimate success. Two explanations I believed were necessary for those who saw results as limiting potential for teaching and learning:

- The notion of 'plasticity' of the brain
- The fact that I.Q. scores often increase when teaching is appropriate and effective.

I.Q. scores should not therefore be seen as a limiting factor on the child's potential. The principles of Feuerstein's (1998) attitudes towards assessment were discussed with many as support for the notion of fluid intelligence. This was offered as a reason to aim for recognition of potential and high achievement. For teachers working with multilingual dyslexic learners there was a need for such an explanation in order to overcome the tendency to resort to low expectation and acceptance of failure. It was explained that Feuerstein, like myself, perceives intelligence as a dynamic process that changes with development and learning. Whilst Feuerstein would agree that genetic factors have some relevance, he maintains that significant factors in the development of intelligence emanate from influences in the home as well as conditioning within the school and social environment. He cites the gap between the learner's actual development and the learner's developmental potential. Taken from Vygotsky, (1962), Feuerstein calls this the concept of the Zone of Proximal Development. When he tests children he uses a form of Dynamic Assessment which allows the tester to identify cognitive gaps and apply relevant instructional processes.

His goals would be to:

- Assess a student's cognitive modifiability by observing how they function in situations designed to produce change;
- Assess the extent of modifiability in terms of cognitive functioning and the significance of a student's attained functioning in the hierarchy of universal cognitive operations, ranging from perception to abstract thinking;
- Determine the transfer value of what is learned in one area to other areas of operation; and
- Identify the student's preferred modalities for learning and the problem-solving strategies that work best.

The reason for not using Feuerstein's methodology for testing in my sample is that his Learning Potential Assessment Device is not on its own sufficient for the identification of the specific areas that are understood today to portray a dyslexia profile. Furthermore it is a lengthy procedure which in some cases may take days to complete with each child.

Many of the teachers with whom I was working held the attitude that I.Q. attainment is in fact the maximum that any one person can achieve; consequently they teach to misperceived limitations. This attitude impacts negatively on the teaching of both dyslexic and multilingual groups of children. Much time is needed in order to change attitudes and remove cynicism, particularly when working with staff from more academically based institutions.

Section Five:

Otitis Media and Dyslexia

5.1 Description of Otitis Media

Otitis Media is a term that is commonly used to cover a continuum of related diseases. The Fourth Research Conference on Recent Advances in Otitis Media addressed the issue of terminology. The Panel on Definition and Classification used clinical criteria to define the following terms (Klein et al 1989):

- Otitis Media: An inflammation of the middle ear. This general term encompasses all the diseases of the OM continuum.

- Acute suppurative otitis media (AOM): Clinically identifiable infection of the middle ear of sudden onset and short duration. Synonyms include acute otitis media and acute purulent otitis media.

- Secretory Otitis Media: Presence of middle ear effusion behind an intact tympanic membrane without acute signs or symptoms. This category includes the clinically non-infectious forms of otitis media. Common symptoms are chronic otitis media with effusion, otitis media with effusion, nonsuppurative otitis media, serious otitis media, mucoid otitis media, catarrh, serotympanum, and mucotympanum.

- Chronic suppurative otitis media, or chronic otitis media: Chronic otorrhea through a tympanic membrane perforation.

It would appear that in different areas of the world and even within the same country there has been no standard use of one definition (Daly, 1997). Furthermore, definitions of recurrent OM vary in the same way. Some researchers have defined three episodes before ages 1,3, or 7 as recurrent; others have suggested six or more episodes before the age of six; yet others have suggested six or more episodes during a period of twelve months. In this study I have taken age 7 as the baseline. Statistical comparisons across the world are therefore difficult to compile. However, what is

clear is that there is a significant problem that is a huge financial cost to society as well as to the individual. Stool et al (1994) suggest that direct and indirect costs of OM in the United States in 1991 were estimated at $1.1 billion for 2 year olds. An earlier estimate was $3.5 billion annually for all children (Stool and Field, 1989). Others believe that there is a link with speech and language difficulties (Gravel and Wallace, 1992). Yet others suggest that in some cases there is a danger of long-term hearing loss (Wright and Meyerhoff, 1994).

For the purposes of this study, I will use the definition as described in the first bullet point above: *An inflammation of the middle ear.*

I intend to show that exceptionally high rates of dyslexic children suffer from OM, which has a direct effect on their learning. I will show how this is further exacerbated in a multilingual environment.

5.2 Prevalence

According to Daly (1997), 'OM was the most commonly diagnosed childhood disease among children in the United States in 1990' p.3. (Schappert, 1992) with peak incidence in the first two years of life. She suggests that OM during childhood is very common, with 5%-20% of those with OM, experiencing recurrent OM and chronic OME (Otitis Media with Effusion). She cites the following environmental factors as the ones that possibly would exacerbate the likelihood of the existence of the condition: winter weather; upper respiratory infection; exposure to other children, particularly in childcare settings; exposure to passive smoking. She believes that the most likely groups to suffer the condition are males; Caucasians and Native Americans; family history of OM. Her recommendations are that further study is needed in the areas of: anatomy, allergy, immune and socio-economic status.

I believe that there is a strong link with allergies, particularly to milk – possibly a weakness in the auto-immune system. (Geschwind and Behan, 1982) Further to this work, Galaburda (1994) suggested that ' there may be a familial tendency to have

auto-immune and allergic disorders, which may lead to subtle brain damage during the second half of gestation.' Personal experience of numerous cases has led me to believe that the links to western males, family history and allergies to milk, overlap with links that are seen in high numbers of dyslexic profiles.

Jariabkova, Hugdahl and Glos (1995) compared 30 dyslexic and 30 control boys aged 7-11 years for frequency of immune disorders and handedness as well as for family history of immune disorders and learning disabilities (dyslexia and stuttering). They were also compared for neurological status and for history of speech and language difficulties. In this sample they found no significant differences between the two groups in the frequency of immune disorders and in handedness. However they did find significantly more dyslexic boys with soft neurological signs and signs of speech and language disorders. Furthermore the frequency of dyslexia was significantly higher in the relatives of dyslexic boys.

From this evidence, it would be interesting to question as to whether heredity, dyslexia, speech and language disorder and OM have common physical roots – and are exacerbated in outcome for those who are additionally bi- or multilingual.

Bearing in mind that internationally, medical researchers in the field of OM are not working to one clear definition, accurate comparisons in prevalence between countries are fragile to say the least. However what is clear is that regardless of the variance in results below cited by Daly (1997), the existence of the condition in its definition among the dyslexic sample in this study is extremely high by any figures:

She compares OM incidence of **one bout during the first year of life**:

- In the US - among non-native populations - ranging from 49% to 97%
- Scandinavian incidence:

  Sweden - 14%-18%,

  Denmark - 22%

  Finland - 28%-42%.

Daly explains that the criteria used in the US are broader than those used in Scandinavia, which is a partial explanation for the differences.

At this point I feel it necessary to point out that I have found no official incidence rates for Israel. As the majority of the cohort of the people in this study were from that country, I feel it is necessary to postulate a possible reason for the inaccuracy of any figures that may at any time be offered for the population of this country.

There may well be a link between the political stance that has been taken, with educational and health implications. Israel is a small country of approximately 6,000,000 people, of whom just under a third are Arab. Israel operates a strategy of a Law of Return, which is an open door policy of allowing all Jews to live in the country should they have suffered persecution elsewhere, or should they wish to live in that country for spiritual, religious or other reasons. This decision was taken when the State was established in 1948 following the 2nd World War and the Holocaust, in particular. Having suffered persecution, it was felt necessary by the United Nations to give this group of people a 'safe haven' should there be further concerns for their safety from wherever they are in the world. It is therefore fair to say that the language and cultural backgrounds of this population are diverse. As a result there are many families from all over the world who choose to emigrate there often once their children are of school age, particularly if they sense racism or prejudice elsewhere. As this is past the most common age of OM, and the education links have not been made, this may well alter documented incidence levels, as many with previous difficulties would be unknown.

To return to the above. When looking at school based incidence, as opposed to the one bout incidence in the first year of life noted above, the numbers drop dramatically. Daly cites:

- Japan - 4% -15%
- US – 12%
- Denmark – 16% – 22%
- UK – 20% - 30%

- Spain – 8%
- Kuwait – 31%

All of these figures are significanlty lower than the numbers identified in this study on dyslexic learners which were 703:1000 – 70%.

Treatment for the condition varies, some children taking antibiotics, others eventually experiencing surgery. What is significant in educational terms, is the amount of time that children experience a loss of hearing whilst these treatments are taking place. Daly cites research (e.g. Rosenfeld, et al, 1994) that states that for 60%-70% of children OM is resolved within 30 days. Others such as Bartolozzi, Sacchetti, Scarane and Becherucci (1992) suggest that it is resolved within 12 weeks. Zielhuis et al, (1990) suggest that an estimate of 60% resolution (i.e. the length of time taken for the problem to disappear and hearing to go back to normal) within 12 weeks is an underestimate.

What is clear is that this is an on-going condition for large numbers of children, meaning that they experience significant hearing loss as well as extreme discomfort/pain in the ears over a long period of time. In cases of recurrent episodes, weeks if not months of their early years will be affected. OM may well lead to lack of concentration as well as an inability to process the fine sounds that are necessary for auditory perception and speed of processing which is a major key to language learning. Tallal (1999) states that:

> *'Timing cues present in the acoustic waveform of speech provide critical information for the recognition and segmentation of the ongoing speech signal. '*

All the studies cited by Daly include children under the age of 7 years. Daly has pointed out that in those children under one year old, the length of resolution of OM is longer than it is for older children. Some researchers have suggested that significant problems with OM at this early stage are likely to lead to chronic OM at a later stage (Marchant et al, 1984). This has clear implications for the language learning process of dyslexic children, as we shall see later.

5.3 Diagnosis

OM is often observed in children who show no signs of illness and also in those who are referred to their doctors for respiratory conditions. This can be a concern as a child's hearing may be greatly impaired without anyone being aware of the loss. An assessment of the status of the middle ear, is in many places a part of routine health checks in the pre-school child. In my view with both health and educational ramifications, assessment should be seen as an important component of regular screening.

In the healthy child, the space in the middle ear is filled with air, allowing for the flow of sound to the inner ear. In cases of OM, the space in the middle ear is either partially or fully filled with a fluid – commonly known as 'glue ear' – which reduces the transmission of sound.

Parents often report earache and restless sleeping in their children in their initial visits to the GP; but there are those children with OM who do not evidence such symptoms. Henderson and Roush (1997) suggest that 83% of children with earache have AOM. Children without earache accounted for 40% of all AOM episodes.

The researchers suggest that 'sleepless nights' is not a clinically useful indicator as AOM is observed in 46% of children with restless sleeping and in 32% of children without restless sleeping. (p.46)

There are a variety of ways in which GPs can identify OM. I will not detail them as they are not relevant to this study. However one of the most common ways of measuring hearing loss due to OM is the use of both 'Pure-Tone and Speech Audiometry' where *conductive hearing loss* (something interferes with the conduction of sound through either the outer or middle ear causing fluctuating deafness) can be measured. Pure tone screening tests are useful in the identification of OM and hearing loss if they are carried out with tympanometric measures. (A tympanogram shows how well the eardrum is working and what the pressure is like in the middle ear. A sound probe is placed in the ear canal and registers how hearing is affected by fluid in

the middle ear.) The measures produced, not only assist in the diagnosis of OM, but quantify changes in hearing and middle ear function that occur as a result of medical treatment. Clinical Practice Guidelines for the medical management of OME were developed by the Agency for Health Care Policy and Research (Stool et al, 1994). The guidelines recommend inclusion of both pure-tone and speech audiometry in assessment. They specifically recommend that a child who has bilateral middle ear fluid for more than three months undergo an evaluation of hearing.

Figure 16: A typical audiogram for a child with bilateral OME

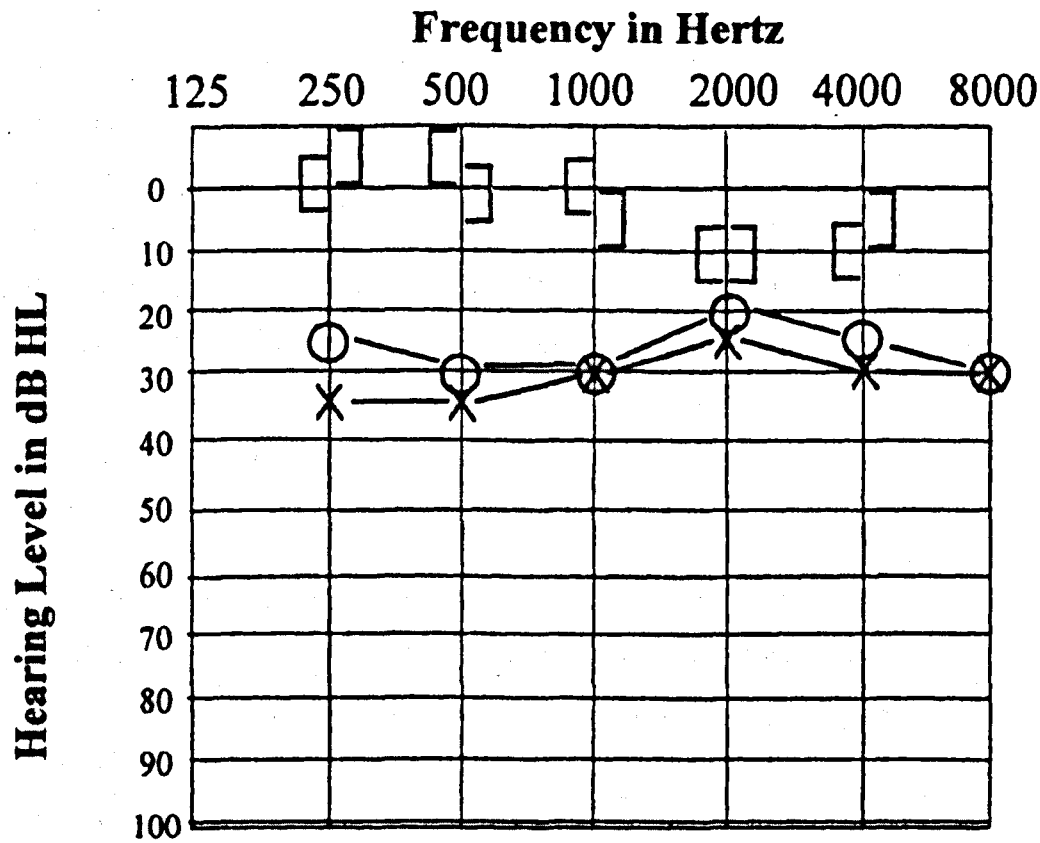


Figure 3. A typical audiogram for a child with bilateral OME.

(Henderson and Roush, 1997).

In children over the age of three years manual tests can be accomplished with ease. In children under the age of three, Henderson and Roush suggest 'behavioural hearing

screening' which they believe is the most effective way to identify the problems of OM and hearing loss.

Watkin, Baldwin and Laoide (1990) raise the issue of the 'potentially harmful developmental consequences' of the mild hearing loss that accompanies OME, when there is no earache, highlighting the fact that the loss may well escape the detection of parents, teachers and caregivers.

5.4 Hearing loss among children with OM

The question needs to be raised as to whether significant bouts of OM with accompanying hearing loss negatively influence development of speech and language and ultimately educational achievement. If this is indeed so, the need for early identification and appropriate intervention to prevent loss of hearing is critical. It is not for me as an educationalist to recommend the form medical/surgical intervention should take, but it is evident that some form of early intervention should take place and that the issue certainly should be placed on the agenda in both health and educational arenas. It may indeed be possible to prevent large numbers of children from becoming speech and language impaired, a fact that so often leads to the diagnosis of SEN - with its accompanying problems, e.g. lack of educational achievement and low self-esteem.

Friel-Palti and Finitzo (1990) suggest that hearing loss during the first two years of life may result in a delay in emerging receptive or expressive language or both. Gravel and Wallace (1995) maintain that although communication skills may appear normal for this group of children on entry to school, other auditory-based deficits may emerge in the classroom situation. They and others suggest that there are weaknesses associated with listening comprehension, academic achievement and even attention and behavioural difficulties.

Gravel and Nozza (1997) suggest that there may be two groups of OM children whose treatment needs may be different:

Those whose persistent hearing loss occurred in the first three years of life and terminated before school entry

Those whose difficulties relating to hearing loss and infections continued into primary school where they were affected on a regular basis.

It is therefore important to work with a speech and communication therapist to both identify weaknesses and to provide a programme of intervention in an attempt to prevent failure developing at school. Feagans, Blood and Tubman (1998) suggest that many OM children 'tune out' when in situations that require listening to speech in a background of noise.

There are clear overlaps with a dyslexic diagnosis that so often cites lack of concentration as part of the symptomology.

5.5 Indicators of Otitis Media

- Early speech and language difficulties
- Mishears or does not hear some sounds in speech
- Reading weaknesses, particularly word recognition
- Spelling difficulties
- Weak written language
- Reflection of limited linguistic experience
- Omission of words
- Incomplete sentences
- Word endings missed (particularly plurals and verb endings)
- Confusion of tenses

- Spelling not phonetically logical
- Omission of letters in spelling
- Poor use and understanding of vocabulary
- Poor general knowledge
- Delay in grasp of mathematical and scientific concepts due to language limitations
- Misunderstands instructions
- May not understand rules of games in the playground or organised games
- Shows tiredness and lethargy
- Tires particularly easily when listening to stories read aloud
- Evidences concentration difficulties
- Easily distractible
- Shows signs of frustration
- Often stressed
- Often feels socially isolated
- Often feels insecure
- Appears to be easily confused

Royal National Institute for the Deaf list – from a conversation between myself and C.E.O (1999).

Dyslexia – children will show differing clusters of difficulties:

- speed of processing: spoken and/or written language slow *
- poor concentration *
- difficulty following instructions*
- forgetful of words *
- has a poor standard of written work compared with oral ability
- produces messy work with many crossings out and words tried several times, eg wippe, wype, wiep, wipe
- is persistently confused by letters which look similar, particularly b/d, p/g, p/q, n/u, m/w
- has poor handwriting with many 'reversals' and badly formed letters
- spells a word several different ways in one piece of writing
- makes anagrams of words, eg tired for tried, breaded for bearded
- produces badly set-out written work, doesn't stay close to the margin
- has poor pencil grip
- produces phonetic and bizarre spelling: not age/ability appropriate *
- uses unusual sequencing of letters or words
- makes poor reading progress, especially using 'look and say' methods
- finds it difficult to blend letters together *
- has difficulty in establishing syllable division or knowing the beginnings and endings of words *
- pronunciation of words unusual *
- no expression in reading

- comprehension poor *
- is hesitant and laboured in reading, especially when reading aloud *
- misses out words when reading, or adds extra words
- fails to recognise familiar words
- loses the point of a story being read or written *
- has difficulty in picking out the most important points from a passage *
- shows confusion with number order, eg units, tens, hundreds
- is confused by symbols such as + and x signs
- has difficulty remembering anything in a sequential order, eg tables, days of the week, the alphabet
- has difficulty in learning to tell the time
- shows poor time keeping and general awareness
- has poor personal organisation
- has difficulty remembering what day of the week it is, his birth date, seasons of the year, months of the year
- difficulty with concepts – yesterday, today, tomorrow
- has poor motor skills, leading to weaknesses in speed, control and accuracy of the pencil
- has a limited understanding of non verbal communication *
- is confused by the difference between left and right, up and down, east and west
- has indeterminate hand preference
- performs unevenly from day to day

- employs work avoidance tactics, such as sharpening pencils and looking for books
- seems to 'dream', does not seem to listen *
- is easily distracted *
- is the class clown or is disruptive or withdrawn (these are often cries for help) *
- is excessively tired due to amount of concentration and effort required *

Written by Peer (1999) for the DfEE as a primary school Handy Hints poster, which was sent for information to all schools in England.

The overlaps between the conditions from an educational viewpoint are considerable. There are sixteen areas in the dyslexia list which it might be said to be hearing related. An asterisk indicates them.

I would suggest that there are clear ramifications therefore for assessment and appropriate teaching provision for OM children traditionally learning in noisy classrooms.

DeMarco and Givens (1989) suggest that even when children with recurrent and significant OM eventually have surgical treatment to open the airways to admit sound more clearly, there may well be continuing weaknesses that would not be predicted. They cite a 4-year-old boy with a prolonged history of OME before and after insertion of tubes. Assessment of his ability to discriminate sounds was carried out prior to surgery using word pairs that differed by a single phoneme. They tested at two intensity levels – one at normal conversational-level speech and the second at a higher level designed to overcome his hearing loss. They demonstrated that some of the weaknesses in hearing were indeed overcome when the child heard the sounds at a louder level, however some of the speech perception errors persisted. After successful

completion of the operation, speech perception was reassessed where the pure-tone registered normal in peripheral hearing. They found however, that some of the speech discrimination errors remained.

Dobie and Berlin (1979) predicted in a study that important speech properties might be absent, distorted or heard inconsistently when there is mild hearing loss associated with OME. They highlighted features such as morphemes (the smallest unit of meaningful language) e.g. final –s or –ed and short words.

It is evident that screening should take place to identify children at risk of difficulties with speech and language possibly leading to academic and behavioural weaknesses in the two groups that Gravel and Nozza (1997) identified above. For those in the second group, i.e. those with on-going OM into primary school, it may be necessary to screen on a regular basis, ensuring that teachers and parents are made aware of the fluctuating periods of time and levels of difficulty that the child may be experiencing. Supporting the child through the learning process, when the ability to hear or work effectively is impaired will be of great value to both achievement and ultimately self-esteem.

5.6 Effects of OM on auditory perception

It is common with children who have suffered OM and have experienced ventilation of the middle ear that hearing levels return to normal very soon after the operation. However, deficits in complex auditory processing may well persist long after the audiogram has returned to normal (Hall, Grose and Drake, 1997). Educationalists and assessors often assume that the learner no longer experiences difficulty with auditory processing if the medical readings appear to be normal. As a result, there is little or no recognition of and appropriate provision for the support of this specific area of weakness, which is so critical for the learning process. The effects of these weaknesses are even more apparent in the multilingual child where specific sounds of different languages need fine hearing and acuity if learning is to be a successful experience.

The ability to process one frequency component in the presence of other simultaneously present frequency components is adult-like by the age of six months (Olsho, 1985). The ability to detect a temporal gap e.g. a short interruption in an ongoing sound, is present in infants aged three months to one year (Werner, Marean, Halpin, Spetner and Gillenwater, 1992) but continues to improve until six years or later (Irwin, Ball, Kay, Stillman and Bosser, 1985). Other areas of auditory processing continue to show improvement in children aged seven to twelve (Besing and Koehnke, 1995). It is clear that auditory performance continues to show improvement over the years that are associated with a high incidence of OME.

There is limited psychoacoustic data available in the area of identification of single sounds (pure tones) in noise in relation to those who have a history of OM. What there is seems to indicate that there is less of a problem in this area than when there is a demand on the recognition of speech signals in noise. There is an identifiable weakness for listeners with a history of OM, as opposed to normal listeners, when trying to identify sounds within complex auditory processes. (Schilder, Snik, Straatman and van den Broek, 1994; Gravel and Wallace, 1992)

Ramifications of the above are considerable. Due to the fact that the ability to hear particular sounds in a noisy environment is impaired, it is reasonable to assume that children experiencing such weaknesses are at a potential disadvantage in the average classroom. Trying to hear the words spoken by the classroom teacher whilst there are sounds being made by other learners in different places in the classroom will lead to an inability to process that which is being spoken. This is exactly what Dana in the introduction to this work was expressing.

Currently it appears to be unclear as to the educational outcome of bouts of OM as little research has been carried out on the connection between the age and length of hearing loss due to this condition. What we do know however is that there is a significant loss of auditory function.

5.7 Phonological awareness and OM

Phonology is the part of language that underlies speech perception and speech production. It is the link between semantic, syntactic and morphological information. In order to acquire phonological awareness a child must be able to perceive, store and analyse the characteristics of speech and language. It is therefore vital that educationalists are aware of any impairment in speech and language, as it will undoubtedly have an effect on phonological acquisition, which in turn will affect the learning process.

A large body of evidence has provided evidence of a relationship between phonological processing and reading ability. Much of it has focussed upon phonological awareness. Some longitudinal studies have provided such evidence. Bradley and Bryant (1985) followed a group of 368 children over a period of three years commencing the study before the children learned to read. The children were tested on rhyme and alliteration oddity tasks as well as vocabulary and memory tests. When reading was assessed later in the study, it became evident that performance on phonological tasks predicted reading skill.

This study was followed up by a further one where they worked with pre-readers (MacLean, Bryant and Bradley, 1987). They showed that rhyme and alliteration detection and production tasks, as well as knowledge of nursery rhymes, differentiated children who were successful beginning readers from those who made less progress 15 months later. In their 1990 study, Goswami and Bryant asserted that both the segmentation factor and an awareness of rhyme in words causally relate to reading development and are in fact pre-requisites for it. Muter, Hulme, Snowling and Taylor challenged this in a study in 1998. They agreed that whilst the ability to segment contributes significantly to the ability to acquire reading, the ability to rhyme does not. They went on to say that the ability to segment in combination with letter knowledge is the best predictor of later reading ability.

Current research concerning phonological awareness and reading has considered the relationship of underlying phonological representations. It would appear that phonological abilities, which develop for the processing of speech, are possibly dependent on the same processes as those necessary for reading. (Elbro, 1996;

Snowling and Hulme, 1994; Swan and Goswami, 1997) Furthermore, tasks such as verbal short-term memory (Jorm, Share, MacLean and Matthews, 1984), speech rate (McDougall, Hulme, Ellis and Monk, 1994), and rapid automatised naming (Bowers, 1995) are significant too.

For the purposes of this study, it is of significance to recognise that whatever the underlying issues relating to the issues surrounding phonological awareness, there is a direct connection between it and the weakness in the acquisition of literacy and language.

When auditory input is impaired, there is a significant link to educational failure. It would appear that this is exacerbated when there are bouts of OM. There are further significant issues when the child is learning to acquire fluency in more than one language.

It is clear that there are different sound systems in specific languages. This means that the learner must be able to process each set of sounds and understand a rule system, which will differ from language to language.

Children with a history of OM seem eventually to acquire the phonology of their mother tongue. I have found no reports of children who have failed to do this at a global level. There may however be specific and detailed aspects of phonology, which have not been researched, which remain problematic for individuals and remain residual deficits. Detailed analysis of individual children would be necessary in order to ascertain this.

Schwartz, Mody and Petinou (1997) suggest that there is still a significant amount of work to be done in the areas of speech perception, speech production and morphological acquisition if there is to be a greater understanding of the effect of OM on phonological acquisition. Until such time, we can only speculate on its effects, preventative measures and remediation. They go on to say that they believe that many children who exhibit speech and language disorders have a history of OM. Much can be done to support these children, but first they have to be identified.

5.8 Language and OM

Conversational speech is not always clear and spoken at a consistent speed. Words are often run together and different people speak at varying speeds with different dialects, stresses and so on. The precision of sound production varies greatly among different speakers and even within the same speaker at different moments in time. In addition to this, environmental influences have the effect of altering perception and understanding e.g. the distance from the speaker or the level of background noise. Hearing loss may well place an additional burden on children in the early stages of language learning. They do not have the experience to use other clues such as body language or contextual clues as would be employed by adults that experience hearing loss.

Roberts and Wallace (1997) describe the result of OM in children.

They offer a Model of OM language sequelae:

Figure 17: OM in Young Children

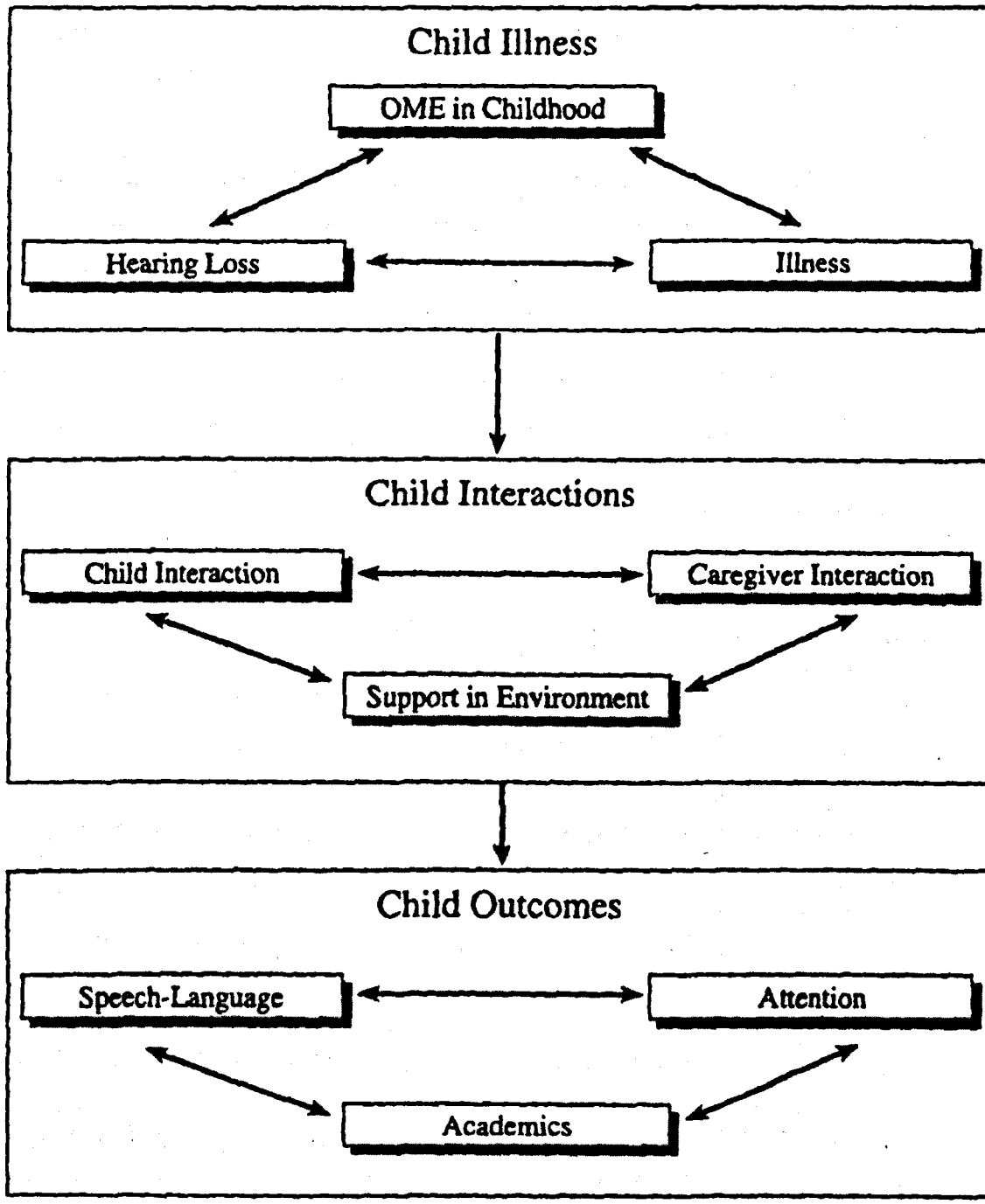


Figure 2. Model of OME language sequelae.

OM is a fluctuating condition, which causes many children to experience mild to moderate hearing loss. By so doing this causes auditory signals to be received inconsistently. In order for these children to understand that which is going on around them, there is a need for high levels of concentration in order to focus. In most cases it

is hard for them to sustain this over a lengthy period. Distractibility and disorganisation are descriptors often used by parents and teachers to describe children when experiencing lengthy bouts of OM. Some children as a result of OM find the discrimination of language and the processing of speech so problematic that they encode information incorrectly. Once language becomes so difficult that engagement is too stressful these children will often tune out a significant amount of auditory based information. In addition to the results of OM described there are also other associated behaviours. The physical manifestations of congestion and general feelings of being unwell over a lengthy period may cause a difficulty in engaging with others in a positive way. Effects such as tiredness, withdrawal, lethargy and clinging behaviour are not unusual. Some children also become unwilling to explore the environment independently (Parmalee,1993). As a result of these reactions many children have fewer opportunities to establish a knowledge base from which to experience and develop language.

In addition to this there are links with poor spelling. Phonology is often affected as discussed above. In particular such children will often find low intensity sounds difficult to hear. Sounds such as t, k, s and sh are often confused. It is clear that if a child cannot hear the sound correctly there is no chance that they will be spelled correctly. Morphological markers are also affected, as they are often spoken quietly and quickly and often end words. Thus the omission of short words in sentences or letters such as the plural s are often omitted in the written form.

Pragmatic language may also be affected, as children will sometimes miss clues such as subtle nuances of language, e.g. questions or exclamations.

Roberts and Wallace (1997) cite '...the large body of research that has shown a significant relationship between OME and later measures of language.' They also state that there are some studies that do not support the hypothesis. The latter group appear to question the validity of some studies due to methods of research design, the timing of the data collection (as for some the data was collected retrospectively) and so on. As a result they carried out a review of many of the studies done and concluded that whilst the '... studies are not conclusive, the data does suggest that a history of

OME in early childhood may be one of the variables that can have an impact on children's language development...'

5.9 OM and link to behaviour

Research has suggested that children who have experienced recurrent bouts of OM or persistent bouts of OME are more likely to display learning and behavioural difficulties (Byrd and Weitzman, 1994). It has already been suggested that these children have to put much effort into concentrating on what is being said and done around them in the classroom. It is not therefore surprising to learn that they are prone to distraction. Feagans (1986) proposed the attention-to-language model to account for these relationships. The model suggests that the mild hearing loss, which accompanies OM tends to make affected children less attentive to language, in particular to lengthy language sequences. Together with background noise in classrooms (Gravel and Wallace, 1992) the ability to focus on verbal instruction is limited.

As in other areas such as the links between OM and academic achievement, there is no absolute consensus on the relationship between OM and behaviour. The links between poor auditory perception and poor phonological awareness experienced by many who have a history of recurrent OM have been established. It has been shown that this may well lead to weaknesses in spoken language development as well as in literacy skill development – particularly in the areas of spelling, reading and writing. This too would add to the frustration felt by pupils who are so closely measured by their successes in these areas.

As a result of these problems, deviant behaviours may well be documented by teachers in the classroom and often by parents in a busy home environment.

There is sufficient evidence to suggest a direct connection between OM and behavioural issues, which would lead to the need for early identification, assessment and appropriate remediation being put in place.

5.10 Hypotheses

From the above information, there is enough to ask whether there is a pattern of difficulties consistent with a sub-group of dyslexic learners, which hitherto have not been identified. This group of dyslexics is those who have experienced specific difficulties due to the pre-existence of OM. The implications of this question are extremely important as the numbers of learners who are not having their needs identified and met will be considerable. Based on my own experience as mother and teacher over many years, there are grounds for serious consideration of these concerns. It is not possible to say whether the results of this study would be totally consistent with that of dyslexic learners within a monolingual situation as the cohort in this study are all of a bi/multilingual background whose complex language background will have an effect on the acquisition of language and learning processes, exacerbating any difficulties attributable to a dyslexia profile. The behaviours that have been documented here were typical of a sub-group of dyslexic learners, many of whom I have taught on a regular basis throughout the years. Their learning patterns were different to those with dyslexia who did not have a background of hearing difficulties. There is enough evidence to suggest that there are vast numbers who will be affected regardless of language background.

The hypotheses that I have posed are as follows:

1. The frequency of OM in the dyslexic sub-group of learners appears to be very high. I believe there is a significantly greater number in this sub-group than would be expected in any given population according to recorded international figures.

2. There appears to be a higher incidence of hearing infections and OM in those diagnosed as dyslexic than those without such a diagnosis. I believe that there is a sub-group of dyslexic people who will experience more profound difficulties in language acquisition and learning across the curriculum than their peers, due to the existence of this condition.

3. Behaviour and attitude are key factors in the identification and effective provision for dyslexic learners. I believe that the dyslexic group that has suffered from significant bouts of OM will evidence behaviours that are more severe than those of other dyslexic learners.

4. Some bi-/multilingual dyslexic children are identified at an earlier age than others. Whilst language differences might account for part of the explanation, I believe that children with OM are identified as experiencing learning difficulties at an earlier age than those who do not.

5. There appears to be a relationship between ear infections, poor speed of processing and successful learning in school. I predict that there will be a difference between those who have experienced OM as opposed to those who have not. This is because the fluctuating loss of hearing leads to periods in a young child's life when information is missed and that which is heard is unclear and too fast to comprehend. Furthermore, the link between poor speed of processing and poor working memory function will have a significant impact on these learners.

6. Many children benefit from being bi-/multilingual learners. Even some dyslexic children enjoy the challenge particularly in the early stages. However, many dyslexic children seem to experience great confusion in language functioning when there is a presence of more than one language. I believe this is related to the existence of OM and more severe phonological difficulties.

7. I predict that bi-/multilingual dyslexic children with OM will find general success across the curriculum more difficult to achieve than non-OM children. The demands placed on working memory and speed of processing, together with the demand to function in a range of linguistic systems with varying phonological and visual patterns, will cause overload on these learners. This in turn will impact upon academic achievement. Furthermore these stresses influence behaviour, which in turn impacts upon achievement.

6. Section 6 – Four Studies

6.1 Study 1: Cohort of 1000 bi-/multilingual dyslexics with and without OM

6.1.1 Rationale

Britain has largely considered itself a monolingual society with a monolingual education system. However with the movement of people throughout the world there are many that enter the British system with a background in more than one language. Much has been written on bilingual education which it was hoped by many would be the answer to all questions which teachers may ask. However that was patently not so, as there are always those people in all societies who experience difficulties in learning for a range of reasons. Little research had been done in that field and therefore there is little that is transferable to education and policy.

As a mainstream teacher of English and drama, and for an extended period, a teacher of English as a Foreign Language (EFL) in a multilingual society over a period of 20 years, it became evident to me that there were many learners, both children and adults, whose specific learning needs were not being addressed through appropriate identification and teaching methodologies. This was because the root cause of their problems had not been identified and effective ways of teaching them had not been employed. Having taught very large numbers of children and adults within mainstream secondary school and adult EFL and native language settings, it was evident that there were substantial numbers of learners who were experiencing difficulties in broadly the same groupings of specific areas. The weaknesses in these areas was having a fundamentally detrimental effect on their acquisition of spoken and written English whether or not they were native English speakers or attempting to acquire English as an additional language.

When working abroad, the significance of success in the curriculum area of English was that it was considered one of the keys to entry into Higher Education; most of the

major texts in the world are in English and therefore success in this subject was considered critical. Unlike attempting to learn a foreign language in the UK, in Israel many people speak English and English is heard in a variety of situations and young people are self-motivated to be fluent in the language. The ability therefore to be immersed in English as a success factor for language learning is far easier there than it is in England. Furthermore, students in Israel cannot matriculate without success in English examinations.

There was a range of students in classes showing different areas of weakness. There were some students whose spoken language was good, but whose written work was very poor. There were some who spelled phonetically and others whose spelling was bizarre, where it bore no relation to the spoken word at all. There were those who were poor in EFL and other language based subject areas, but who were very good in other areas of the curriculum. For some there was clearly a problem with auditory perception. For the majority experiencing difficulties, there seemed to be a problem with speed of processing language. Even if staff could be persuaded to recommend that these children were sent for hearing tests, in many cases the tests showed that at that specific moment hearing was within normal parameters. Teachers were told that there were no problems in evidence, therefore there must be alternative reasons for failure. The link between early OM and educational under performance was not being made. To remind the reader, as stated at the beginning, Daly cited 20%-30% of the UK population as being registered as having OM and there are no figures for Israel, as explained in that section.

In addition to the condition of OM, it was clear that many of these students were dyslexic. In the majority of cases there was little acceptance by teachers of the existence of dyslexia. Specific failures in school were generally seen as laziness, unwillingness to co-operate, poor teaching, bad parenting and so on. However by far the greatest excuse for failure given by teachers seemed to be that many learners had a language background other than monolingual, which for some unknown reason specifically caused them a problem. The solution suggested by many was that it was the responsibility of the parents to learn the language of the country and drop their mother tongue. The emotional effects of this suggestion were never considered, neither was the practicality of it or the loss to all individuals concerned of the cultural

enrichment to their families when their own language would have been lost. In cases where difficulties were so profound that no reading was acquired at all, a limited number of special schools were in existence where these children were placed with others who had limited ability to learn for a range of reasons. In some areas of the country, there were those who were working towards the recognition of dyslexia, but within limited parameters i.e. the child could not read. There was some identification of need among psychologists, some assessment being carried out in the language of the country but very limited provision. (Kidron, 1988). There was little work being carried out in relation to dyslexia among the multilingual population at that time in Israel.

Having trained in this area my role was to work in the major assessment centre in Tel Aviv and to travel around the country raising awareness generally among inspectors, head teachers, teachers and training providers. Specialist courses were set up for the training of teachers working with bi-/multilingual learners who were diagnosed dyslexic.

An SEN committee was established which reported directly to the Minister of Education. This group ultimately promoted the work and changed policy and practice. This remit, together with the growing public knowledge that this was a new area of work gave me access to large numbers of dyslexic people. However, it became evident that in research terms, the tool for real educational change, a reasonably large sample needed to be produced to show that:

- dyslexia does indeed exist in a multilingual grouping irrespective of language and cultural background;
- dyslexia is a condition which is broader than just a reading problem;
- the effects of dyslexia can affect self-esteem and behaviour; and
- dyslexia has a long term effect on the person's ability to learn.

On return to the UK, I continued growing this database and meeting with others in the field from all over the world. Their educational experiences were strikingly similar one to the other. The need for the production of identification and assessment tools in

addition to methodologies for teaching those who have a multilingual background was and still is urgent. There is also a great need to effect change in policy in addition to practice.

The 1000 individuals in this cohort were from many countries of the world, but all showed common patterns of strengths and weaknesses. Although they spoke a range of languages, by far the greatest number were those who spoke at least two languages, always English, and most often Hebrew. This was of particular use for my study as I myself had grown up as a monolingual and had acquired my second language, Hebrew, as an adult. I was therefore aware of the process that I needed to go through in order to become a bilingual in a language so very different from English.

6.1.2 Method

Over the course of several years, information was collated on a large group of 1000 individuals. These were all people who had been referred for assessment or had been assessed and needed further advice and support. The criteria for entry to this group was that the learners were:

- exhibiting behaviours that educationalists believed was on the dyslexia continuum in its broader sense (see definitions - Peer); and
- they were bi-/multilingual.

Initially, it was essential to decide which tools to use as part of the assessment process.

6.1.2.1 Tools used for this study

It was decided to use the following variables in the design of the study:

Gender	
Age	
L1	(First language)
L2	
L3	
L4	
L5	
Psychometric Assessment by psychologist	Yes/No
Diagnostic Assessment by specialist teacher	Yes/No
Level of spoken English	Good/Fair/Poor/Negligible/Nil
Level of written English	Good/Fair/Poor/Negligible/Nil
Level of reading in English	Good/Fair/Poor/Negligible/Nil
General success across the curriculum	Good/Average/Poor
Behaviour problems	Yes/No
Significant ear infections as a child	Yes/No
Bouts of OM leading to insertion of grommets 1	Yes/No
Bouts of OM leading to insertion of grommets 2	Yes/No
Bouts of OM leading to insertion of grommets 3	Yes/No
Weaknesses with speed of auditory processing	Yes/No

Compilation of the results was from the learner's own perception of their abilities and difficulties, that of their parents where appropriate and from their teachers. All of the

1000 were experiencing difficulties in some form or other in the learning process; they were all described as being on the dyslexia continuum at some point.

Summary data for those tested is shown in Tables 2 and 3 below.

Table 2: Mean ages of Participants in Study 1

	Mean (s.d.)	Range
OM Group	13.24 (6.45)	4-61
OK Group	13.97 (6.41)	6-65

Table 3: Frequency distributions for Participants in Study 1

		Total/999	OM Group/703	OK Group/296
Gender	Male	680	464	216
	Female	319	236	83
Number of languages spoken	2	572	395	177
	3	336	237	99
	4	81	60	21
	5	10	8	2
Bouts of OM	0	304	0	304
	1	209	209	0

	2	396	369	0
	3	90	90	0

When categorising levels of spoken English, writing in English and reading in English, I scored success at five levels – good, fair, poor, negligible and nil. Being an English teacher myself of both native speakers and of English as an additional language, I was able to guide teachers into judging success against the standard criteria of the class average. I recognise that this does not give a disparity of ability against individual I.Q., but unfortunately that data is unavailable.

The children and adults were initially split into two groups – the first who were English speakers at home and the second, those who were not. Those with English and Hebrew as a background - the 'native English speakers' - were given comprehension tests that were used at the time in Israel whether they were living in Israel or in the U.K. Following the written passage, there were tests that showed levels of free writing, spelling, grammar, punctuation and knowledge of homophones. Additionally there was a listening comprehension on tape and a conversation with each individual learner. The 'non-native English speakers' received a similar range of tests looking for similar information, but they started at a lower level. Their scores were rated against the Israeli standard of 3-point, 4-point and 5-point matriculation with 5 being the highest; this was for those aged 14 through to adulthood. The younger children were rated using class materials and ratings according to their teachers' estimation of their work. For those who were assessed in the U.K. without a Hebrew background, they were assessed using the standard English tests such as Neale Analysis (Original or Revised) and then compared to chronological age. Likewise a passage of free writing was assessed according to standards expected by children in this country in terms of punctuation, spelling, grammar and content. Their spoken language was assessed purely by teacher perception and compared to their written work.

The parents (where appropriate) and learners were also asked for their own views on their areas of strength and weakness. The learners appeared to be quite self-aware and

in agreement with the teachers. The parents were more able to report on the amount of time spent speaking English at home and reported the number of people who spoke English with that learner. They were less able to accurately rate their children's ability in reading and writing.

In terms of general success across the curriculum, this was rated good, average and poor. This was based on teachers' perceptions. In secondary school, they asked their colleagues, but in primary school where they knew the children much better they were able to report for themselves.

In terms of behaviour problems, reporting in this first study was based on description with no attempt to try and identify root causes. Children in Israeli classrooms were encouraged to shout out answers and 'debate' with the teacher and each other at that time. There was therefore far less emphasis than in English schools on quiet and discipline. Children who were therefore reported as having behavioural difficulties were in fact quite extreme if one were to make a comparison with British standards. Those who were resident in the U.K. were compared to U.K. standards which I believe are far more stringent. They would include shouting out of turn, bullying, aggression, refusal and swearing.

In terms of weakness with speed of processing, a number of factors were looked, at all relating to a constant pattern of performance:

- Children who seemed vague and did not grasp what was being said to them the first time they were spoken to.
- Those who needed to have a parent or teacher slow down their pace of speech as otherwise they 'looked vague'.
- Those who could not remember a series of instructions.
- Those who found the teacher talking whilst they were taking notes too overwhelming to deal with.
- Those who found mental arithmetic too difficult.

- Those who did better in additional language learning when speech was delivered by the teacher, and phrases were chunked, rather than being given a tape of continuous natural speech.

- Those who found native speaker accents difficult, but coped better with an accent delivered by their 'own' language speaker.

My primary interest was an attempt to identify the number of people that had experienced significant hearing problems as a child due to OM and see whether their functioning was in any way different from those who had not. My secondary interest was to see what correlation there is based on the results from the other variables.

I was asked to see countless numbers of people through my journeys as described above as well as through my work in the learning centres and at schools. On my return to England I again interviewed many learners exhibiting these difficulties through my on-going work in the field at schools and through referrals by teachers and parents. I was given permission in 1991 by the British Psychological Society to use psychometric testing under supervision. The two named psychologists were Dr. Jean Alston and Dr. Harry Chasty.

For those students where psychometric testing was possible, the WISC R or WISC 3 (English or Hebrew translation) was administered. In diagnostic tests Raven's Matrices were given.

In all testing situations, the following tests were conducted:

- Digit span forward and reversed - in a range of 'other' languages as appropriate
- BAS Spelling test
- BAS Numeracy test
- Neale Analysis Reading (Original or Revised)
- Kidron reading test (Hebrew) where appropriate
- 15 minutes free writing in each of Hebrew and English (where appropriate)

- Laterality (hand/foot/eye)
- BAS visual motor test
- Wepman Test of Auditory Perception

First I compared the OM and OK groups in order to identify significant differences (Mann-Whitney U tests) between them. Then I studied the correlation factors between the relevant variables in the OM group – the relevant factors being the ones related to the issues highlighted in the hypotheses set out at the beginning of this section.

6.1.3 Results

6.1.4 The mean data is presented in Appendix 7.

Those with OM are described as mean OM.

Those without OM are described as mean OK.

Of the 1000, 703 report that they are OM; 293 are OK.

The OM group was performing significantly differently to the OK group on certain measures:

Table 4: Mann-Whitney test results comparing results from Study 1 across OM condition (OM/OK).	
1. The greater the number of bouts of OM (total) the greater the likelihood of the learner being taken to see an educational psychologist for a psychometric test, rather than a specialist teacher for a diagnostic test.	(U=93 277.00, p<0.01)
2. Problems with written English in the OM group are significantly higher than the OK group.	(U=82 791.50, p<0.0001)

3. Problems with the reading of English in the OM group are significantly higher than the OK group.	(U=82 747.50, p<0.0001)
4. General success across the curriculum is significantly better in the OK group than it is in the OM group.	(U=60 845.00, p<0.0001)
5. Behavioural problems are greater in the OM group than they are in the OK group.	(U=94 857.50, p<0.001)
6. The number of bouts of significant ear infections in the OM group together with the insertion of grommets are common in the OM group and not found in the OK group.	All those in the OM group had had significant ear infection and and averaged 1.81 grommets. None of the participants in the OK group had had either.
7. Speed of processing identified as a problem is significantly higher in the OM group than it is in the OK group.	(U=89 244.00<p<0.001)

6.1.4.1 Correlations

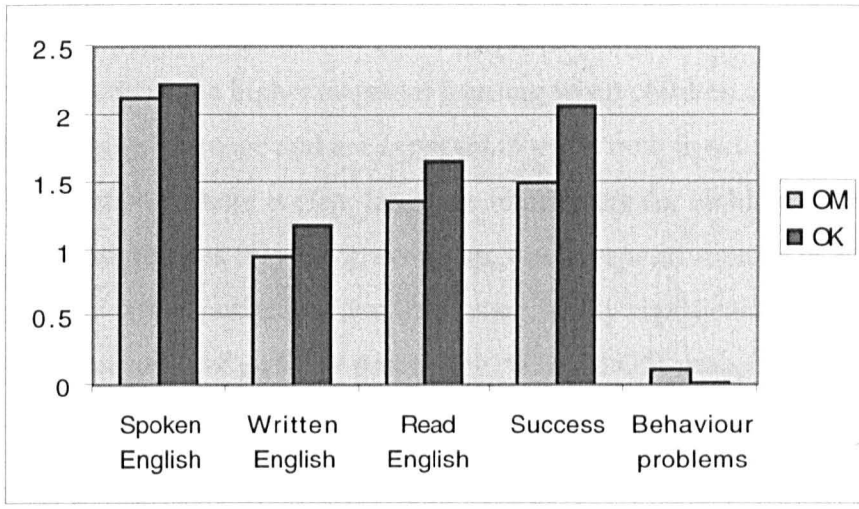
Table 5: 1 000 Child Sample: Correlations across (B) and within groups (OK/OM)

No.	Item 1	Item 2	set	r	d.f.	p
8	Behaviour problems	Spoken English	OM	-0.33	701	<0.0001
			OK	**-0.07**	**294**	**NS**
9		Reading in English	OM	-0.34	701	<0.0001
			OK	**-0.05**	**294**	**NS**

10		Written English	OM	-0.36	701	<0.0001
			OK	**0.00**	**294**	**NS**
11	OM	General success at school	B	-0.33	996	<0.0001
12		Significant ear infection	B	0.83	997	<0.0001
13		Speed of auditory processing	B	0.54	997	<0.0001

The following bar chart gives a visual explanation of five key differences between the OM and the OK groups. The measures are according to levels of success against five rankings of G (good), F (fair), P (poor), Neg (negligible) and Nil.

Bar Chart One: Selected problems identified for the two groups from the full data set.



6.1.5 Discussion

The 25 statements above give us a picture of significant difference in functioning between the OM and the OK groups even though they are all bi- or multilingual and have all been assessed as being dyslexic.

The figure of 703 with OM as opposed to 297 without OM is highly significant and raises the question of the need for a link between health and education being formulated in a way that has not happened before. Understanding the differences in the daily functioning of the groups should highlight areas of critical importance for teachers in terms of provision and for policy makers in terms of guidance.

It was established in the results, that there were a greater number of children seeing an educational psychologist in the OM group as opposed to the OK group. This may be due to the complexity of the condition and the perceived need for a more in-depth

assessment. Whilst specialist teachers are able to administer diagnostic tests, they are limited in that which they can do as well as the esteem in which they are held by parents. It is fair to say in my experience that parents tend to prefer the advice of an educational psychologist if they can access the services of one.

It was noticeable that problems with written but not spoken English are significantly higher in the OM group than in the OK group. Teachers reported that 'chat' language was at a similar stage in both groups, but that 'academic' language was impaired, particularly at the higher stages of learning when children are faced with more challenging language and are expected to use it both in school and in public examinations. There is clear language impairment for children who lose out on sounds and vocabulary as they are growing up, due to repetitive ear infections and loss of hearing. It was noticeable that there were highly significant differences between the groups in speed of auditory processing, with the OM group significantly worse.

Likewise there are greater problems with the commitment of information to paper for those needing to write in English as opposed to other more transparent languages. I suggest that for the OM group, there is a combination of both the complexities of the written language, together with the specific weaknesses caused by hearing difficulties as outlined above. Moreover there is an issue of directional confusion between the languages. Hebrew is written right to left, whereas English is written left to right and books are opened in the opposite direction to each other at different times of the day according to the subject being studied. This overload on working memory and laterality will undoubtedly add to the confusion.

Equally, there are more problems with the reading of English in the OM group than in the OK group. Decoding in English is a complex process and makes demands upon the reader to understand the links between the letters in all their combinations. Letters do not always sound as they are written, unlike in Hebrew where they are consistent. When the vowels are written in texts, for the first two years at primary school in Israel, unless there is particular condition that prevents the child from reading, it is a comparatively simple task to acquire the skill, as compared to the same task in English. Once Hebrew speaking children have the vowels taken away - as in textbooks from year three onwards - some flounder, but most cope. If the reader

speaks the language presented to him on paper and the words are known, it is not a difficult process to decode. Printed Hebrew might be described as similar to speed writing, a form of shorthand. However there are some visual problems that confound the reading process in Hebrew and could well slow down the process of reading in English. First there is a totally different script for writing as opposed to reading. Another is when the eyes move across the page to read. It is known that many dyslexic readers have a problem with a smooth scan (Adler-Grinberg and Stark, 1978) in English. In Hebrew their eyes move from the top of the words to the middle to the bottom, in any order and at any time – and all in the direction that is opposite to English. For children who are struggling with the effects of OM, they might find that this is an additional burden and slow them down considerably.

It is of no surprise bearing these issues in mind, that the results of the tests show that general success in the curriculum is significantly better for the OK group than for the OM group. We must remember that all of these children and adults are dyslexic and bi-/multilingual and undoubtedly struggle at some level in terms of learning; but the OM group clearly struggles more. The ability to process language, comprehend that which is written and then manipulate it, is key to success in all subject areas; written work particularly. When there is a confounding factor of OM on top of dyslexia, there is a great deal of stress on the processes that deal with language, learning, memory and behaviour.

From the 1000 sample, there is a clear link to behavioural problems in the OM group, which are significantly higher than is to be found in the OK group. Gravel and Wallace (1995) highlight this issue as being fundamental to understanding the condition in its broadest sense. This will have an impact on learning, teaching and general classroom management. In the literature I have discussed the issue of 'hyperactivity' versus 'hyper-reactivity' (Peer, 2000).

Frustration leads very often to antisocial or deviant behaviour. There is no doubt that the strain placed on a child to 'do better' when they are trying to the best of their ability is unreasonable. The problem is that often the child's problems are attributable to emotional issues, sometimes with a background of problems at home, rather than anything to do with a struggle with the education process. It is clear that there is a

need to identify the root causes, so that they can be addressed. There is anecdotal evidence that many children displaying significant behavioural problems related to frustration seem to improve dramatically when the situation that is inappropriate is replaced by something more suitable. Children who appear to be hyperactive in some classes, but not in others are not hyperactive. Are they reacting to the teacher, the mode of teaching or to the situation in which they find themselves? Montgomery (2000) when discussing Developmental Co-ordination Difficulties (DCD) children echoed these questions when she stated:

> *' Speech delay was a most frequently appearing concern in DCD studies with more than 50% of children with DCD requiring speech therapy. Half of the groups were doing well in maths at school but their problems in spelling and handwriting were hampering progress in other subjects. In addition to the DCD there was an association with poor social skills, emotional problems and a predisposition to hyperactivity.'*

An example from therapeutic practice is given by Schlichte-Hiersemenzel (2000) when discussing underachieving highly able learners:

> *It was frequently the case that a child was thought to be hyperactive, had been diagnosed as such, but did not entirely fit into this category. Sometimes such a child could not sit still during a consultation. On the basis of my esteem and empathy for the whole person I then addressed the child in a way that challenged his or her intellect. This could provide release from high restriction/pressure. As the child enjoyed this, he or she could then sit still and concentrate on what we were doing. This is a change that could also be observed at schools when a so-called hyperactive child – but actually an underchallenged one – skipped a grade, or when his or her capacity was challenged by a high level task in any other way. This would seem to indicate that when the 'grey cells' are not stimulated sufficiently, the unused energy is redirected and released through the muscles: as a typical*

transfer into body language, the muscle cells express the child's urge to be active.'

There is no doubt that frustration due to educational challenges that are not being appropriately addressed, is likely to lead to challenging behaviours. The examples above show the potential for educational remediation if teachers can identify the causes and address the needs.

It comes as no surprise that if children and adults do not hear clearly, they will be left out of that which is going on around them. OM tends to leave the child with periods of better hearing and times when it is worse. Often neither the child, the parent or the teacher is aware of when those periods are. The link into poor behaviours is an obvious one, through possible disorientation and frustration.

In an interview with an audiotometrist in 1994 (Oxfordshire NHS), she suggested that children could lose a substantial part of their hearing for up to eight weeks after a heavy cold. That being the case, a great deal of learning is not going on and there is potential for a great deal of frustration to set in. People suffering from any form of deafness, temporary or otherwise will often talk of feeling isolated and the frustration of misreading situations and circumstances. Whilst adults learn strategies for dealing with such situations, children have yet to learn and often act out in rebellion in the classroom. Children have reported to me on numerous occasions (21 BDA Family Day conferences (1994-2001) that they are often yelled at by teachers who tell them that they are not listening; parents who tell them that they have already told them something a couple of times and they should listen better; friends who make plans that they do not hear properly and as a result may well miss out on social activities. They are clearly living with frustration on a daily basis in whatever circumstances they find themselves.

The test results highlight the fact that those in the OM group suffered a great deal through numerous and significant ear infections, so much so that many of them had 1, 2 or 3 sets of grommets inserted over the course of time to facilitate better hearing and fewer bouts of infection. One can only imagine the pain that these children must have

endured during this period of their lives. Pain too, often causes frustration and anger that in some cases becomes aggression.

In their earliest years of development, the formative years, in many cases these children did not develop the earliest critical skills of listening, comprehension, speed of processing and language development. They missed out on the development of speed of processing, which is so important for success in learning (Interview with the Head of ENT at the Radcliffe Infirmary, 1992). His belief has been substantiated by the results of this research, where speed of processing was considered to be a highly significant factor in the OM group as opposed to the OK group. For these children, the skills need to be taught, as they don't seem to develop by themselves at a later stage. Teachers need to be aware of this as both a deficit with implications for the classroom and as a skill that needs to be learned.

The second group of results looked at the correlation between factors within the variables. The first was not surprising – when English was spoken at home, English spoken at school was better than those that did not speak English at home. This is not the fact in all cases (See Dana's story in Appendix 1). However, there was a significant negative correlation between the number of languages spoken and the success in spoken English at school. In my lectures I have talked about the impact of overload on the working memory. It appears that unlike bi/multilingual children without dyslexia, for those with dyslexia in addition to the added dimension of a history of OM, there is a notional and maximum amount of language that speakers appear to be able to remember and manipulate. I have described it thus (e.g. Uppsala University, Sweden, 1999):

Unlike those bilinguals with no learning difficulty, for these people, it is as though they have a limited amount of memory that can be used effectively. It is as though there were a 12-inch ruler and that is the limited amount of space that is available for use. There appear to be two types of people:

- *The first is the person who is good at 'chat' language in two or more languages, but under functions in either or all at an academic level; or*

- *the person who is skilled at one language, but almost completely forgets the rest.*

These people need to be identified and supported with the learning process from a very young age.

There was a positive correlation between the number of languages spoken and assessment being carried out. Clearly when there is a greater load on working memory, there is a more significant failure factor at school and teachers and parents will seek more specialist advice and support.

There was a positive correlation between written and spoken English. Despite the dyslexic and OM difficulties, children and adults who had experienced spoken English as a first language were better at written English than those who did not. This did not of course mean that there were no problems in writing as there clearly were, e.g. they all had problems in spelling.

There appears to be a positive correlation between spoken English and success across the curriculum. This is a surprising result, as for many the language of teaching was not English. It is just possible that the way English is taught helps children succeed better at other subjects, i.e. there would be a positive transfer of skills.

There is a negative correlation between behaviour difficulties and spoken English, reading or writing, for the OM group, but not for the OK group. This could be accounted for by frustration on the part of those who were in group one as identified above, i.e. the overload of languages caused them not to succeed at either language at an academic level. There is a direct link to low motivation, low self-esteem and frustration.

There is a highly significant negative correlation between significant ear infections and general success across the curriculum for both groups. This would fit into the pattern of lack of hearing at times and pain. Lack of success across the curriculum may be influenced additionally by bouts of time away from school due to illness in addition to lack of concentration. See identifiers (RNID, 1999)

There is a correlation between the number of ear infections experienced and problems with auditory speed of processing, again in both groups. There are children in schools who experience difficulty with language spoken at speed, foreign language learning, mental arithmetic, taking instructions and processing of written as well as spoken language. See Handy Hints Poster (Written for DfEE, Peer, 1999)

There is a significant correlation between instances of OM and speed of auditory processing in both groups. This must therefore imply that a prediction could be made at a very early age for this sub-group of children at risk, by identifying those who have experienced this difficulty at an age as young as 9 months.

The need to understand more about the children in question necessitated an in-depth conversation with parents and teachers. 65 were selected. The work is described in studies 2 and 3. Due to the need for further understanding of these learners, I will link the results to the 7 stated hypotheses at the end of study 3

6.2 Study 2: Parents of cohort of 63

6.2.1 Rationale

Having gathered information on 1000 multilingual learners with a dyslexia-type profile (Study 1), I felt that some closer analysis was necessary. I wished to see if there were underlying trends that hitherto had not been linked to assessment in dyslexia, but which could be uncovered and become important as part of the early indicators used for both identification and remediation of a sub-group of dyslexic children at risk. Anything that can prevent the descent into the *low motivation – low self-esteem – behaviour difficulty – failure* route must be better for the individual, the parent and the school.

Of the 1000 in Study 1, it was established that a group of 703 were identified as having experienced OM at a significant level and 297 that had not. Furthermore, the OM group appeared to have more difficulties in the learning process even after the condition had physically healed, than those that did not, although they were all considered to be learning disabled at one level or another. Both groups had a learning

profile that until now has largely been ignored; that is dyslexia and bi-/multilingualism.

My intention in Studies 2 and 3 was to ask more searching questions to see whether there is a way of determining trends that could possibly be used as identifiers and ideas for educational intervention for the group of dyslexic and bi-/multilingual learners - some of whom had been affected by OM. The group was 15 = OK and 48 = OM. It would be my hope that ultimately tools will be developed sensitive enough to pick them up at a young age and stage, ideally through the system of Baseline Assessment. Currently there is nothing available in schools that can be used to select this group out from other children with a multilingual background who might be struggling. Why wait until children show signs of failure if there is a way of intervening and teaching children in the way they learn the most effectively, so that they can ultimately reach their full potential? I therefore decided to take a group of those already assessed and augment the information available by interviewing their teachers and parents.

The 63 children in this study were taken from the original 1000 from Study 1 according to the following criteria:

- the age group was limited to those who were still in mainstream school;
- they all spoke Hebrew and English as first and second languages;
- the group was a mixture of boys and girls;
- they were a mixture of those with OM and those without;
- the group was selected from those families who had returned to me for more advice at a date after the original work; and
- only those children whose schools were prepared to participate in the research as well as their parents could be included (Study 2).

6.2.2 Method

Based on the criteria above, a group of 65 families was approached and asked whether they would be willing to take part in some research to understand more about their child's condition in an attempt to help others.

Although they all originally agreed, two dropped out at the beginning.

- The first when the parents couldn't agree at interview about some of the reasons for their child's problems – and requested to be removed from the sample.

- The second when the parents of the child informed him of the research that was to take place. Even though he was assured that he would not be approached, he did not want anyone talking about him. He apparently yelled at them saying: 'Ani dafuk! Azvoo otee'. This translates broadly (and more politely!) as ' I am a failure already! Leave me alone.' Despite the fact that the entire client group was assured that names would be changed and no information would go any further and all paperwork on individual families destroyed, the child could not be persuaded. This to me highlights the critical need for earliest intervention - to prevent any children feeling so badly about themselves.

I was therefore left with 63 families with which to work. Summary data for the children tested in this (Study 2) and Study 3 is shown in Tables 6 and 7 below.

Table 6: Mean ages of Participants in Studies 2 and 3

	Mean (s.d.)	Range
OM Group	10.13 (2.69)	6-16
OK Group	12.40 (2.56)	8-17

Table 7: Frequency distributions for Participants in Studies 2 and 3			
	Total/63	OM Group/48	OK Group/15
Significant ear infection	50	46	4
Seasonal ear infection	43	43	0

A questionnaire was designed that would look at the following areas in addition to the information already gleaned from study 1. See Appendix 4 for detail:

- age at assessment
- whether anyone in the family had experienced similar difficulties
- birth weight
- number of weeks premature
- difficulties at birth
- cause of birth difficulties
- allergies
- breast or bottle fed
- significant bouts of ear infections
- whether or not infections experienced were seasonal
- whether or not they had suffered from OM and had had grommets inserted
- age of first medical intervention
- number of sets of grommets inserted

- bed wetting
- late or unclear speech
- behavioural problems at home and/or at school
- difficulties in learning to read, write and spell
- weaknesses in rote learning
- concentration difficulties
- organisational difficulties
- forgetful – long and/or short term memory
- confusion between languages
- hearing – as to whether or not TV needs to be turned up
- hears clearly in a noisy background
- daily behaviour: quiet/noisy/anxious/naughty/aggressive
- whether the child has always behaved this way
- onset of behavioural change – school/home/family difficulties/other
- clumsy behaviour
- balance difficulties – riding a bicycle; playing with a ball; controlling movements at the dinner table
- whether the child crawled as a baby
- whether the child enjoys fun fair rides or gets sick
- gets on well with siblings and friends

The families were given the choice of either filling in the form and posting it back or being interviewed on the telephone or in their homes. They all gave consent for me to interview the teachers at their child's school and collate the information. Only one family asked to see what the teachers had written. No teachers asked to see the parents' opinions.

6.2.3 Results

The mean data are presented in Appendix 8. Discussion follows the table of results.

6.2.4 Statistical Analyses

In the following analyses there are large numbers of statistical tests. In such cases it is common to apply a Bonferroni correction in order to avoid the danger of the occasional test appearing significant by chance – clearly one in 20 will appear so. However, in cases such as those below where in fact the vast majority of tests indicate significant differences, quite the reverse is the case. The chance of having two Type 1 errors (rejecting the null hypothesis when the populations are in fact the same) is 1 in 400, three Type I errors is 1 in 8000 and so on. Consequently it is not necessary (or appropriate) to apply Bonferroni corrections here.

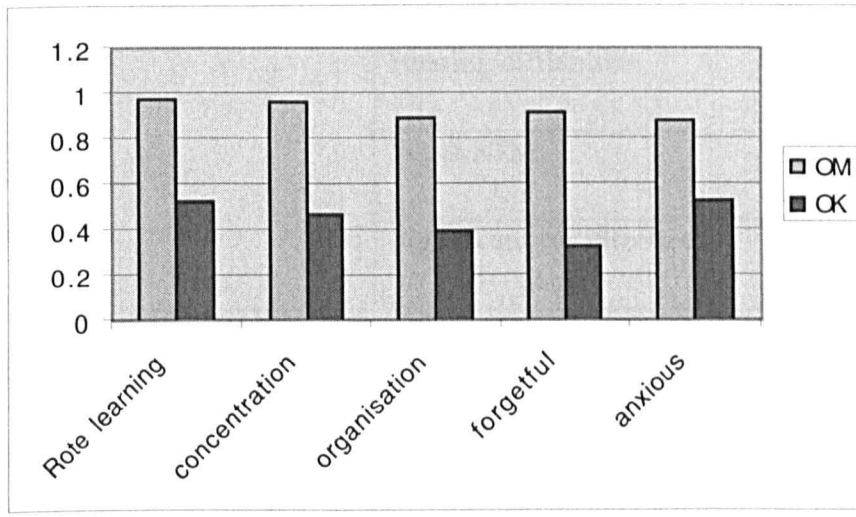
Table 8: Results of the Mann-Whitney U tests on the data for this study are divided into mean OM and mean OK.

1. The age at which the children are identified as having dyslexic-type difficulties is significantly younger for those with OM than those who did not experience such episode i.e. the OK group.	(U=191.50, p<0.01)
2. The occurrence of significant ear infections is noteworthy for those with OM as opposed to those without.	(U=111.00, P<0.0001)
3. Likewise those with seasonal ear infections were significantly greater in the OM group than those in the OK group.	(U=30.00, p<0.0001)
4. Rote learning was significantly more difficult for the OM group than for the OK group.	(U=199.50<p<0.01)
5. Concentration difficulties were significantly more noticeable in the OM group than in the OK group.	(U=183.00, p<0.01)
6. There was a significant difference in organisational difficulties between the two groups with OM experiencing greater problems.	(U=181.50, p<0.01)
7. Likewise there was a significant difference in forgetfulness between the two groups, with OM experiencing greater problems.	(U=150.00, p<0.001)
8. Hearing well in a noisy background was an issue of great significance for the OM group, as opposed to the OK group which seemed to manage it better.	(U=165.00, p<0.01)
9. Whilst the range of measures on behaviour did not show high levels of significance between the two groups, the anxiety measure did, with the OM group registering significantly higher than the OK group.	(U=237.00, p<0.05)
10. The impression that parents have of their children experiencing hearing problems is higher in the OM group than in the OK group.	(U=202.50, p<0.05)

hearing problems is higher in the OM group than in the OK group.	
11. Parents reporting problems in short term memory in the OM group was highly significant as opposed to the OK group where they did so much less.	(U=174.00, p<0.01)

The following bar chart gives a visual explanation of five key differences between the OM and the OK groups. The measures are according to levels of success against five rankings of G (good), F (fair), P (poor), Neg (negligible) and Nil.

Bar Chart Two: Selected problems identified by the parents for the two groups from the subset studied in depth.



6.2.4.1 Correlations

Table 8: Parent Assessment: Correlations across (B) and within groups (OK/OM)

No.	Item 1	Item 2	set	r	d.f.	p
12	OM	Age of child	B	-0.35	61	<0.01

13		Seasonal ear infection	B	0.85	61	<0.001
14		Unclear speech	B	0.26	61	<0.05
15		Rote learning	B	0.57	61	<0.001
16		Concentration difficulties	B	0.57	61	<0.001
17		Organisational difficulties	B	0.51	61	<0.001
18		Forgetful	B	0.60	61	<0.001
19		Problems hearing in noisy background	B	0.53	61	<0.001
20		Turns the TV up to hear better	B	0.26	61	<0.05
21		Anxiety	B	0.36	61	<0.01
22		Hearing difficulties	B	0.40	61	<0.01
23		Weak STM	B	0.54	61	<0.001
24		Significant ear infection	B	-0.72	61	<0.01

6.2.5 Discussion

In terms of the hypotheses which motivated this study, the findings of the Mann Whitney tests indicate that the OM children in this group have higher levels of ear infection and seasonal infections, and hearing problems, particularly in a noisy background. The difficulties for this group are identified at a younger age than the OK group, and they show problems with rote learning, forgetfulness, concentration, short term memory and organisation. The OM group are not signficantly noisier, naughtier or clumsier than the OK group, nor is their speech less clear. Interestingly, therefore, they do not display significantly more evidence of behavioural difficulties, but they do show greater evidence of anxiety.

The results on the correlation tests are based on information from a comparison of the variables to see whether we might be able to identify discrete variables for the bi-/multilingual dyslexic group which would give a direction in terms of fresh thinking in early identification, assessment and provision. This is a combination of those with OM and those without. Whilst there are numerous variables from which information may be extracted I have chosen to take out the most relevant for this study.

It is noticeable that the parents of children with OM in this study identified their children with dyslexic difficulties at a younger age than those whose children had not experienced OM.

I would suggest that living with children exhibiting the signs that accompany OM (see indicators RNID, 1999) makes parents more aware of the difficulties that their children experience in learning. Earache, hearing loss, lack of concentration and difficult behaviour would all be issues with which parents would have to deal from a young age. The chances are moreover, that schools would call parents in to school to discuss their children's problems. In the initial phase these would probably be blamed on the hearing problems and behaviour management at home rather than on dyslexia. In the case of these children, much of the blame is placed on the bi-/multilingual background rather than any sort of SEN.

Parents also identified seasonal infections as being common. It is well known that OM affects many children seasonally, with the worst cases happening in the winter and the least number of episodes in the summer. This will have a direct effect on the times of the year that children hear better and when they hear more poorly. This does not of course preclude children from experiencing infections throughout the year for those with a propensity towards the condition.

Parents noted that the OM children had a particular difficulty with rote learning and short-term memory weaknesses, which were greater than would be expected in dyslexic children. They experience this particularly when working with their children on spellings, formulae, times tables and so on during homework periods. (See Handy Hints Poster, DfEE, 1999, Peer) Parents have reported to me over the years that rote learning tasks often cause a great deal of tension in homes and the stresses placed on

all concerned exacerbates the difficulties. Children and parents are often left feeling failures and exhausted by their efforts through no fault of their own.

Parents also reported particular weaknesses in areas of concentration, organisation and forgetfulness in the home. They were all at highly significant levels in the research and all cause stresses in the home. Parents have reported that there is often more than one member of the family with these types of behaviours living in the home, so stress is in the atmosphere frequently. They report anxiety levels as being high too. In my work in the past counselling parents, there were often cases that one parent was threatening or had left the home as they couldn't stand the tension. They often added that life seemed to have been taken over with 'dealing with the problem'.

This aspect of the range of behaviours evidenced by this group is certainly something about which educators and parents need to be made aware so that their children and other members of the family in particular can be supported through difficult times. Parents too need support. (Peer, 1998)

In this group of children, late speech did not register as a significant issue, but unclear speech did in both the OM and the OK group. Moreover, difficulty hearing in a noisy environment and evidence of hearing difficulty was found, with those who had experienced OM having significantly higher levels than those who had not. Bearing in mind these children need to be able to articulate different sound systems and produce a different set of words and phrases for individual words within a differing grammatical structure in each language spoken, it is of no surprise that those with OM experienced greater difficulties. Bradley and Bryant (1985) and others have done extensive work on the complexities of early language development with its connection to reading, but very little has been done on the issues of the multilingual learner experiencing difficulties in language and literacy development. Whether or not children actually 'hear' the specific sounds and can identify them at a range of ages and stages is yet another question that needs to be addressed. E.g. the boy who could not differentiate the soft a, e, u, one from the other could clearly not spell words with them in. The results of that question will have a powerful effect on the decisions made about appropriate provision and age intervention for the learners in this sub-group.

The negative correlation regarding age indicates that the younger the child, the more likely he is to experience bouts of OM. As the educational effects of OM are apparent at a young age, it is of paramount importance to include the ramifications of it when we discuss early identification and remediation. There are concerns regarding the application of a medical model of assessment being applied to dyslexic children (Lindsay, 2001), but in this case the situation is clearer as these OM children have experienced a medical condition which is having a direct impact on their educational functioning. It is vital that they are given the early support that they need in order not to fall behind in their work and by default enter the low self-esteem and failure route.

Parents reported that there were significant issues related to hearing with which they were dealing at home: turning up the TV and not hearing clearly in a noisy atmosphere. They also noted the familial connections with other members of the family experiencing similar symptoms.

A range of significantly poor behaviours at home and/or at school, including naughtiness, clumsiness and bed wetting were reported to correlate with the number of sets of grommets inserted. Aggressive behaviour was significant for the high grommets group, and has much to do with levels of frustration. There was a further correlation along this continuum for this group and that was an inability to get along with friends and/or siblings. This finding would add to the stress levels already evidenced within these families.

At this point, the third study began and that was the interviewing of the teachers of the 63 participants to gain their perspective.

6.3 Study 3: Teachers of cohort 2

6.3.1 Rationale

The third study involved interviewing the teachers who were working with the 63 children involved in Study 2. The aim of the study was to glean more in-depth information on this group of children from a school perspective and see what could be learned about bi-/multilingual dyslexic learners, some of whom had experienced OM

and some of whom had not. I then intended to see if some discrete characteristics might be established which would lead to recommendation for change in policy and practice.

The information was in addition to what had already been collated from:

(a) the original information from the first study where this group was a part of the 1000 cohort; then

(b) information from the second study that had been selected for further investigation where their parents had been involved and had shared a significant amount of information on them from the home perspective.

The teaching staff in this study, either directly or indirectly, had all been part of the referral process for assessment for these children who were at that time in their classes. Either they had made the initial recommendation following discussion with other staff in their schools, or they had agreed to parents' wishes to seek further advice after educational progress at school had been considered by those parents to be too slow or unsuccessful. In some cases referral was due to concern at the levels of anxiety that the children were exhibiting. The 63 children in this study were selected from the original 1000 from Study 1 according to the criteria outlined in the rationale for Study 2.

Those primary school teachers who were working with the younger children aged 6 – 11, tended to give information based on their own knowledge of the child. Those who were secondary school teachers working with adolescents aged 12 – 17, provided information which had been collated from their own knowledge and from discussion with other staff whom they considered had information which was pertinent to the questions being asked about individual students.

6.3.2 Method

Before interviewing the parents of the 63 children selected for Study 2, the teachers were all contacted and asked whether they would be willing to take part in the research. They were all told that information would be kept confidential unless parents asked for it and in those cases, permission would be sought and discussion facilitated if requested. It is interesting (and concerning) that none asked for feedback in relation to the parents' responses. Teachers, like the parents were told that all names and contact details would be omitted from the final report. Having secured their confidence and agreement, the two linked studies (1 and 2) went ahead.

Issues that arose prior to commencement:

- There were teachers who were questioning the existence of dyslexia, claiming that if the child could read, they could not be dyslexic. In these cases, discussion took place with the individual staff explaining current research and the need for the furthering of understanding to facilitate more effective practice for this type of learner in the education system. Whilst some did not agree with the evidence, nevertheless they all agreed to participate.

- Explanation needed to be given as to the meaning in practice of long-term as opposed to short-term memory weaknesses.

- There were some that felt that if the children only applied themselves, there would not be a problem. This needed discussion.

- There were some that felt that it was anxious parents who were causing a difficulty and if they left the child alone, all would be well. This too needed discussion.

It was interesting to note that at the end of the interview sessions, three of the staff said that they had begun to think about the children as individuals rather than as a class that needed to be taught and as a consequence would look at children's learning styles and attitudes to learning in a different way from then onwards. Moreover, they began to identify other children whom they felt were experiencing similar difficulties to those being discussed.

The questionnaire was drawn up employing the following variables: (See appendix 5 for the full questionnaire.)

- age at assessment
- attitude towards school work
- ability in art and drama
- ability in the sciences
- spoken language ability
- written language ability
- ability in number
- ability in physical education
- organisational skills
- sequencing skills
- difficulties learning to read
- difficulties learning to write
- difficulties learning to spell
- ability in rote learning
- concentration difficulties
- forgetfulness with homework and/or classwork
- understanding of homework and classwork
- unclear speech
- speaking age inappropriate

- confusion of languages
- poor hearing in background noise
- behavioural problems
- personality quiet/noisy/anxious/naughty/aggressive
- level of self esteem
- reasons for behavioural changes (if any)
- weak long term and/or short term memory weaknesses
- clumsiness
- laborious handwriting
- balancing difficulties
- social skills in relation to peer group and staff

Teachers were asked to either complete the questionnaire and return by post, or be interviewed over the telephone or face to face.

6.3.3 Results

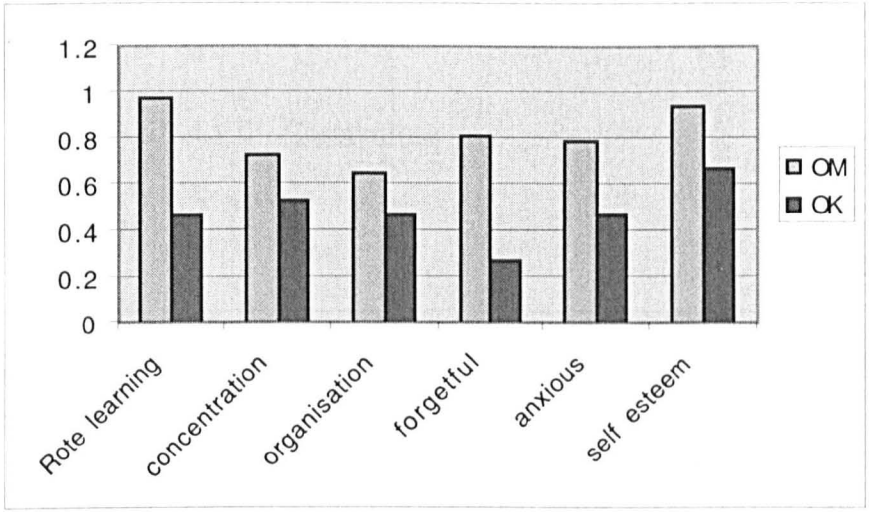
6.3.4 Table 9: The mean data are presented in Appendix Nine. Discussion follows the table of results.

1. It is significant that children in the OM group were identified for assessment for dyslexic type difficulties at a younger age than those in the OK group.	(U=191.50, $p<0.01$)
2. It is highly significant that those children in the OM group have far	(U=78.00,

greater difficulty in writing that which they know than those in the OK group.	p<0.0001)
3. It is highly significant that those in the OM group had greater difficulties with rote learning in class than those in the OK group.	(U=178.50, p<0.01)
4. It is significant that the OM group were more forgetful than the OK group.	(U=235.50, p<0.05)
5. Teachers reported more hearing difficulties in background noise in the class amongst the OM group at a highly significant level.	(U=100.50, p<0.0001)
6. They also reported a highly significant level of behavioural change in the OM group as opposed to the OK group.	(U=192.00, p<0.01)
7. Teachers believed that hearing difficulties were a highly significant reason for behaviours in the OM group as opposed to the OK group.	(U=142.50, p<0.001)
8. Teachers highlighted weaknesses in short-term-term memory functioning as being significantly greater in the OM group as opposed to the OK group.	(U=192.50, p<0.01)

The following bar chart gives a visual explanation of six key differences between the OM and the OK groups. The measures are according to levels of weakness.

Bar Chart Three: Selected problems identified by the teachers for the two groups from the subset studied in depth.



Note that the measures compared here are the same as those earlier selected from the parental questionnaire, with the addition of a question on self esteem. It is clear from these graphs that the pattern of results is similar across the 2 groups, with both teachers and parents identifying more severe problems for children with OM and dyslexia, than for children who are just dyslexic.

6.3.4.1 Correlations

Table 10: Teachers Assessment: Correlations across (B) and within groups (OK/OM)						
No.	Item 1	Item 2	set	r	d.f.	p
9	OM	Sequencing skills	B	0.25	61	<0.05
10		Problems writing that which they know	B	-0.75	61	<0.001
11		Rote learning	B	0.62	61	<0.001
12		Forgetful	B	0.33	61	<0.01
13		Unclear speech	B	0.27	61	<0.05
14		Confusion between languages	B	-0.27	61	<0.05
15		Poor hearing when there is background noise	B	0.66	61	<0.001
16		Anxiety	B	0.31	61	<0.05
17		Low self esteem	B	0.35	61	<0.01
18		Behavioural changes	B	0.40	61	<0.01
19		Hearing difficulties in class	B	0.52	61	<0.001
20		Poor STM	B	0.63	61	<0.001
21		Poor social skills with peer group	B	0.25	61	<0.05

22		Early reading found difficult	B	-0.25	61	<0.05
23		Age inappropriate language	B	-0.27	61	<0.05
24	**Good at Art/ Drama**	Naughty behaviour	**OK**	**0.11**	**13**	**NS**
			OM	-0.36	46	<0.05
25		Aggressive	**OK**	**-0.08**	**13**	**NS**
			OM	-0.34	46	<0.05
26		Under pressure at school	**OK**	**0.11**	**12**	**NS**
			OM	-0.39	46	<0.01
27	Problems writing that which they know	Had difficulties learning to read	**OK**	**0.39**	**13**	**NS**
			OM	0.30	46	<0.05
28	Behaviour probs	Poor social skills with peer	OK	**0.12**	**13**	**NS**
			OM	0.45	46	<0.01
29	Confuse languages	Poor spoken language	**OK**	**0.13**	**13**	**NS**
			OM	0.35	46	<0.05

6.3.5 Discussion

These are the results from the third in a series of three studies designed to give as much information as possible from home, from school and from the individual themselves. All members of the cohort had been assessed and were known to be

dyslexic. Furthermore they were all bi- if not multilingual and additionally were a mixture of those who had a history of OM together with those who had not.

Experience has taught me that when the parent, the school and the child work together taking a pro-active role in the education process, success is easier to achieve. It was therefore essential to me to gain information from all three groups to see what could be established to further knowledge in the areas covered by the questions being asked in the original hypotheses.

The results of the 63 interviews are as follows:

Teachers were fed back the information that dyslexic children who had experienced problems with OM were identified at an earlier age than those who had not. This was a great surprise to them, as the majority did not know that there had been earlier problems with hearing! This was particularly true of the teachers in upper primary and secondary school levels. This has great implications for practice that will be discussed in the next section of this study.

It was highly significant that the children with OM had far greater difficulties in the writing process than the non-OM group. This could be due to the complications inherent in the complexities caused by the combination of dyslexia, OM and multilingualism. Serious weaknesses were evident in language and literacy development. This same group had equally significant problems in rote learning. These children needed identification and specialist support at a very young age if they were to overcome or even cope with the immensity of the problem. It might be suggested that across the world there are many thousands of children living in multilingual communities where learning is a daily nightmare!

Teachers of these children noted that although there was a trend towards the confusion of languages this did not reach significance. It has been reported to me by educationalists working in Europe with children they believe are like these, that it is not unusual for them to confuse syllables in a word, phrases in a sentence or words in a sentence. Some children might even say half a sentence in one language then the other half in the other. Whilst it is considered 'cute' for them to be doing this at a young age, it becomes an embarrassment at an older age and contributes to the desire

to speak and write as short a sentence or paragraph as is possible at every opportunity. In my professional capacity I have received telephone calls from families who have returned to the UK from Europe asking for advice as their dyslexic children could not cope with the language pressures they found themselves studying in whilst living in a bi or trilingual system. It has been described to me as being particularly frustrating for all members of the family as non-dyslexic siblings were reported to be able to cope with the new challenges. This is a situation with which the organisation European Children in Crisis, based in Brussels, are trying to deal at the current time. It will be a growing issue for educators in the UK as more families move around Europe.

In an educational environment like this, it is not surprising that the children and young people in this group were described by their teachers as more forgetful than their peers who had not experienced bouts of OM. Anyone who has experienced severe stress knows that affects memory. Teachers like parents noted significant problems with short-term memory weaknesses. These children had poor short-term memories anyway due to dyslexia, with significantly more impairment in the OM group

Teachers noted that it was highly significant that these children found it difficult to commit to paper that which they know. Whilst this is a common finding amongst dyslexic children, it would be particularly pertinent amongst a group struggling with another or other language(s) particularly if there is a sound system which is not very clear to them. Together with poor sequencing skills, and a general lack of understanding of classwork, lack of success in the learning process would be noticeable in many classroom situations.

Teachers noted that deteriorating behavioural changes had taken place in the OM group. They noted that although there was no significant link between disinterest in schoolwork and OM, for the subset of children to whom this applied there was a correlation with poor behaviour and poor social skills with staff in both the OK and OM groups. Moreoever, behavioural problems were associated with forgetting homework, and not understanding in class in the OM but not the OK group. These children had experienced early difficulties with the acquisition of reading and writing skills, compounded by hearing difficulties, that had continued to the present. One

might assume that by the time they were sent for assessment, they had had enough of the pressure being placed upon them and had begun to give up.

There was however one area in which these children were successful and that was in the area of art/drama. Creativity being a strong side of the dyslexic profile (West, 1991) it is understandable that of the all the curriculum areas in school, these might be the areas that would gain the interest and success of these learners.

To me one of the most incredible findings was that despite the apparent acknowledgement of these children's significant difficulties, the only area that was discussed between parent and teacher was that of academic success. This needs urgently addressing.

6.4 Conclusions in relation to hypotheses

1. The frequency of OM in the dyslexic sub-group of learners appears to be very high. I believe there is a significantly greater number in this sub-group than would be expected in any given population according to recorded international figures.

The frequency of OM in this cohort of 1000 is 703 – 70%. This is a greatly enhanced figure which could not have happened by chance. This is more than twice any other figures quoted internationally. Whilst acknowledging that there a range of definitions of OM used internationally, none of them could describe the highly significant findings. This raises several questions leading to the need for further research. These will be addressed at the end of this thesis.

2. There appears to be a higher incidence of hearing infections and OM in those diagnosed as dyslexic than those without such a diagnosis. I believe that there is a sub-group of dyslexic people who will experience more profound difficulties in language acquisition and learning across the curriculum than their peers, due to the existence of this condition.

According to these findings, hearing infections and OM do indeed co-occur in a sub-group of dyslexic learners. As a result, they appear to have a considerable

negative effect on language acquisition, learning, self esteem and behaviour of these individuals. Bearing in mind that all the cohort had difficulties along the dyslexia continuum, it is highly significant that this group had greater difficulties than their counterparts. This is noted by parents, by teachers and by the individuals themselves.

3. Behaviour and attitude are key factors in the identification and effective provision for dyslexic learners. I believe that the dyslexic group that has suffered from significant bouts of OM will evidence behaviours that are more severe than those of other dyslexic learners.

It is clear from the results of the first three studies that dyslexic learners with a background of OM have indeed exhibited behaviours that are more extreme than those without OM. However, the pattern here is less clearcut than predicted, with study 1 showing significant differences between OM and OK, but study 2 and 3 showing no overall effect of OM, and behavioural difficulties only applicable to a subset with the most severe OM. A more significant finding here is that the OM group overall are more anxious. This appears to be linked to frustration, demotivation and lack of success. I suggest that the very lack of understanding on the part of parents and teachers, due a lack of information flow from GPs is the major cause for behavioural difficulties. Parents and teachers are not aware of the short or long term effects of OM and therefore make no allowance or provision for it. Likewise, children are informed that their hearing is 'within normal range' and as such assume that they no longer have problems. They are therefore not in the position to be able to report to anyone that they are experiencing difficulties. Their assumption must be that the depressed state of hearing is indeed the norm. As such frustration and anxiety grow on all sides. Schools need to develop screening tests for identification, and teachers need to be trained how to deal with such children. In severe cases the use of Sound Field systems as described later can overcome many of the problems experienced by these learners.

4. Some bi-/multilingual dyslexic children are identified at an earlier age than others. Whilst language differences might account for part of the explanation, I believe that children with OM are identified as experiencing learning difficulties at an earlier age than those who do not.

It would appear from the results that those dyslexic learners with OM are indeed identified earlier. It may well be that they are identified due to obvious hearing problems, so parents turn to the GP for support. Alternatively, due to the severity of the hearing problems, teachers may identify the child and refer them to a speech and language communication therapist. It may well be that parents are aware of problems with hearing or behaviour at home and as a result speak to the schools. Clearly those with more significant needs are identified earlier – and it would appear to be those dyslexic children with a background of ear infections and OM.

5. There appears to be a relationship between ear infections, poor speed of processing and successful learning in school. I predict that there will be a difference between those who have experienced OM as opposed to those who have not. This is because the fluctuating loss of hearing leads to periods in a young child's life when information is missed and that which is heard is unclear and too fast to comprehend. Furthermore, the link between poor speed of processing and poor working memory function will have a significant impact on these learners.

Undoubtedly the results of these three studies have concurred with the above hypothesis. There is a clear link between short-term memory loss (exacerbated in the OM group) and weakness in speed of processing. As suspected, it would appear that OM can cause retardations in language acquisition at an early age – and continue to cause difficulties as the child grows older and the speed and pressure of language demands grow. When a learner is faced with the need to acquire more than one set of linguisitc demands, the overload on working memory and speed of processing becomes too much and leads to severe stress and failure. Learning therefore is affected generally and children may well spiral into disaffection.

6. Many children benefit from being bi-/multilingual learners. Even some dyslexic children enjoy the challenge particularly in the early stages. However, many dyslexic children seem to experience great confusion in language functioning when there is a presence of more than one language. I believe this is related to the existence of OM and more severe phonological difficulties.

Discussion with many dyslexic learners leads me to the conclusion that in general they would like to be able to acquire more than one language. In practice however, there is considerable difficulty in doing this. It may well be that the fact that they cannot hear the sounds clearly together with an inability to cope with the speed of flow of a new set (or sets) of phonological codes is too much for them. For those who additionally have visual difficulties and are dealing with languages such as Hebrew or Arabic where the language order is diametrically opposed to that which they are used, there are added problems. The existence of OM could well account for the language confusion many dyslexic children exhibit, although in these studies this trend failed to reach significance.

7. I predict that bi-/multilingual dyslexic children with OM will find general success across the curriculum more difficult to achieve than non-OM children. The demands placed on working memory and speed of processing, together with the demand to function in a range of linguistic systems with varying phonological and visual patterns, will cause overload on these learners. This in turn will impact upon academic achievement. Furthermore these stresses influence behaviour, which in turn impacts upon achievement.

The results of these 3 studies have shown that the impact of OM and dyslexia in bi/multilingual learners have indeed had a major impact across the curriculum and not just in language acquisition. It would appear that these children are possibly suffering from Wolf's Double Deficit theory. These children are experiencing problems both at home and at school as described in studies 2 and 3 - and this impacts greatly upon their daily lives and their life chances as adults. This is the link to study 4.

Very little has been documented about the effects on bi/multilingual adults who are dyslexic. An opportunistic sample of such people emerged on the occasion of the first International Conference on Dyslexia and Multilingualism (1999). It was an opportunity to gain some limited information on a small number of adults aware of their dyslexia. As this study is in addition to the original three that were planned, its format and description are inherently different and are to be seen as enhancing knowledge of the bi/multilingual dyslexic field generally. The numbers are small and the information detailed, giving an opportunity to provide full details of the sample. The study is therefore in-depth and has more background information than the full cohort of 1000 study.

6.5 Study 4. Adult cohort of 74

6.5.1 Rationale

It is clear that the sub-group of those who are bi/multilingual and dyslexic need to have their needs addressed, whether or not they have a history of OM. The 1st International Conference on Dyslexia and Multilingualism (Manchester, June 1999) seemed too good an opportunity to miss in order to gather some fresh evidence from a group of educators who found themselves or others they knew in this sub-group. This is therefore additional evidence to that produced in the initial three studies, with a new group of people. Information was gained solely from a specific questionnaire (see Appendix 6) which provided more general information on the topic in relation to adults from an international arena.

Information relating to three specific areas was considered when the questionnaire was being designed. The issues were:

1. What is the incidence of bilingualism or multilingualism amongst the dyslexic population?

2. What questions and issues affect the process of identification and diagnostic assessment of dyslexia in bilingual or multilingual learners?

3. How might the teaching of dyslexic learners who are bilingual or multilingual be improved ?

In the first studies I had alluded to the fact that although there is an already substantial and rapidly increasing body of research information about language, phonology and learning to read (Hulme and Snowling 1997; Snowling and Nation 1997) and about learning to read and spell in different orthographies (Goswami 1997; Leong 1997), until very recently there appears to have been relatively little research which focused directly on the complex issues associated with multilingualism and dyslexia (Landon 2001).

The focus sharpened, however, with the event of the British Dyslexia Association's (BDA) 1st International Conference on Multilingualism and Dyslexia in Manchester, 1999. In my opening address I spoke on the lack of research and consequent teaching materials for this group – and as a result, the lack of policy supporting this group of learners be they children or adults. It became quickly evident from the exchanges between the 500 delegates from over 40 countries, that a new impetus had been given to make connections across the two areas of study, dyslexia and multilingualism. All delegates agreed that the two areas had tended to remain separate in the past, no matter in which country people were working. In Professor Tony Cline's words in his conference address:

> *" Some people in the field have been looking so hard for factors they expect to see, not learning to look from a different perspective".*

The conference provided an opportunity to begin to appreciate the range of perspectives from which dyslexia and multilingual matters could be more fully appreciated and understood. For a brief report on the conference see Schwarz (http://ldonline.org/whats-new/mulilingualism-conf699.html).

One of the major areas of concern was the lack of a test that is suitable for use in the identification of dyslexia internationally. There was debate amongst delegates as to whether there could in fact be one assessment that would suit all languages and cultures. However the conference delegates received the research in progress on the development of an international test of dyslexia with interest. They received an invitation to make their contribution to the ongoing process of refining and carrying out international trials with this instrument. This is currently on going at the University of Surrey (Smythe).

The delegates were equally concerned at the need for the provision of appropriate learning support for such dyslexics at different stages in their lives. The use of the questionnaire in this environment endorsed the importance of collaborative research at all levels at an international level.

The survey questionnaire was designed to establish a baseline data bank of an informal and reflective kind by taking into account dyslexic bi/multilingual learners' views.

6.5.2 Incidence of Dyslexia and Bi/Multilingualism

At present there is no clear picture of the incidence of bilingual or multilingual learners amongst the dyslexic population, nor detailed knowledge about the nature of the impact of dyslexia on their simultaneous language learning.

While broad indications of the incidence of dyslexia across several countries is cited in the International Book of Dyslexia (Salter and Smythe 1997; see figure below), there is no detailed information provided there as to the range of languages spoken in the countries represented, nor those spoken by the dyslexic learners, whether indigenous, temporary residents or immigrants and whether they were in fact included in the relevant statistics.

Figure 18: The Incidence of dyslexia

Belgium 5 %	Japan 6 %
Britain 4 %	Nigeria 11 %
Czech Republic 2-3 %	Norway 3 %
Finland 10 % *	Poland 4 %
Greece 5 %	Russia 10 %
Italy 1.3-5 %	Singapore 3.3 %

* This figure refers to 'slow learners receiving special attention'.

As was previously stated any incidence of dyslexia is, of course, governed by the definition in use. We already know, for example, that in England and Wales dyslexic students' learning strengths are often regarded as characteristically greater in areas relating to speaking (oracy) but lower in areas relating to reading and writing (literacy). This tendency is noted in the DfE(1994) Code of Practice's definition of dyslexia as a specific learning difficulty:

> *".....They may gain some skills in some subjects quickly and demonstrate a high level of ability orally, yet may encounter sustained difficulty in gaining literacy or numeracy skills."*

It might be anticipated that this greater oral ability might be sustained over more than one language in those who are bilingual or multilingual.

6.5.3 Dyslexia and Language Learning Difficulty (Monolingual and Multilingual)

There are noticeable complications in the fact that the issue of dyslexia and bi/multilingualism is not always clearly differentiated from the issue of difficulties with monolingual literacy learning. In the UK secondary school system, it is often assumed that monolingual students who already show difficulties in reading or writing in English would have significantly greater difficulty in coping with another (second) language. On the basis of this assumption, they may be denied access to learning a second language and this prompts concerns about ' Equal Opportunities ' and 'Rights to Education'. We know, for example, that some dyslexic English speaking students learning French in secondary school, experienced difficulties in processing English phonology which, Crombie (1997; 1999) suggests, affected their learning of French phonology and that the dyslexic students required more time to

process phonological information. I would like to return later to the issue relating to phonological factors but meanwhile to contextualize the question in the much wider concern, that there is insufficient general awareness about the fact that, currently, in the UK, in some areas students, including dyslexic students, are required to learn via other languages. Miles E. (1996) reminds us that :

> *"...our dyslexics are required to learn some of them in school. Welsh, not English is the indigenous language of some of our British population, who need to learn two working languages; some immigrant children start with assumptions about language which are very different from English ones. More recently the birth of the European Dyslexia Association has opened our eyes to the fact that other European languages may pose altogether different problems for dyslexics from the English language, and that some of the features we regard as the chief characteristics of dyslexics simply do not appear in a language of a different type. This is rather startling news if we had assumed that the methods that Americans and ourselves have refined over some 50 years for teaching dyslexics will be the ones that we will now teach to other Europeans."*
>
> *(Miles, E. 1996)*

The point Elaine Miles makes is an important one not only in the UK with its indigenous Welsh and Gaelic speakers and over 50 other languages represented in the families of children attending some inner city schools, since a substantial increase in teachers' knowledge about language is required for their work with all their students, not only the dyslexic learners.

6.5.4 Limitations of Teachers' knowledge about Language Learning and Dyslexia

The dyslexia and monolingual issue, however, must be differentiated from the concern about the current limitations of non-specialist teachers' knowledge about the developmental patterns in relation to profiles of bilingual or multilingual dyslexic students.

It might be suggested that the introduction of the Literacy Strategy (DfEE 1997) is making a strong contribution to increasing teachers' knowledge about basic linguistic terminology and structures (e.g. spelling rules) in English. However, it is the wider knowledge about differences in linguistic structures (e.g. grammatical sequences) in the other languages in use in the homes of their pupils, that may be required in order to understand and to differentiate between problems that relate to either language learning or dyslexia or both.

6.5.5 Underfunctioning

Another area of concern which requires to be considered in a conceptually discrete manner is that of 'Underfunctioning' in terms of possibly associated causal factors including 'deprivation' and 'disadvantage'. As previously stated, in the 1960s Hess and Shipman (1965) wrote that "the meaning of deprivation is a deprivation of meaning". They saw the deprivation which so limits learning and later achievement in school as arising from failure to understand and use language to facilitate a cognitive structure which enables parent and child, teacher and student, to represent and control the social and learning environment. Related to this, in the 1970s Cashdan and Esland (1972) wrote that

> *"A substantial minority of British schoolchildren underfunction in the education system. After ten or more years in the educational system, their attainments are low. They are hostile to school, and remain in the system only as long as they are compelled to do so. They are the*

disadvantaged children in our culture. They, (or their parents) come from a wide variety of social and ethnic backgrounds, but most of them are still the indigenous British poor. Their accents and their language also differ in significant respects from those approved by the school and displayed 'naturally' by the children of the middle class."

The factors they highlight as being important can be classified as cognitive and related to the representation of ideas. In bi/multilingual children, or children whose primary linguistic code differs significantly from the form of language used in school, the expression systems for delivering the learner's thoughts and ideas through speech or writing are more complex and difficult to learn and to control (Sage 2000).

The concern with secondary and adult dyslexic learners, also requires to take into account more recent work in the fields of phonology, language and literacy learning and dyslexia.

Previously phonological awareness was defined as sensitivity to sound in spoken language. (Gallagher, 1995). Stanovich (1988) has gone as far as to suggest that a major key to the failure in the development of the reading process for some students is a weakness in the phonological processing system in the learning of grapheme-phoneme correspondences. Studies have been carried out highlighting the association of phonological processing and reading progress in primary schools (Stanovich, Cunningham and Cramer, 1984; Stanovich, Nathan and Vala-Rossi, 1986) Other studies of the longitudinal type have linked pre-readers' phonological skills with their later acquisition of reading. (Bradley and Bryant, 1983; Torgensen, Wagner and Rashotte, 1994) Programmes have been developed which include the training of phonological skills and have proven that the progress made by students with difficulties in the acquisition of reading skills has been substantially enhanced (Hatcher, Hulme and Ellis, 1994).

6.5.6 Questions still to be explored

There is a significant gap, however, in that none of these programmes have looked selectively at the specific difficulties experienced by the dyslexic learner who speaks two or more languages. Amongst the questions still to be more fully explored are:

1. In what ways do their cognitive profiles differ?

2. Do they differ in terms of processing spoken language, literacy and numeracy?

3. What is the effect of stress on their learning?

Many countries demand that their students reach a high level of proficiency in a minimum of two languages, before entering vocational or academic higher education. Failure to achieve the required competence in two languages at this level is not only a personal tragedy for the individual, but also represents a substantial loss of skills to society, which neither developed or under-developed nations can afford. Furthermore, current studies among the prison populations show that there is a high rate of offenders who have a poor level of literacy and numeracy. The question arises as to the linguistic contexts and experience of the population under consideration. A government funded study in Sweden (Alm and Andersson, 1996) highlighted the fact that 31% of such offenders were dyslexic. In countries in which bilingualism or multilingualism are the norm, it would be helpful at this point of our international research, to learn about the language characteristics of the relevant population including those in prisons.

6.5.7 Procedures for Identification and Diagnostic Assessment

This discussion raises some of the questions and issues which affect identification and diagnostic assessment of young dyslexic bi/multilingual learners and are compounded for the older dyslexic students who may not have been diagnosed accurately. It draws attention, amongst other things, to the importance of distinguishing between levels of competence in Basic Interpersonal Communicative Skills (BICS) and

Cognitive/academic language proficiency (CALP). This point was made by Cummins (1984). BICS, whilst important, is not enough for educational success since the learner must be able to use language for analysis, synthesis and evaluation of ideas if he is to succeed at the higher academic levels.

Thus any diagnostic assessment would need to include not only possibilities to observe characteristic 'dyslexic' difficulties but also opportunities to explore these dynamic aspects of language in use. Such an evaluation of the ability of the learner to use language has been suggested by Cline and Fredrickson (1991) as requiring to be considered from five different perspectives:

a) competence in phonology and syntax

b) competence in semantics

c) pragmatic competence

d) conversational competence

e) socio-linguistic competence

They consider that the proficiency of a bilingual speaker is best understood if all five of these factors are taken into account. Essential factors beyond listening and speaking include the speaker's attitudes and feelings about the situations in which each language is used. They firmly state that a proficient bilingual speaker requires not just competence, but also confidence across a wider range of situations than faced by monolingual speakers. On the other hand, those learners who have a low verbal learning ability also require diagnostic approaches which take into account not only the linguistic processing and dyslexia characteristics, but also the findings of recent work by Mellanby (1996) on cognitive determinants of verbal underachievement at secondary school. Whilst not selectively working with dyslexic learners, their study may throw light on the range of factors involved in language-learning at secondary school level in relation to comparing reading and spelling abilities with learning 'pig-latin' in tests of phonological awareness in groups of students classified as 'discrepant' (non verbal scores exceeding their verbal scores) and those classified as 'verbal' and 'non-verbal'. Their results suggest that the discrepant group, who were not necessarily

reading-retarded with respect to chronological age, 'needs to be identified if they are to reach the potential level of achievement predicted by their non verbal CAT scores (cognitive abilities test)'. However, information about the research samples' home language(s) experience was not provided. As stated throughout this thesis, it might be suggested that the condition of dyslexia and bi/multilingualism presents a substantial diagnostic challenge; one which is not solely the responsibility of any one linguistic group and which requires diagnostic assessment to include differential information about the following factors any of which may contribute to reading, spelling and writing retardations:

- social, cultural and linguistic home and school experience;
- different or impoverished language skills including imbalanced speech development or restriction of vocabulary in one or all languages; and
- unusual learning profiles, including reference to memory competence.

6.5.8 Successful Teaching Approaches

Recognising the complexities of diagnostic assessment, nevertheless, points towards the importance and desirability of avoiding some of the difficulties and distress as well as costs of late intervention. This prompts the suggestion that funding go into early identification in the hope of prevention of later more complex problems.

Appropriate teaching approaches for younger and older dyslexic bi/multilingual learners may in the future involve, increasingly, the use of technology to bridge the speech-to -text and text-to-speech communication challenges and for prevention via early intervention, of later literacy problems. However, the wider range of dyslexic symptoms will need to be addressed too including areas such as speed of processing, visual/auditory perception and short term memory weaknesses. Already there are some exciting developments in international communications about dyslexia and special teaching e.g. papers presented at the BDA's first international conference on Dyslexia and Multilingualism in 1999 (see Peer and Reid 2000). New technology

programmes for linguistic learning offer hope for increased effectiveness in language learning. With or without the support of computer technology, there remains a need to share information about successful teaching and learning approaches for this particular group of dyslexic learners. One way in which an attempt has been made to identify a sample of such learners and to seek their reflections via self-reports, is reported below.

6.5.9 Method

The questionnaire was designed by myself together with Morag Hunter-Carsch (Leicester University) and distributed to the 500 delegates at the BDA's 1st International Conference on Dyslexia and Multilingualism in Manchester, 1999. It has two parts, the first of which was for completion by conference delegates; the second part, for dyslexic bi/multilingual speakers. Some analysis of the returns from the first 74 delegates to complete the first part and a sample of 12 dyslexic multilingual speakers who completed the second part has been carried out by Morag Hunter-Carsch with the assistance of Sue Mailley and is reported below.

6.5.10 The sample

The sample of respondents included 41 teachers of whom 21 were class teachers (15 secondary or both secondary and primary level, 1 primary, and 5 teachers of adults) and 20 were specific learning difficulties specialist teachers and/or SENCos (Special Educational needs Co-ordinators). There were also 14 teachers of English as another Language (EAL) and 9 university-based respondents (7 tutors/researchers and 2 university students) as well as 5 educational therapists, 2 educational psychologists and 1 medical doctor.

The age range of the sample included some respondents at every level from age 20 years to over 60 years. There were 29 respondents of age 51-60; 19 who noted age 41-

50; 12 indicated 31-40 and 4 at each end of the scale (20-30; 61+). This slightly skewed distribution curve indicates the weighting of the responses towards the 51-60 age range, who might be anticipated to bring considerable experience to their shared views.

Respondents came from 22 countries. The largest number, 37, came from the UK (19 noted UK, 9 noted England, 6 noted Scotland, 2 Wales and 1 Ireland). Respondents from other countries included 8 from Sweden, 5 from the USA, 3 each from Denmark and Israel , and 2 each from Belgium, Cyprus, Germany and Luxemburg. The remaining respondents were from the following 10 countries: China, Dubai (UAE), Greece, Hungary, Italy, Japan, Lebanon, Norway, Poland and Spain.

In the case of 49 respondents, their first language was the same as that of the largest national group in their country of residence. For 25 respondents their first language was different from the main national language of their current country of residence. 8 of the 25 were bilingual and a further 4 had three 'first languages'. 66 of the 74 respondents were bilingual. 42 were 'trilingual' and 23 had four languages; 10 had five languages and 7 reported having a seventh language in which they considered themselves to be 'strugglers'. The respondents' self reports regarding their level of competence in the different languages is as follows: 35 considered that they were 'fluent' in their second language, while 20 considered themselves 'competent' and 9 'strugglers'. With regard to the third language, 8 considered themselves to be 'fluent', 18 to be 'competent' and 13 to be 'strugglers'. For their fourth language, none of the respondents noted that they were 'fluent' but 9 respondents considered themselves ' competent' and 14, as 'strugglers'. Regarding their fifth language, again, no-one described themselves as 'fluent', but 2 considered themselves to be 'competent' and 7 to be 'strugglers'. For the sixth language, all 7 respondents considered themselves to be at the 'struggler' level.

6.5.11 Results

Self-Reported Levels of Competence in Second or Other Languages

	second	third	fourth	fifth	sixth
Fluent	35	0	0	0	0
Competent	20	18	9	3	0
Struggler	9	13	14	7	7

N= 74

58 of the respondents noted that they knew someone who was dyslexic and multilingual, and 56 of them were willing to contact that person and request that they complete the questionnaire (second part) or assist them, by 'interview' to complete the questionnaire. 30 respondents indicated that they knew more than one person whom they could invite to complete the questionnaire and some stated that they could find up to 8 such people.

6.5.12 A sample of responses from dyslexic multilingual learners

The second part of the questionnaire was designed for completion by (or with assistance) dyslexic multilingual learners. Arising from the efforts of the 74 respondents to the first part of the questionnaire, there were 12 returns within a few months from the conference in June 1999. Preliminary analysis of the first 12 returns is summarised below.

4 of the respondents who had completed the first part of the questionnaire went on to complete the second part as they themselves were dyslexic. A further 8 respondents completed the second part in consultation with and on behalf of a multilingual dyslexic person.

(i) Current country of residence of the sample of 12

The 12 dyslexic multilingual learners included 7 from the UK , 2 from Israel and 1 from each of Greece, Norway and Sweden. There were 8 females and 4 males. Their ages ranged from under 20 to over 60 years. There were 8 in the 12-20 year category, 3 between 21 and 30 years and 1 between 41 and 50 years. 6 were students at school, 2 were adults and 3 were adult students and 1 was a secondary school teacher in England.

(ii) Home languages

Only 2 of the sample of 12 were native English speakers living in England. For a further 5 living in the UK (4 in England and 1 in Scotland), their home languages were French, Greek, Japanese, Swahili and Urdu respectively. The remaining 5 were bilingual at home. Their home languages and current residences were noted as follows:

- 2 living in Israel, home languages Hebrew and English/ English and Hebrew;
- 1 living in England, home languages English and Russian;
- 1 living in Norway, home languages English and Norwegian;
- 1 living in Sweden, home languages Swedish and German.

(iii) School or Work Language

With reference to the question of home and work languages, there were only 10 replies (2 non responses). The school or work languages for 4 of the dyslexic respondents were the same as their home language and for a further 2 (bilingual respondents) the school or work language was one of their two home languages. For 4

dyslexic learners, the school or work language was different from their home languages.

(iv) Family History of Dyslexia

9 dyslexic respondents noted that there was a family history of dyslexia and 3 did not know if this was so. The ages at which there was first awareness of dyslexia ranged from 5 years old to 15 years. 8 became aware during the primary school phase and 2 at 12 years, 2 at 15. If the notional age of 7 is taken as an 'earliest age for formal assessment' as has been the pattern in some countries, at least 5 of the 12 cases were aware before that point.

While for 8 of the respondents the age at which awareness of dyslexia was noted and the age at which awareness of being dyslexic was 'confirmed' are regarded as the same, for 4 respondents, there was a gap of 2 years in one instance (7-9 years of age) of 5 years in another (5-10 years of age), 8 years for another (6 -14 years old) and 10 years in another instance (15 –25 years of age).

(v) Assessment of Dyslexia

The age of assessment whether informally or formally was noted by 10 of the respondents. Their responses ranged from 1 at age 6 years, to 4 at age 11 or 12, 3 at age 15 or 16 and 2 beyond this (1 at 19 years and 1 at 25 years of age).

Of the 10 respondents who completed the question about the language in which they were assessed, 6 were tested in their home language (2 of the bilingual learners were tested in one of their home languages and 1 was tested in both home languages), 4 were tested in a language which was not their home language and in which in at least 2 cases, it was a language in which they did not consider themselves to be fluent. Formal testing took place in only 7 of the 12 cases. Assessment was informal for 5 cases. 9 respondents were able to comment on the occupational background of their testers: 7 assessments were made by educational psychologists, and 2 by specialist trained teachers of students with specific learning difficulties.

(vi) Strengths and difficulties

Taken collectively the multilingual dyslexic learners' strengths include the following (in the words noted) : spatial, art (noted twice independently), creativity (noted twice independently), sports, (noted twice independently) photographic memory, verbal and spatial ability, oral work, vocabulary, analogies, logical reasoning, reading.

The noted areas of difficulty include : spelling (noted 6 times independently), writing (noted 5 times independently), reading (noted 3 times independently), auditory/visual sequencing (noted 3 times independently), memory (visual/auditory) noted twice independently, and mathematics which was noted twice independently.

(vii) Learning Support

Learning support in primary school was noted by 5 respondents. 4 noted that they were given 'out of class, withdrawal learning support' during their primary schooling. 6 noted learning support during secondary. 3 noted 'in class' support. 3 noted they were withdrawn for support (2 noting both 'in class' and withdrawal support). One noted private tuition and another noted 'one-to-one support'. The language of mediation of the support was noted in 6 cases (English and Hebrew for 1 case and English only for the remaining 5. (For 3 of them, English was not their home language).

(viii) Support found to be most helpful during school years

Five respondents did not answer this question and one mentioned only that the difficulties were attributed to bilingualism. 2 considered that private tuition was most helpful. English teaching, targeted withdrawal in writing and mathematics and class

support were noted by 3 and 'encouragement' specified by 1. Having a reader in examinations was noted by 1 as helpful.

(ix)Most effective kind of support at home

Four respondents did not answer this question. 3 of the remaining 8 mentioned the value of help with homework, especially with spelling, reading and written work. Other points mentioned as helpful were:

- stopping the pressure;
- making the correct school choices;
- having well educated parents who paid attention to education;
- private tuition;
- elder sister (who helped with homework);
- mother read aloud school books; and
- specific multisensory spelling teaching.

(x) Advice about support for school age students

No advice was offered by 4 respondents. The advice given by the remaining 8 respondents regarding learning support for school age students was:

- ensure early recognition/ pre-school screening;
- start as early as possible; (2 responses)
- listen to the students;

- explain dyslexia;
- come to terms with it; don't bottle it up;
- read worksheets to them and write for them when they are tired;
- don't ask them to stay to work before or after school;
- it is important not to make them feel stupid;
- important to diagnose correctly; and
- teachers should be aware of the problems and give enough time and don't care about spelling.

(xi)Learning support as an adult student and learning support in adult working life.

Only 1 person said they had learning support as an adult student. It was support with lectures and it was given in English. 5 said that they had no support and 6 did not answer. 8 did not answer the question about support at work and 4 respondents indicated that they had no support.

(xii) Dyslexia Support for the family and Advice to Dyslexia Support Groups

Six respondents noted that they had been members of a local dyslexia support group. 4 said they were not members and 2 did not answer. There were 4 comments about the ways in which the local group support was helpful. They were as follows:

- can learn about dyslexia;

- it is helpful when making an appeal;
- they provided an excellent lecture series and support for parents; and
- mother works with dyslexic people and their families.

Five respondents gave points of advice for local dyslexia groups. They noted:

- help to keep up the momentum;
- inform dyslexic families and teach them;
- speak to schools about dyslexia;
- help children to believe in themselves and to use computers; and
- never give up fighting!

(xiii) Other Comments

The only other comment that was made was to emphasise the importance of raising dyslexia awareness and the value of early assessment. It should also be noted however, that 7 respondents were willing to be contacted with a view to assisting with further research.

6.5.13 Discussion

The willingness of the 74 respondents and their dyslexic friends in making time to share their relevant views and to offer assistance with further research is encouraging. Their shared information provides endorsements for some of the feelings and hunches

expressed in various ways at local dyslexia support gatherings and at national and international conferences by both professionals and laity. It is important that the bi/multilingual dyslexic learners' own reflections are listened to. Their collective language experience is both diverse and substantial, as is their experience of dyslexia.

There is a need to generate further information about how best to proceed with this kind of investigative collaborative research as well as to assist with illuminating directions for subsequent studies which may be able to explore selected issues and questions in greater depth.

In order to answer the questions posed at the beginning of this study, there is a need for further research at many levels and for the effective dissemination of the research findings, for effective home-school and community projects and for parents as well as teachers to work together to bridge gaps in understanding both the language and cultural factors which affect dyslexic learners in particular contexts. Promising research and development projects are happening at local, national and international levels within the wider literacy and communication framework (e.g. Leicester's Highfields Project and its Literacy Hour Video in Asian languages for use at home (Barnes, Chauhan et al . 2000); Edinburgh University's Scottish study of multilingual and dyslexia assessment procedures (Landon et al 1999) and its research extensions beyond Scotland, concurrently with the development of the International (and Multilingual) Test of Dyslexia (Smythe, 1999).

It is in the sharing of the experiences of learners, teachers, parents, researchers and others possibly from many professional and linguistic backgrounds, that a significant contribution to the development of research procedures, not only the collation of information which may, in itself, lead to further understanding.

It is clear from the results of this group of 74 bi/multilingual dyslexic adults that there is a need for early identification for this sub-group. They view themselves as do monolinguals showing little understanding of the complexities of their condition. There is a clear demand for early identification and assessment which demands more in terms of expertise than it does for monolinguals. Clearly as adults they are trying to cope with the on-going pressures of dyslexia in tertiary and post-tertiary educational frameworks. They would be considered by many as successful, but from their

descriptions of themselves and their recommendations for others, they are experiencing on-going difficulties. This is something which has become clear within the body of the thesis. That is, that dyslexia is not just an issue of difficulty acquiring literacy which causes problems in the early years of school education, but in fact has a major impact on people's lives long-term. This would be due to the underlying weaknesses in the pre-requisites for learning – the enduring effects of poor working memory competences, speed of processing and lack of organisational skills. For these adults, there is a request for understanding, raised awareness of the issues and support.

Whilst there was no investigation of the issues of OM, there was clear value in ascertaining the on-going effects of dyslexia in this group. From this group comes the proof that it matters little what the language background, transparent language or opaque, many of the issues with which the adult dyslexics have to deal are the same.

The implications for research and practice perhaps, are to be less concerned about the phonological issues of specific languages, but more about early identification together with the provision of support in the areas of weakness. Dyslexia needs to be seen as a life-long condition for which there needs to be provision – particularly so in the bilingual and multilingual communities.

7. Section Seven

Overall Discussion and Conclusions

In this concluding section I summarise the main findings of the studies reported in this thesis, and then move on to consider their implications from a theoretical perspective and from an applied perspective. This analysis leads on to directions for further research, to proposals for implementation of more dyslexia-friendly policies, and thence to my final conclusions.

Section Seven

[A] Theoretical Implications

From the results of this research it would appear that the proportion of dyslexic people with a history of ear infections and OM is significantly higher than in other groups of the population. Furthermore, the data shows that the two conditions are linked and are highly significant when considering functioning within a learning situation for a sub-group of dyslexic people. It would appear that the existence of OM in early childhood has a major impact upon the development of language and literacy as well as on the emotional stability of the individual. These effects have an impact well into adolescence and beyond for some people. This is despite the fact that tests at a later stage show that levels of hearing have returned to within normal limits. A major research finding is the extraordinarily high incidence of severe OM (70%) in these dyslexic bi/multilingual children.

Key findings in this study show that despite both groups being dyslexic, the OM sub group evidence tendencies that are more severe than those found in the group that does not suffer from OM. It should also be noted that whilst many children world-wide experience a single bout of OM in their first year (Daly 1997 cites between 14% - 18% in Sweden to 49% - 97% in the USA among non-native populations, depending on the criteria used) the majority do not go on to develop severe and continuing bouts of the condition. (Daly 1997 cites Japan, 4% -15%; the USA – 12% and Kuwait recording the highest at 31%.) These estimates are well below the 70% established in this study..

Not surprisingly, due to the impact a loss of hearing has on the children, their families and their reactions in school, these children tend to be identified earlier than other dyslexic children. Often they are considered to be more severe cases than the non-OM group; hence the tendency towards referrals to psychologists who are generally deemed to be more 'knowledgeable' than specialist teachers.

This group of learners also recorded as evidencing more significant problems than other dyslexic learners when language performance was measured. In areas of written

but not spoken English ('academic' as opposed to 'chat' language) they were performing at a greater deficit than the non OM dyslexic group. Both reading and writing skills were significantly poorer in that group. As a result of this, their general success across the curriculum was depressed, leading to areas of specific weakness in language, learning, short-term memory and in some cases, behaviour.

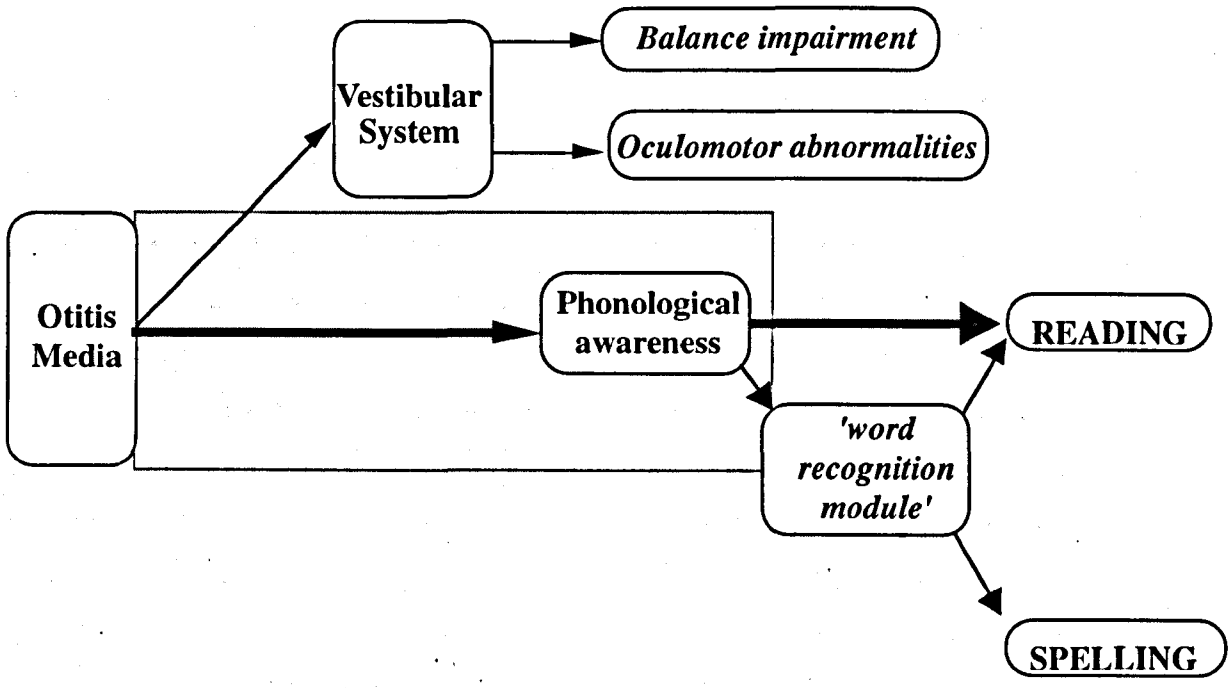
The significant weaknesses in the OM group noted in speed of processing tasks I suggest is also a result of intermittent and significant hearing loss for weeks or months at a time.

Otitis Media as the causal factor in dyslexia?

This has strong implications for theory and practice. From a theoretical perspective, one intriguing possibility is that, rather than reflecting some underlying brain abnormality from birth, the difficulties in phonological processing, in auditory magnocellular performance and in vestibular function are actually acquired later in life. If a child suffers from OM in the early years, normal development of all of these functions just will not take place.

I intend to consider the strongest possible causal involvement of OM as is described in the following conceptualisation. As such I am postulating a new theory for a sub-group of dyslexic learners. Having considered the various theories in line with the results of this work, I have reached the following conclusions. For a sub-group of dyslexic learners – those who have suffered serious bouts of OM – there is perhaps a different theory. Rather than the Nicolson and Fawcett ontogenetic causal chain (Figure 1), in fact the causal chain for these children may look much more like the figure below:

Figure 19. Otitis Media and Dyslexia, an ontogenetic causal chain



It may be the case that in fact some genetic abnormality predisposes 'dyslexic' children to OM. It is almost certainly the case that the risk factors are cumulative, so that a dyslexic child who has to learn two or more languages and who has OM is particularly likely to develop literacy difficulties.

The Otitis Media and Dyslexia ontogenetic causal chain is as relevant to monolingual learners as it is to those who are bi/multilingual learners. Its impact however, I believe will be more profound on those who are dealing with more than one language, for the reasons outlined in previous sections. Those young children who are exposed to bouts of OM so severe that it has led to the insertion of grommets, have been deprived of the input that is so needed for normal development in areas of language and literacy. This loss has the effect of causing a chain of difficulties in the development of phonological awareness, ultimately leading to difficulties with reading and spelling. As bouts of OM occur at a very young age, the early loss of consistent hearing, together with bouts of ear infections is equally likely to impact upon the vestibular system in some people which will affect balance and may cause oculomotor abnormalities.

Clearly more research would be needed to investigate these issues, with the immediate priority being the analysis of monolingual poor readers. Nonetheless, the research presented here opens up the possibility that a simple environmental insult (OM), occurring at a time when auditory and vestibular skills are developing rapidly, may be sufficient in itself to lead to the symptoms of dyslexia.

Whilst not a part of the causal chain, it is not unimportant to add the issue of behaviour to this discussion. It is quite common for dyslexic children to evidence signs of anxiety and often poor behaviour Peer, 2000). This is often a reaction due to the frustration felt by the learner when demotivation and low self-esteem set in. The results of this study show more extreme levels of these behaviours in the OM group. I would expect this when children cannot hear too well and language is spoken too fast for them to comprehend. Life perhaps seems to be passing them by and often may appear frightening. They are often in trouble too both at home and at school for 'not listening and not concentrating'. Indeed, it may well be that behaviour problems were not significant in studies 2 and 3, because this subgroup of OM children were receiving support from parents who were committed enough to seek out extra involvement in tbis project. Identification of the problem at an early age and stage of development together with appropriate support may well help overcome some of these difficulties. Suggestions for support follow in the second part of this section.

Evaluation of current theories of dyslexia in relation to the OM theory:

Phonological deficit hypothesis

The theoretical issue is whether OM is sufficient to cause the phonological deficits? I believe that it does as is demonstrated in figure 19 above. Is it the case that the OM group is poorer at phonology? There is every case to suggest that they have demonstrated that even within an entire group that is dyslexic with identified language weaknesses, they are particularly poor in areas of language acquisition consistent with this supposition. The difference is that this group needs particular support from

specialist teachers and/or speech and language therapists in the specific identification of these weaknesses and then need those skills to be 'taught back'. The damage caused by OM at a very early age of development appears to leave these learners with a permanent deficit (interview Head of ENT at Radcliffe Infirmary, 1992) in the area of phonological awareness.

Within this particular cohort, the fact that the bi/multilingual dyslexic learners had to deal with more than one set of phonological codes undoubtedly placed more pressure on them than if they had had to deal with only one set. A background of weakness due to the presence of OM would have placed greater pressure on them. A learner with phonological deficits will find it difficult to effectively deal with grapheme-phoneme conversion, which in turn leads to poor reading. Furthermore, it leads to poor phoneme awareness and poor naming speed. How much more complex is the process when dealing with more than one language?

The weaknesses with phonological development in the dyslexic population are well documented in the literature. One of the unresolved issues for the phonological deficit hypothesis is what causes these deficits? The OM hypothesis provides an explanation for the phonological deficit for the vast majority of this group.

Magnocellular deficit hypothesis

The second causal model refers more to visual and motion detection deficits in the dyslexia profile than the phonological. The issue here is whether OM might be sufficient to cause magnocellular abnormalities. I shall consider this firstly for auditory magnocellular deficits, and then for visual. I believe that notice has to be taken of OM when considering the auditory theory - it is critical in this area as weaknesses in hearing may well lead to phonological difficulties as explained above. It is known that those who have problems along the deafness continuum need language presented to them loudly and clearly, and benefit by having it chunked and presented at a slower pace than others. This is consistent with Paula Tallal's findings

that children with SLI/dyslexia have difficulty in identifying sounds if they are presented rapidly. OM could lead to auditory magnocellular weakness, but more research in this area would be needed in order to understand the impact of OM.

Additionally OM may well lead to imbalance in the middle ear – related to motion deficits. In relation to visual factors however, it would seem that for the majority of dyslexic learners, visual weaknesses are not the primary cause of dyslexia and do not affect all dyslexic learners. For many of those with visual difficulties, they seem to be a secondary factor within the complexities of the learning process and not the causal factor. It might have been expected that in this cohort in particular, there may have been ample reason for an excessive strain on the visual system as so many of the children and adults were exposed to either Hebrew or Arabic (which are written in opposing directions to English) as one of their languages. However there was nothing in the results which pointed to more of a difficulty for the OM group with either visual difficulties or poor motion-detection (although this of course was not directly tested).

Cerebellar deficit hypothesis

This theory suggests weakness in motor control, learning and time estimation, functions thought to be under the control of the cerebellum. More recent evidence for the role of the cerebellum in language has made the cerebellar deficit a plausible candidate for the underlying cause of dyslexia. The theoretical issue in this theory is as to whether OM could be sufficient to cause the cerebellar and vestibular signs, given that the two systems are often linked together and described as the cerebellar-vestibular system. I believe that OM may well be a cause for vestibular signs however other cerebellar signs such as muscle tone, may not be related to the medical condition. It might however be one underlying cause for the cerebellar model (see Fawcett and Nicolson). It is suggested that cerebellar weaknesses might also affect the

motor and timing aspects of speech processing. It is postulated that phonological impairments could be explained as consequences of a more general deficit, which also affects balance. It is suggested that the effect of abnormality on reading acquisition is mediated by a phonological deficit which in turn is a consequence of a speech motor deficit.

One would expect the key behavioural correlation of OM would be difficulties with phonological skills and with vestibular function. Nicolson (personal communication) suggests that the primary behavioural correlates of cerebellar deficit will be incomplete skill automatisation together with difficulties in learning new skills. Presumably, one would divide dyslexia children into three groups, cerebellar only, OM only, and cerebellar and OM. The predictions would be that the cerebellar only group would have relatively good balance and phonological skills, at least when their automaticity was not challenged, whereas the OM only group would show no particular difficulties in verbal learning, assuming that the material is easy to hear. Of course the key determinant between the two theories would be determined by performance in the first year, if there were some method of assessing dyslexia at that age.

It is clear that there is a proportion of dyslexic children who do not suffer from OM, and therefore deficits related to OM could only account for up to 70% of the cases, but this is a substantial proportion. It may well be that there are different subtypes of dyslexic person – one that until now has not been investigated being the one with the severe, prolonged and recurring OM background.

The Dyslexic Automatisation Deficit (DAD)

This deficit describes the fact that dyslexic children show problems in the gross motor skill of balance in addition to experiencing phonological and/or visual deficits. Could OM have an impact in this area? Nicolson and Fawcett concluded that when the child was performing one task only, there was little difficulty. However when dual-tasking

or by having visual cues removed, significant difficulties were experienced. The dyslexic children in the studies were either incapable of fulfilling the set tasks or they took many more times longer to complete them. This is highly significant for children and adults who are struggling to make sense of linguistic structures in more than one language and are required to perform at the same rate and speed as the others of the same chronological age when consistently dual tasking.

In order to be effective learners, competence has to be established within an area of automaticity - automaticity being the process by which learning and responses become automatic. E.g. the ability to drive a car without thinking about each move; in the classroom, the ability to spell well without having to consider each letter. The skills need to become internalised and automatised rather than having to be re-learned and rehearsed each time they are needed.

One needs to ask whether dyslexic learners who are bi/multilingual and additionally are OM, experience similar problems with 'dual thinking' as others do with 'dual tasking'. Quite clearly the act of having to reproduce linguistic phrases and structures in a range of languages is challenging for the dyslexic learner. How much more so for the learner who is additionally OM and does not 'hear' language the way others do, and as a result cannot process it in the same way. How this would be researched I do not know – but automization for this group would be interesting to investigate.

Double Deficit Hypothesis

Lack of fluency in reading is a key characteristic of dyslexia, but there is extensive evidence of difficulties in speed of processing for almost all stimuli. Children with dyslexia show robust speed deficits on these tasks. It has been established that dyslexic children need a longer exposure time to read a known word than normally achieving children matched for reading age. In a synthesis of phonological and speed problems, an alternative conceptualization of developmental dyslexia, the double-deficit hypothesis was developed, which holds that phonological deficits and processes underlying naming-speed deficits represent two separable sources of

reading dysfunction, and that developmental dyslexia is characterized by both phonological and naming speed 'core' deficits.

Taking the notion of a double deficit, one might ask what the consequences might be if the learner could not hear very well in addition to being dyslexic. Would this in itself act as an extra burden to the learner who is already struggling with phonological and naming speed deficits? In this specific cohort we can go one step further and add in to the equation the further burden of needing to function in an additional language (or languages). Within this framework, it would not be unlikely to see significant problems for all of the group. However there are clearly additional problems for those who have the OM difficulties, leading me to consider that the hearing problems indeed are causing the overload factor for this group.

[B] Applied Implications

Learning and behaviour are clearly linked and of profound importance for the design of educational provision for dyslexic people. According to the results of this data, the effects of OM are so severe that I believe that it is essential to identify that particular sub-group who have experienced the medical condition and are therefore at real risk of failure. We have the capability to identify these children at a very young age and having done so, can provide the support they need to overcome many of the difficulties they would undoubtedly face otherwise.

Monolingual dyslexia can be identified and assessed at a young age and provision put in place; in many places this happens. I believe that it would be beneficial to add some sub-tests to tests already in existence, which would help educators pin point the areas of weakness caused by repetitive ear infection and OM.

Where behaviour is an issue in terms of low self-esteem, diminishing motivation and unacceptable behaviours at home and/or at school, investigation should be carried out. There should be an attempt to identify whether or not the cause might be due to a possible reaction to the inability to hear clearly and focus on what is going on in the environment.

Likewise in terms of educational success, teachers should be aware of the types of errors made in writing, and see whether or not there might be a connection to lack of acuity. If the child is writing but missing out the 'soft sounds', is it that they are simply not heard? E.g. When I was discussing a piece of writing with a 7-year-old, he explained that 'sutis' was 'sometimes'. Further discussion showed that he simply did not hear the 'm'. His teachers had been telling him to listen to the sounds then go away and write what he heard – he was clearly unable to do so.

Despite good specialist dyslexia provision, there was a critical area that had not been identified and therefore was not addressed.

There is also a direct and significant link between speed of processing, OM and dyslexia. When teachers are discussing differentiation, it is critical for them among other issues, to be aware of the need for slowing down speech and sounding out words carefully. They need to know too that for these dyslexic children in particular, rich vocabulary is not only under-developed as is so often the case for many dyslexic learners, but is particularly poor for the OM sub-group. These children have not only missed out on language from the written word, but also on so much of that which is being spoken about around them.

It is clear from the data evidenced in this study that dyslexic children with OM function potentially less well across the curriculum than do their dyslexic peers who have not experienced OM. In their earliest years of development, the formative years, in many cases these children did not develop the earliest critical skills of listening, comprehension and language development. They missed out on the development of speed of processing, which is so important for success in learning (Interview with the Head of ENT at the Radcliffe Infirmary, 1992). For these children, the skills need to be taught back as they don't seem to develop by themselves at a later stage. Teachers need to be aware of this as both a deficit and as a skill that needs to be taught.

A major problem identified in this work was the lack of communication between relevant and key members of staff. The majority of teachers had not been told that there had been earlier problems with hearing with specific learners in their classes. This was particularly true of the teachers in upper primary and secondary school levels. Moreover even if they had been told, they had no idea of the educational and

behavioural significance of the condition as many had made an assumption that once hearing had returned to normal levels, there would be no further difficulties. Discussion with doctors in ENT working in this area has led me to believe that they are not raising issues of educational significance with parents and schools, nor writing to GPs to ask them to raise the issues as they too are not aware of the links. This could be changed and have a significant effect on educational provision. My most recent conversation was with the Head of ENT at a Hertfordshire hospital (2002) where he openly stated that he had never considered the educational link. This balance needs to be redressed.

There is a significant implication for teacher training and for enhancement of skills of literacy consultants working within the National Literacy Strategy. This might also be significant for those working through the Numeracy Strategy who again are dealing with a subject based on language and memory competencies.

For learners who are both dyslexic and have been affected by OM, and who are additionally bi/multilingual, there are further complications. There is a critical need for the development of a range of ways to assess the strengths, weaknesses and learning needs of these children who are functioning along the dyslexia continuum. Materials need to be developed and methodologies need to be employed so that assessment does not remain just that; it must be seen as the key to unlocking the door to learning. As Lindsay (2001) says:

> *'Unless action is to occur, then assessment is redundant, so before assessing it is important to consider the possible action outcomes and their likelihood of occurring.' p258*

The results of Study 4 highlighted the needs of adults from a bi/multilingual background. They have clear ideas on what needs to be done to facilitate the needs of this large international population. It is noteworthy that from wherever dyslexic people are in the world, they are facing the same difficulties in learning, skills development and opportunity. Clearly there are individual language differences that will lead to identification at an earlier or later age and stage – transparent languages leading to later identification than others. Additionally there are definitional

differences and policy differences that by definition will encourage different practices across the world. However underlying all of these issues is the fundamental point that dyslexic people wherever they are faced with additional language stresses find life difficult and need appropriate support.

For too long, there has been an acceptance of failure amongst the group of dyslexic learners who have a non-monolingual background, through a significant lack of knowledge and skills. There are undoubtedly a substantial number of children who experience early literacy difficulties because of linguistic and cultural obstacles that they have yet to overcome. However, of them, there is a sub-group (OM) whose needs are more profound and would benefit from appropriate dyslexic-type support; they are currently undiagnosed.

From my discussions with government I am aware that there is no monitoring of provision for these groups of children. A way is being sought to seek ways forward to support the growing number who are failing in our schools despite current literacy and numeracy initiatives. I am told that the numbers of bi/multilingual children receiving specialist support for dyslexia was only 1% of the total dyslexia provision (personal discussion with DfEE SEN department, 2000).

It is possible that a single test for the bi/multilingual cohort would not be suitable to deal with the range of challenges described in this thesis. I would like to see the development of a strategy for identification, assessment, remediation and consultation that would begin to address the needs of learners and their teachers. It must be recognised that it will not be possible in many cases to have a full history of the child's background and in some cases there will be little knowledge of the other languages spoken. Certainly formal assessment in these languages will be impossible. In order to ensure equal opportunities for all children we must find a way forward so that school becomes an effective and welcoming place for learning. This will have a clear impact on the lack of motivation and the low self-esteem that has been evidenced so profoundly in this study.

There needs to be consideration too of the child's cultural and religious background in order to establish that there are no clashes between home and school. Where they are evident, consideration needs to be made as to the handling of the conflict and ways to

work with families and possibly communities to effect positive educational outcomes. This is a significant challenge for educators and should not be underestimated.

There will need to be discussion between mainstream and specialist dyslexia educationalists, speech and communication therapists, EAL staff and policy workers in order for this to happen. From my international experience, this has happened in no country as yet.

Appropriate classroom management together with multisensory type teaching methodologies will help such children to overcome their difficulties and begin to reach their potential. The BDA today is working with education authorities to become 'dyslexia friendly'. In this sort of environment there will be empathy and children will be addressed as individuals as opposed to being one member of an institution that provides for all needs in a similar way.

All schools in England are required to conduct baseline assessments on children within seven weeks of school entry. In my work with the Qualifications and Assessment Authority in the late 1990s, we discussed the limited use of most of the 92 tests that were available at that time across the country. Although the government today (2002) is moving towards a substantial slimming down of this number, as yet there appear to be none which include the necessary test items for identifying the pre-requisites for learning difficulties such as dyslexia. Furthermore there is nothing that identifies the root causes of language and learning weaknesses caused by the combination of OM, dyslexia and English as an additional language.

Currently the government is discussing ways of preventing behaviour difficulties in classes (personal communication between Baroness Ashton and Lindsay Peer, 2001). Dyslexic children are undoubtedly a group that would fall into the group that can be supported appropriately and given ways to succeed, overcoming the behaviours that are so disruptive for all. The 'hyperactivity – hyper-reactivity' model (Peer, 2000) is highly relevant for this group of learners.

The range of behaviours evidenced by this group due to frustration is certainly something about which educators and parents need to be made aware so that their children and other members of the family in particular can be supported through

difficult times. Parents too need support. (Peer, 1998). This is a situation with which the organisation European Children, Our Children, based in Brussels, is trying to deal at the current time. It will be a growing issue for educators in the UK as more families move around Europe and children find themselves having to succeed in language systems, which are many and complex. The overload on their working memory appears to be too weighty compounding the dyslexic difficulties already in existence. Add to this the bi/multilingual aspects, OM and there is frustration with its associated behaviours waiting to happen.

To me one of the most incredible findings emanating from this study was that despite the apparent acknowledgement of these children's significant difficulties, the only area that was discussed between parent and teacher was that of academic success. This needs urgently addressing. Bringing parents into the discussion relating to their children's progress and needs analysis will undoubtedly bring improvements and a more positive feeling of empathy all round. An example of this happening recently with monolingual dyslexic children was in Swansea LEA in Wales (1999). Due to their public commitment to working with parents, training of teachers and involving children in the decision-making process, the children's grades have improved dramatically. The numbers of requests for Statements of Educational Need have dropped to 2 a year from close to 200; parents and teachers are displaying confidence and working well together for the benefit of the children (Dyslexia Friendly Schools, 1999).

These are in the few LEAs and specific schools which have taken on the ethos and philosophy of 'dyslexia friendliness':

> *"Whilst 'the special educational needs friendly school' is the ideal descriptor to work for, this document focuses on dyslexia in the knowledge that many of the strategies which can be used to help this group also enhance the learning of other children with a variety of needs."*
>
> *From the 'Dyslexia Friendly Education – a good practice guide' Swansea LEA. (1999)*

Within an inclusive learning philosophy

This leads on to a related issue - and that is as to the environment in which these children learn. The vast majority find themselves learning in mainstream schools rather than in special schools at a time in educational history that supports a philosophy of inclusion.

> *The government has achieved a great deal in terms of educational reform, placing SEN on the national agenda in a manner that had not been considered for many years.*
>
> *'The ultimate purpose of SEN provision is to enable young people to flourish in adult life. There are therefore strong educational as well as social and moral grounds for educating children with SEN with their peers. We aim to increase the level and quality of inclusion within mainstream schools, while protecting and enhancing specialist provision for those who need it. We will redefine the role of special schools to bring out their contribution in working with mainstream schools to support greater inclusion.'*
>
> *The Green Paper, Excellence for All Children: Meeting Special Educational Needs (DfEE, 1997) p43.*

Endorsing these sentiments the publication Meeting Special Educational Needs: a Programme of Action (DfEE, 1998) outlined the Government's intentions by promoting inclusion in mainstream schools and developing the role of special schools. The document clearly recognises the need for a continuum of provision, recognising that 'inclusion' is a process:

> *'...spend as much time as possible in a mainstream setting'*

For inclusion truly to work, there is a need for schools to adopt ways of managing the changes necessary to fulfil the requirements of a fully inclusive policy. Up-grading the skills of all staff and appropriate resourcing are key, as is the need to share good practice where it exists. In such a way the philosophy of inclusion regarding dyslexic children can be met. The alternative stance, by definition will mean exclusion for those with needs different to the norm.

In the foreword to the 'Dyslexia Friendly Schools Resource Pack' (BDA, 1999) David Blunkett, the then Secretary of State for Education and Employment, stated:

> *'As I know from first hand experience, dyslexia is not something a child grows out of and when it goes unrecognised, it can be the source of much misery, frustration and underachievement.*
>
> *It is equally important that we recognise that the effects of dyslexia can be alleviated by using appropriate teaching strategies and committed learning. Teachers need to know how to identify children who have special educational needs and how to provide for such children effectively once they have been identified.'*

For an LEA to become 'dyslexia friendly' an approach centred on these key elements is fundamental:

- Working in partnership with parents and voluntary organisations, the production of clear expectations and good practice guidelines accepted by parents and schools.
- Awareness raising and continuing professional development for staff.
- The provision of BDA - accredited training for at least one teacher in most, if not all, schools.
- Specialist support for schools to ensure quality improvement and appropriate provision.

To make this work, there has to a commitment on the part of leaders in schools in addition to an LEA commitment. An inspiring head teacher can ensure that all staff work together ensuring that all their SEN children are fully included.

There needs to be a roll out of this programme with the additional input of reference to OM and to bi/multilingualism.

Time for change

There is a need to implement change in the relationship between policy makers in health and education in order to facilitate the provision of need for this large group of children whose needs as yet have not been met.

Furthermore '...there is a critical need to raise public awareness of the condition and to allay fears on the part of both parents who do not understand what is happening to them, and educators who feel unqualified to deal with children who need to learn differently.' (Lecture by Peer, Maharashtra, India, 1996) The concerns can be compared to the fears that many people experienced thirty years ago in the field of dyslexia.

Tutors in teacher training institutions have made great progress over the past few years in the area of dyslexia. Now is the time to take more steps in the unravelling of the specific learning difficulties and all their component sub-groups. When teachers get it right, everyone benefits. As Reid (2001) says:

> *'The controversies related to dyslexia are unlikely to disappear. Despite them, however, there is a clearer and more credible view of the concept of dyslexia witnessed by the considerable research activity in this area and the increase in appropriate teaching programmes related to the outcomes of research. It is important that teacher-training incorporates the two elements of research and practice and paves the way for a new generation of trained teachers confident in the recognition and teaching of dyslexic children.'*

This training will by default lead to changed guidance for schools so that all children can have their needs met. If we do not facilitate this then in the current climate of inclusion, it would be fair to say that 'inclusion' by definition means 'exclusion'. In order to ensure that this happens, there is a need to bring the Schools Inspectors into the frame, in order to guarantee the monitoring and maintaining of standards.

Many more young dyslexic people today are entering further and higher education. With early identification of need and on-going assessment there will be significant improvements made for this large sub-group of dyslexic learners. Furthermore, with the onset of technology, many of the difficulties they currently experience should be overcome. We will then be left with a group of individuals who feel successful and are of value to their society.

Most critically I have to say that there is an urgent need for research to pick up the issues here. There will never be effective change in policy and practice until research can shed light on this condition. In June 2002, the 2nd. International Conference on Multilingual and Multicultural Issues will take place in Washington. In the USA they live with the same issues and concerns and are seeking answers with the same urgency that we do here in the UK. I have every hope that some of the ideas that have been expressed through this piece of research and through the auspices of researchers who have begun to take a tentative look at some of the issues after the 1st International Multilingual Conference in 1999, will feed back their ideas into health and education circles.

Critical Analysis

This study was carried out on a bi and multilingual population of 1000 people. The reason for the choice of such a population was that at the time that I was collecting most of the data, I was residing and working abroad. It would be interesting to see whether the results would be similar on a monolingual population. Experience in education internationally and nationally over a period of twenty two years, leads me to believe that the results in relation to OM would not be dissimilar.

Another issue is that for the majority of the cohort, the two specific languages under discussion were English and Hebrew. It is possible that the differences between the two languages exacerbated the problems experienced by the learners in ways other than those that might be experienced in other languages. I suspect that this would not be the case as Hebrew is a highly transparent language. Further research would clarify this.

Questions that I posed in the various tests were influenced by that which I had seen in my own three children, hence the quest for information on the existence of significant ear infections and OM. At 70%, this is a very high figure. I believe that there are many children who are either mislabelled as mild - moderately dyslexic in error, due to the residual effects of OM, or alternatively many who are sitting in normal mainstream classes who are not identified at all and struggle with learning due to difficulties with listening.

As the majority of this cohort were of a Jewish background, it is just possible that there is a genetic preponderance to OM and linked infections. However, experience of assessment on a range of people from various cultures leads me to believe that this is not a genetic condition.

It might be suggested by some that the research inadvertently attracted a population with a higher predisposition to OM once it became known that this was an area of particular interest to me. However, this aspect of the research was not discussed with the subjects nor with those who were sending learners with dyslexic type difficulties to me for assessment. The reason for this was that I had not found a connection at that time in the research and at no time was it mentioned in what was considered to be good teaching practice for dyslexic learners. I considered therefore that OM could have been a particular medical problem relating for whatever reason solely to my particular family.

8 Section Eight

[A] Theoretical Issues for future research

1. More research would be needed to investigate these issues, with the immediate priority being the analysis of monolingual poor readers. Nonetheless, as stated in section seven, the research presented here opens up the possibility that a simple environmental insult (OM), occurring at a time when auditory and vestibular skills are developing rapidly, may be sufficient in itself to lead to the symptoms of dyslexia.

2. It would be most important to test out the new theory – Otitis Media and Dyslexia, an ontogenetic chain (figure 19). I would suggest that initially, the question to parents as to hearing background in terms of severity is incorporated into all testing to give a sense of the existence of the condition in the UK.

I would then take a group of children who have suffered severe OM over a period of time and compare them with dyslexic children who have not suffered with the difficulty (OK). I would take a third group of children who are not dyslexic (Con) as a control group. A range of tests would be developed that would look at:

- automaticity through dual-tasking
- cerebellar tasks
- phonological development;
- oculomotor abnormalities;
- speed of processing;
- age of speech development and link it to the ages of insertion of grommets.
- Document difficulties experienced in speech and hearing and see how they link to written language weaknesses.

- For older children, a longitudinal study investigating their ability in the acquisition of modern foreign languages and documenting whether they find native speakers on tape particularly difficult.

- Document how older children acquire the written and the spoken word in another language. For younger children I might use a nonsense word test.

- Include a range of tests to measure self-esteem and anxiety.

3. A comparison needs to be made between the effects of language acquisition on OM children from different genetic backgrounds.

4. A third test might look at levels of language ability between monolingual and bi/multilingual dyslexic learners and identify where the difference appears between 'chat' and 'academic' language acquisition as described in this work. As yet this has not been documented – or accounted for - and will be of great importance when helping dyslexic young people reach their academic potential.

5. A comparison needs to be made between phonological awareness of dyslexic children from a range of language backgrounds – and evidence documented on the effects that has on their functioning in English.

6. Based on magnocellular abnormality, deficits are seen in visual as well as auditory processing and in poor motion-detection. More research would be needed in order to understand the impact of OM on magnocellular auditory function.

7. Skills need to become internalised and automatised rather than having to be re-learned and rehearsed each time they are needed. There is a need to identify whether dyslexic learners who are bi/multilingual and additionally are OM, experience similar problems with 'dual thinking' as others do with 'dual tasking'. Quite clearly the act of having to reproduce linguistic phrases and structures in a range of languages is challenging for the dyslexic learner. How much more so for the learner who is additionally OM and does not 'hear' language the way others do, and as a result cannot process it in the same way. Automization for this group would be interesting to investigate.

8. There is a need to investigate sub-types of dyslexic learner. For the first time that I am aware of, I would suggest the OM group as a discrete group.

[C] Applied Issues for future development

There is a need to develop action-based research projects that will feed into effective practice and policy changes. Due to the current state of play in the education world, I would suggest that at the outset the issues are dealt with individually and at a later date are brought together to seek out solutions for individuals with co-morbid conditions. As such I would suggest that initially the following 5 critical areas are tackled.

Practice:

1. The development of screening and assessment tools sensitive enough to identify bi/multilingual learners who are dyslexic. These tools should then be made available to special needs teachers and psychologists. The results should link into educational development plans for individual children.

2. Develop and trial materials to teach bi/multilingual learners using multisensory type methodologies. These should go alongside the development of methodologies that support the improvement of phonological skills, visual tracking, organisation, sequencing and speed of processing language – both written and oral. The aim must be to bring the learners to the level of their peers.

3. Having introduced the link between early OM and educational implications, action research should be carried out that would both identify the weaknesses of those children experiencing the difficulties as well make provision for them. This work should ideally bring together the skills of speech and communication specialists together with that of mainstream classroom and specialist teachers.

4. Trial the use of central soundfield systems in mainstream school classrooms thereby encouraging clearer acuity for all children. Measure the increase in learning and concentration for all children, particularly those who experienced OM at a young age. This system should ideally be replicated in classrooms for all children, starting at primary level.

5. Through a process of early identification, work with speech and language therapists, identify the needs of parents and develop the skills they need to work with their children to overcome early spoken and written language weaknesses due to OM and dyslexia. Measure improvements in the acquisition of literacy and success across the curriculum as well as improvements in and behaviour.

The results of all of the above should be linked into measures of growth in self-esteem which is fundamental to the foundation of educational success and ultimately opportunities for employment appropriate to cognitive abilities and skills.

Policy

Due to the complexities of the three areas which have been covered in this study as with recommendations for practice I am suggesting that the policy issues remain separate in the first instance. Once the results of new research feeds into them, the dyslexia world will comfortably move forward that one step further and begin to look at co-morbid conditions and the consequent need for further change.

- Campaigning for change in policy and practice in relation to health and education with specific reference to OM.

- Campaigning for change in policy and practice in relation to Dyslexia Friendly Schools.

- Campaigning for change in policy in relation to meeting the needs of ethnic minority learners with dyslexic-type difficulties.

- Campaigning for change in policy in relation to meeting the needs of those exhibiting challenging behaviour due to a background of dyslexia.

[a] Campaigning for change in policy in relation to health and education:

It is clear from the results of this work that currently little connection is made between the health issues and specific literacy difficulties in the classroom in relation to the educational effects long-term of OM. As such ENT doctors and practitioners deal with the health side of the problem, advising parents if there is a medical problem at the primary school stage. Teachers traditionally deal with the educational needs of the children, never considering the need to ask the questions as to whether or not there was a problem of recurrent ear infections, insertion of grommets and bouts of OM. Until such times as both sides appreciate the implications of the effects of the other, this is unlikely to change. Perhaps a major campaign raising awareness of the connection between the two might be the catalyst, which will encourage policy makers and practitioners to talk.

In January 1980, of dyslexia, the British Medical Association stated:

> *'It is not basically a medical problem...this is something which will be universally recognised by teachers as essentially a problem that does not concern doctors.'*

In 1986, Holland stated that:

> *'Sadly there is generally little contact and liaison between the optometric profession and the educational professions.'*
>
> *(Mailley, 2001)*

OM and Soundfield FM Systems – a solution to a problem?

Over the past few years Soundfield FM systems have begun to arouse interest in the UK, and equipment has been installed in some schools. This technology is designed to improve listening conditions for children in the classroom.

The soundfield system comprises a microphone, worn by the teacher, which is connected to an amplifier. This is done by the use of an FM radio transmitter which allows the teacher to move around the room without the interference of wires. Speakers are fitted around the classroom, either on the walls or on the ceiling.

The soundfield system amplifies the sound of the teacher's voice producing a clear and uniform sound around the classroom. The teacher's voice is amplified just enough to improve the signal to noise ratio; it makes it easier to hear in comparison to unwanted background noise. The amplifier may have tone controls that allow it to be set to match appropriately the acoustic qualities of the room.

In the school I visited recently (2002), Emmbrook school, Wokingham, this system had been installed in many Infant and Junior classrooms, in addition to acoustic ceiling tiles and carpeted floors. The reason that the school was equipped in this way was because it was the LEA's designated school which housed the hearing impairment unit for the area.

Whilst having no documented data, the head teacher, the head of the hearing impaired unit and the staff all stated that they had noticed a significant improvement in the functioning and behaviour of children with a range of milder hearing losses, including OM since this system had been installed. Experiencing it myself, I could see why. There was no strain to hear the teacher, it was easier to concentrate and each sound was clear, regardless of where I was situated in the classroom. The teacher's voice was well modulated and she was easy to listen to. At no point did she raise her voice, automatically reducing the tension that is experienced in any noisy classroom situation when teachers find themselves shouting for attention.

Vaughan (2000) of the National Deaf Children's Society has stated that

'Personal soundfield systems have been seen to be beneficial for children with ... attention difficulties.'

He cites a figure of one million children under the age of eight who experience temporary deafness every year through glue ear (OM), and believes that this system will benefit them directly.

He goes to state that '...the use of soundfield can improve discipline and concentration in the class.'

He notes that portable, desktop soundfield systems are also available that can be taken from room to room to benefit small groups of children if they are out of the class homeroom.

Ereaut (2000) evaluated the benefits of a soundfield system for both hearing-impaired and normally hearing pupils in a Key Stage 2 mainstream classroom. She trialled the system in Oxfordshire in 1999 using the auspices of the LEA SEN team in a DfEE funded project focussed on inclusion. The project was collaborative, involving mainstream schools, special schools and support services with an intention to develop links and expertise.

Teachers of the deaf selected a school where a Statemented year 6 boy who had a mild bilateral sensori-neural hearing loss was situated, in a classroom which was not acoustically appropriate to his needs. It was noted that he was experiencing specific difficulty in classroom discussion and that traditional radio aids had not been successful for him. At his annual review, prior to the commencement of the project, there was much discussion on his inability to attend, listen and contribute in a whole class situation. One of the targets on his Individual Education Plan was for him to learn to take more responsibility for listening; this was clearly something he was unable to do without support. On entry to secondary school, the information to which he had to attend was increasingly more complex and at that point it was decided to install the soundfield system in an attempt to develop his skills.

With funding from the Standards Fund, installation was possible. The researchers hypothesised that the soundfield system would:

- optimise the acoustic environment of the classroom for the hearing impaired pupil;
- improve the quality of communication in the classroom for all the children;
- improve the listening experience of all the children in the classroom;
- improve the teacher's ability to project her voice and decrease vocal strain.

The group set out to evaluate the benefit of soundfield amplification for the hearing impaired pupil, comparing its use to alternative management strategies. Additionally the group were interested in finding out the advantages and disadvantages for the normally hearing pupils in that class of children.

During the period of two terms, the soundfield system was used consistently and the system was evaluated according to a number of measures. Questionnaires were completed by staff and learners. Additionally a second evaluation was made specifically to the hearing-impaired child. The measures included the following:

- contributing to class discussion in a listening and speaking activity at least once each session
- raising a hand during class discussion to answer a question during the Literacy Hour
- listening out for one piece of information at the request of the class teacher or learning support assistant, from each class input.

Results from the staff questioned in relation to normally hearing children included:

- an ability to hear more clearly from all areas of the room; and

- more opportunity for them to project themselves more clearly in reading and speaking to the whole class, through making use of the microphone.

They all agreed that the acoustic environment improved for the hearing impaired pupils in the class and that the ability to project their voices improved.

Results of the pupil questionnaire were as follows:

All ten pupils were unanimous that the soundfield system had made a difference to the sound heard in the classroom. In answer to the question 'When you first used the soundfield system in the classroom did you notice any difference to the sound heard in the classroom?' answers included phrases such as 'It was much louder'; 'You could hear it everywhere'; 'Everyone listens'; 'We remind the teacher to put the mike on if she forgets as it's much easier to hear everything'; 'Much louder and clearer'; 'I could hear it better because I sit at the back and I used to have to move up to the front to hear'.

In response to the second question 'Did the teacher's voice sound quieter, the same or louder than before?' they unanimously agreed that the teacher's voice sounded louder when the system was in use.

In response to the third question 'What did your voice sound like when you answered questions?' four felt that there was no difference; four said that it sounded quieter, one said it sounded 'strange' and the final child said that they had tried to 'talk louder to talk the same as the soundfield system.'

In response to the fourth question 'Do you think that the background noise in the classroom is quieter, the same or louder than before?' most thought that the background noise was quieter than before. One pupil suggested that 'everybody thinks they can be heard louder' and another said that 'You try and sound louder to talk the same as the soundfield system loudness.'

In response to the fifth question 'Do you like it best when the sound system is on, off or it doesn't make any difference?' eight said that they preferred it on. One of those volunteered that it was because they have bad ear infections. Two preferred it

switched off. The two reasons given were that one didn't like the bass; the second said that it was annoying when it squeaked when turned on.

In response to the sixth question 'Do you notice the equipment in the classroom? If yes, why?' most replied that they didn't notice. Others pointed out that they had noticed the wires and the black plugs on the walls.

In response to the seventh question 'Is it helpful to have the soundfield system switched on in numeracy lessons, Literacy Hour or other sessions?' nine said it was helpful in the numeracy session. Eight said it was helpful in the Literacy Hour and nine said it was helpful in other lessons, specifying those in which there is background talking. The ones who did not agree stated that it was not helpful.

Finally in response to the eighth question where they were asked 'Are there lessons when it is not helpful to have soundfield systems switched on?' three said it was not helpful in private reading as they could hear the teacher breathing in addition to the noise of it being switched on and off. One did not like it in the art class as they liked to talk whilst working. Others said it was distracting when working independently.

The hearing impaired child did not find the sound system immediately helpful. Due to his difficulty in expressing ideas, he was unable to explain why. His learning support assistant however, was monitoring his progress and noted that he had started to make contributions to class discussion even when he thought he was not making progress. By the third observation, he had made progress and had recognised that fact.

In summary:

The results of the research were immediate. Feedback after the first two days of the trial period from all of the pupils was that it made listening easier. Although the long term effects for the hearing impaired pupil were not dramatically improved in relation to attention and interest in whole class discussion, with the introduction of the soundfield system, his contributions had noticeably increased.

For those pupils who were within the normally hearing group – including those with OM – there was a strong feeling that the soundfield system had been beneficial,

particularly in subjects that were literacy based. It did however need to be turned off when children were studying quietly or doing independent work.

Teachers reported that the system made a significant difference for the whole class as well as for the hearing impaired child. They felt that it lowered the level of the noise within the class generally and the children could respond to a request to listen without the teacher having to raise her voice. They felt that it was particularly good during carpet times and during whole class teaching sessions.

The installation of such a system in classes throughout the education system I am sure would make a great difference to many of the areas that are problematic for a large number of children with OM and those with the residual effects post – OM.

Undoubtedly for those who are bi/multilingual, particularly those who are dyslexic, there will be the added advantages of clearer speech as well as significant support in acquiring a new sound system so necessary for success in additional languages.

Mailley (2001) suggests that possibly a body, which has overall responsibility for the detection and remediation of dyslexia might be the answer to future good practice. If so it should be constituted by a wide range of practitioners from health, education and representatives from the ethnic minority communities. For too long the two worlds of health and education were separated by a financial and philosophical divide. Now that so much more is known in the two areas, there is every reason to bring the two groups of experts together. OM is a common and simple condition which if handled effectively and early should not develop into a hindrance to effective learning and an SEN problem. So long as the two groups of practitioners are not communicating with each other, what might be a simple condition may well become a serious problem for some affecting behaviour at home and at school due to immense frustration and low self-esteem. This is all preventable.

b] Campaigning for change in policy in relation to Dyslexia Friendly Schools:

The principle of working towards the facilitation of all people to reach their educational potential – regardless of challenge or disability – is fundamental to the principle of 'dyslexia friendliness'. In a world where up to 20% of children at any one time experience a form of Special Educational Need (SEN), there is a moral obligation to place the needs of this substantial group on all agendas to ensure that their voices are heard and needs are met. Moreover now that there is a growing body of evidence highlighting good practice internationally, as a nation we should be able to facilitate successful change in the UK at all levels and stages of educational practice. It is recognised that leaders in schools are the key people who have the power to influence this agenda and by so doing, determine the philosophy, policy and practices of their institutions.

It is fully recognised that only when a head teacher leads the way for such changes in attitude, do teachers feel empowered, parents confident and children successful. Change in working practice must be facilitated to ensure the inclusion of all learners. Should this not happen, by definition, 'inclusion' will mean 'exclusion'. Dyslexic people have a great deal to offer every society, with their creativity, skills and talents which so often lie dormant within a framework of frustration experienced by them in our traditional educational environment. A dyslexia friendly environment and appropriate support will open doors for those who hitherto have experienced failure. This will ensure success and confidence for all concerned – teachers, parents and dyslexic people themselves.

Attitude

- LEAs should advocate clear, written guidelines for teachers. The needs of dyslexic learners should be an integral part of the whole school's policy, enabling children with dyslexia to develop strengths at the same time as addressing their weaknesses.

- Head teachers need to ensure that being 'dyslexia friendly' underpins the philosophy of the school.
- All current and new staff need to 'buy into' the dyslexia friendly philosophy of the school.
- Schools should adopt an open and formative approach encouraging communication between all relevant parties. Include the range of school staff, external agencies where appropriate, parents and dyslexic learners themselves.
- High expectations of all learners must be demanded. This is only deliverable by acceptance of appropriate philosophy and effective support.
- Policies must be in place to encourage the self-esteem of children who find learning through traditional methodologies frustrating.
- Ensure that the needs of those learners who enter the education system with more than one language, have their dyslexic needs met as effectively as those who speak one language only.

Whole school

- Specialist teachers and speech and language therapists working in an advisory capacity should make regular visits to schools to evaluate, support and advise on how to improve provision. Equipment and training for all staff should be in place for the benefit of those children who need it.
- Establish a whole school approach to ensure policies are translated into action. This should be done by:
- comprehensive and appropriate training for different levels of staff
    - a common approach
    - target setting

- recognition of those children with differing language needs
- the placing of monitoring and evaluation systems

- All staff are made responsible within their role for the progress of each individual learner.
- Teachers must have available to them a range of alternative methodologies to ensure success for all learners.
- Teaching of study skills across the whole school.
- Encourage active participation of parents to support both the individual child and the school. Take particular note of those cultures where priorities may not be with the learning of English as a primary language.
- Introduce whole school marking, assessment and homework policies.
- Develop a culture of teaching, which reflects a range of learning styles.
- Introduce a thinking skills programme.

Discreet provision

- Individual target setting should be aimed at the level where learners are, rather than at where they should be according to age.
- Recognition of and support geared to intellectual potential, whilst appropriate individual teaching of areas of weakness takes place.
- Introduce group education plans where appropriate and individual education plans for specific need.
- Use multisensory teaching methodologies to enhance learning capabilities.

- Introduce programs, which will enhance development of those areas underlying the dyslexic weaknesses, e.g. speed of processing, memory, language, organisation.

- Ensure that all staff, regardless of subject specialism, are responsible for and use methodologies that will benefit dyslexic learners across the curriculum.

Conclusion

By taking advice from those who have successfully created such change and working with other leaders who feel that they too have the drive and ability to facilitate the modifications necessary, the above goals will be reached. Schools that view children as individuals and answer their needs appropriately are schools that ensure best practice for all. It is a widely held view by practitioners in the field of dyslexia that educational methodologies that are successful with for dyslexic learners and their teachers, is good for all learners.

There needs to be a recognition and acceptance of diversity, as an imperative on a national scale. Schools must be helped to reach their targets of academic, emotional and social achievement and concurrently shape the successful package of a triangular model of working relationships - schools, parents and SEN children themselves.

[c] Campaigning for change in policy in relation to meeting the needs of ethnic minority learners:

Without question there are many challenges facing education today. Teachers, school management, psychologists, politicians, parents and learners all have specific needs and each experience increasing pressures from the changing demands, challenges and priorities of education and society. There are many places where there is a clear and

unspoken agenda, which often attempts to compromise effective and essential practice based on sound research, for reasons of paucity of resources.

The challenges and priorities that face education today are considerable and complex. Financial considerations compete with the desire to provide an equitable education for all students despite the convictions of political will, cutting edge research and enlightened practices. The needs of multilingual children, their parents and the communities in which they live must be seen as one of those overriding priorities and should not just be considered in financial terms but in terms of equity and best educational practices. Identifying the literacy and communication needs of multilingual children in a culture-fair manner will not only help to ensure the preservation of different cultures but also help identify the cognitive abilities and communication skills of multilingual children. This must be at the heart of any educational and philosophy and innovation in the 21st century.

It is necessary that culture-fair principles and practices are considered in the identification and assessment processes, in classroom practices and provision, the curriculum, in the training of teachers, support assistants and psychologists, in the selection and allocation of resources, in policy and in liaison with parents and the wider community. The need to maximise the potential of dyslexic learners whose first language may not be English is of paramount importance and this must be the priority of identification and assessment procedures.

The last two decades have witnessed great strides in our grasp of dyslexia. Much of this is due to major leaps forward in our understanding of brain function, the evolution of advanced technology, scientific and educational research and the development of effective teaching methodologies. However in the area of multilingualism and dyslexia there has been no recognition and provision. This has led to anguish and failure on the part of the learner, the family and the school.

As we move into the 21st century and individuals move around the globe for reasons of work, we must recognise the needs of their children, the multilingual learners for whom diversity of skills becomes a necessity. We must also recognise the needs of all countries comprising multi-ethnic communities, where many languages are spoken. In

the context of equal opportunities, we have a duty to recognise and provide for the needs of all of these learners.

The sub-group of people who are bi-/multilingual and dyslexic have a learning profile which is significantly different to that of their peers. They have traditionally been lost in the world of research and practice because of the complexities of their condition. Teachers and psychologists have tended to misdiagnose or ignore dyslexia in these groups because of a multiplicity of factors that seems to be causes for failure. Reasons cited often include home background, different or impoverished language skills, inefficient memory competencies, unusual learning profiles, emotional stress, imbalanced speech development, restricted vocabulary in one or all languages, leading to reading, spelling and writing weaknesses. There is recognition that numeracy for some is affected too. However, educators are often aware that these students are very different from others who experience difficulty, as they are often bright and able orally or visually. The difference between their abilities and the low level of written work they produce is very obvious.

There is a recognised need to identify those children experiencing dyslexic type difficulties as early as possible if they are to make the greatest progress in their learning. There is a critical need to develop identification tools that will give assessors and teachers enough information to develop learning programmes which will be of maximum benefit to the children with whom they work. These tests must be culture-fair and give enough information to apply appropriate strategies for learning both across the curriculum and in language and literacy based areas specifically. There needs to be an understanding at national and local level that it is not sufficient to simply use translations of tests if there is no recognition of and adjustment for cultural differences. I believe that it would therefore be of great benefit if policy makers would recognise this range of needs. One way in which they might deal with training needs might be to encourage both teachers and psychologists to work with at least one multilingual child with one of the specific learning difficulties whilst in training. This would set the stage for greater understanding in these two key professions and by so doing provide a broader national base of expertise. There are many policy makers at government level who feel that whilst they might like to fulfil their responsibilities in

this area they do not know what to do or have a group of experts upon whom they can call. There are very few models of good practice that can be cited.

Whilst considering the making of provision we need to acknowledge the need for the development of teaching and learning materials that address areas of learning support. These are likely to be broader for multilingual learners than for those who are monolingual. Specially developed reading materials might usefully provide stimulation and motivation for learning and enhance the development of literacy skills. It is important that the materials acknowledge the diversity of communities and of individuals within these communities.

One vital factor in working with dyslexic children is the need to dispel misleading myths. Avenues for effective communication necessitate openness to ensure the effective triangular working partnerships of parents, schools and the individual children concerned. There are still communities in which dyslexia is misunderstood and for whom awareness and understanding need to be raised. Until such times success is likely to be limited. This greater understanding needs to be accepted and acted upon by policy makers.

I suggest that the way forward should be determined by two imperatives:

- What we believe *must* happen on ethical and moral grounds relating to equality and human rights; and
- what our knowledge, skills and understanding tell us *can* happen.

(Peer, 1999)

Much has been achieved in the field of monolingual dyslexia. However there is still much to be achieved in the field of multilingualism, literacy and the overlap with dyslexia.

Testing

There are specific areas of concern that need consideration. One of those is testing. Cultural experiences have a great effect on the way we think, feel and react. Even tests for small children make assumptions about the familiarity of play objects and experiences. Without the awareness of different learning and socialising habits of the particular culture from which the child comes, many unfortunate assumptions may be made about the child's assumed lack of ability. Tests given orally are prone to the same bias and therefore have to be considered with great care and knowledge on the part of the tester.

It is not a viable proposition to trust the use of translation for administration of tests for children whose native language is not the language in which the tests were designed. There are problems of cultural and linguistic bias, differing syntax and structure, which would make them unreliable, hence their scores invalid. Cline and Reason (1993) postulate that children who are at risk of dyslexia, due to immature phonological awareness and memory, will face heightened difficulties if the language or dialect adopted in school is different to that spoken at home. Avery and Ehrlich (1987) describe the difficulties for children for whom English has been acquired as a second language in terms of the problems of pronouncing English vowels and consonants, which are not in their native tongue. They point out that these children are not used to using relevant mouth muscles in the appropriate way.

The ability to comprehend is also a problem dependent on appropriate word stress, rhythm and intonation. If the specific learner's dyslexia is based on weaknesses in auditory processing, the additional strain of another language will exacerbate the difficulties. Cline and Reason (1993) state that '...it seems extraordinary that the research traditions on specific learning difficulties (dyslexia) and on social and cultural differences have remained in different compartments.'

Practice and Provision

The selection of resources particularly reading materials for multilingual dyslexic learners is of significant importance. Reading materials can provide stimulation and motivation for learning and enhance the development of literacy skills. It s important that the selected reading materials acknowledge the diversity of communities and individuals within these communities. The culture fair assessments should be linked to culture appropriate materials for learning. This together with the production of high interest, low level literacy materials should aid the development of literacy in these learners.

Equal Opportunities Issues

There is a need to separate out additional language learners who perform poorly due to limited familiarity with the language and cultural differences of the country. For some time there has been a concern regarding the misidentification of those with special needs in literacy due to a concern determining too many false-positives and false negatives. For the former, there is a concern based on the comment by the Commission for Racial Equality in 1986 which drew attention to the fact that pupils whose home language was not 'standard English' were discriminated against in their allocation to SEN provision. In the case of the latter, there is a concern that there is a risk of failing to identify a learning difficulty early enough. There is anecdotal evidence citing cases of bi/multilingual dyslexic people not being identified and consequently not receiving appropriate help for many years, leading to a severe exacerbation of difficulties.

Bias

Edwards (1986) investigated perceptions of the language of Afro-Caribbean children. Student teachers and groups of learners were asked to make a series of judgements on the basis of taped extracts from the speech of four children:

- A working class boy from Reading
- A middle class boy
- A recently arrived Jamaican girl
- A British born Began girl who unbeknown to the judges, spoke twice: once in a Reading dialect and once in a Began dialect.

A hierarchical situation arose from the judges' evaluations in which the middle class boy was looked upon most favourably, followed by working class speakers and then by West Indian speakers. Significantly the same child was evaluated more positively when she spoke with an English accent than when she spoke with a Began one. Some of the student teacher judges also considered that West Indian girls would do worse academically and be less interesting members of the class (McCormick-Piestrup,1974).

Policy

The McPherson Report (1999) suggested that every institution should examine their policies and the outcomes of these policies in order to ensure that no section of any community is placed at a disadvantage. This should include the dyslexic community in its entirety. Information needs to be dispersed throughout the communities in relation to dyslexia, and avenues need to be opened for parents of dyslexic children as well as dyslexic adults in order to allay fears and encourage communication.

Like the parents of monolingual dyslexic children, parents from bi and multilingual communities need to be trained in self-advocacy and to participate in groups designed to influence policy and practice.

In a DfEE lecture Sebba and Ainscow (1998) described inclusive education as a process by which a school attempts to respond to all pupils as individuals by reconsidering and reconstructing its curricular organisation and provision and allocating resources to enhance equality of opportunity. It is through this process that the school builds its capacity to accept pupils from the community.

It is my hope that in the coming years we will see great changes in policy, research and practice which will influence work in the field. These changes need to be shared by those working internationally, as it is highly likely that most of what is discovered and works successfully in one place will be of equal benefit in others.

Recommendations:

- Every institution should examine their policies and the outcomes of these policies in order to ensure that no section of any community is placed at a disadvantage. This should include the dyslexic community in its entirety.
- Information on the overlap of dyslexia and bi/multilingualism needs to be dispersed throughout the ethnic minority communities and avenues need to be opened for parents of dyslexic children as well as dyslexic adults in order to allay fears and encourage communication.
- Like the parents of monolingual dyslexic children, parents from bi and multilingual communities need to be trained in self-advocacy and to participate in groups designed to influence policy and practice.

- Teachers and LSAs need to be aware of the differences between language delay of those who are acquiring English as an additional language and those who are experiencing a specific learning difficulty; this is a training issue.

- Work should begin on the production of diagnostic tests that can be used by those in EAL and those working in dyslexia designed to identify learners with specific learning difficulties.

- Educational psychologists should be examining the role they can play in:

  (a) the development of interpretation and use of tests that are for their discreet use;

  (b) their role in the support of the development of educational programmes.

- Input should be made to the designers of the Literacy and Numeracy Strategies that consideration should be made to the level of spoken English that children should have acquired before they are taught and tested on the standard materials.

- OFSTED need to be aware of the issues so that these can be taken into account when monitoring schools.

[d] Campaigning for change in policy in relation to meeting the needs of those exhibiting challenging behaviour due to a background of dyslexia:

Hyperactive or hyper- reactive: EBD or not?

Frustration leads very often to antisocial or even deviant behaviour. There is no doubt that the strain placed on a child to 'do better' when they are trying to the best of their

ability is unreasonable. The problem is that often the child's problems are attributed to emotional issues, sometimes with a background of problems at home, rather than anything to do with a struggle with the education process. It is the responsibility of educationalists to look for the root causes of the stress; after all, even the best counselling will not help the child whose underlying difficulties have not been identified and addressed. Through my work I have received a significant number of anecdotes that many children displaying significant behavioural problems related to frustration, seem to improve dramatically when the situation that is inappropriate is replaced by a more suitable structured environment. One such case was Steven, a bilingual dyslexic boy, aged 13, who had experienced major problems - both academic and social - at school. His behaviour was so poor that he was eventually sent to a special school where within five months, there were no signs of 'hyperactivity'. On discussion with his class teacher a year later, she was amazed to hear that there had ever been any behavioural problems. However the parents were deeply saddened that this had been the only solution for their son whom they wished to have raised at home and not just visit at a boarding school at weekends.

On an everyday basis we see that there are children who may be extremely difficult in some classes, yet not in others. We do not consider them to be hyperactive, but as educators, we do ask ourselves what it is that underlies the problems. Teachers often ask whether it might be the subject matter, the mode of teaching or possibly a personality clash with specific staff that is causing the trouble? These children are simply 'reacting' to the situation in which they find themselves.

In personal discussions with numerous teachers of those working with hyperactivity and dyslexia internationally, it would appear that the current feeling is that 25% - 30% of dyslexic children might be described as being hyperactive.

Genuine hyperactivity may well start before the child enters school; everyone is aware of it! Sleepless nights and unacceptable behaviour are often part of the report that parents give. For this there are a variety of treatments, which are often a combination of educational and medical interventions. However there are also children who seem to develop similar behavioural patterns to those who are genuinely hyperactive, but the symptoms only start when things begin to go wrong in the school environment.

Interventions in these circumstances are totally different. I have personally seen that many children displaying these behaviours calm down dramatically when taken out of the system in which they find themselves. When placed in a 'dyslexia friendly' environment be it either specialist school or mainstream school with appropriate provision and an empathetic staff, who are knowledgeable and understanding, the hyperactivity seems to disappear. That is because it was not hyperactivity. As teachers and parents in secondary schools in particular know, (the time when hormones hit with a vengeance!), questions need to be asked which relate to the child's behaviour and performance way back in primary school and in some cases pre-school. Worryingly there are many dyslexic children being reported anecdotally, who are sent away to schools for children who are suffering from Emotional and Behavioural Difficulties (EBD). It is critical that the aetiology of the dyslexic condition is identified before these children are misdiagnosed and misplaced in inappropriate environments. The return to mainstream schooling for them at a later date is extremely difficult, if not impossible. LEAs and schools have a responsibility to ensure that within the framework of inclusion the needs of these children are identified and provision is made.

Motor skills weaknesses and dyslexia related to bullying:

There are groups of dyslexic children who experience weaknesses in the areas of fine and/or gross motor skills. In the past these children were described as being clumsy. The children, who are co-morbid dyslexic and dyspraxic, appear to be the ones who are most easily bullied. This finding is from evidence I have gathered from twenty-one BDA Family Days around the country over the past six years. On each day the children aged 11-16 have been taken into a room where they have discussed their difficulties and suggestions for resolution. In total an approximate figure of 400 children have gathered and discussed the issues. They were remarkably similar in their descriptions – and they raised bullying each time. These children talk about themselves in a way that adults could only describe as cause for considerable concern relating to vulnerable children. They describe themselves as unwanted in the

playground, in the sports hall and in practical workshops within the curriculum. They talk of teachers making unpleasant jibes and children picking up on those comments in the playground. Some are in physical fear of other children.

Teachers need to be working with this group to develop the muscle control, body language and self-esteem that they are missing. All staff working in a 'dyslexia friendly' school would be aware of these issues and look out for them. They are currently not doing so; no specific guidance has been directed to relating to the side effects of children with various SEN. This needs to be recognised and addressed by changes in policy and practice.

Stress, Giftedness and dyslexia:

There is a need to recognise that stress can have a significant impact upon all dyslexic learners. As Susan Hampshire (1995) states in her Foreword to *Dyslexia and Stress* (Miles and Varma):

> *'One of the worst aspects of being dyslexic is the viscous circle caused by stress. As soon as I make a mistake I panic, and because I panic I make more mistakes.'*

Gifted dyslexic people have their share of anxiety and tension too:

> *'I believe that the vast majority of gifted dyslexic children are still unidentified in schools today and those few who have been identified are in the main not receiving appropriate provision. There is a great need to highlight the existence of this group and make provision for them at local and national level. The worst thing for them is to place them in classes with underachievers as this is bound to cause severe stress and possible deviant behaviour in an already difficult situation (Peer, 2000).*

Through my work I interviewed a professor of mathematics who takes his calculator to the supermarket, as he cannot calculate his bill in his head. His short-term memory is particularly weak, but his I.Q. is very high. His description of the way he was treated at school and the impact that that has had on his life defy belief. So traumatised was he that he wishes never to have children so that they will not have to undergo the same stressful times that he did.

There is a real issue about the lack of recognition of varying groups of dyslexic learners, causing significant difficulty for the individual, parents and teachers who have to try and teach classes with severely disruptive children in them. The dyslexic cohort is both open to prevention of disruptive behaviour, and remediation of it in many cases if provision is put into place early enough. Other groups of disruptive pupils may not be as easy to remediate to the same extent.

Becoming a 'dyslexia friendly' school where all staff buy into such a philosophy will benefit all. The ability to identify and ask for a full diagnostic assessment including that of self-esteem may well be the answer for many. A classroom run in the 'dyslexia friendly' way will also allow many other learners with difficulties to alleviate many of their daily stresses and learning needs. The outcome will therefore become 'win-win' for all.

Recommendations

- Teachers need to be working with this group of learners to develop the muscle control, body language and self-esteem that they are missing to deal with potential bullying.
- All staff working in a 'dyslexia friendly' school would be aware of the above issues. They currently are not and no guidance has been directed to do so.
- Teachers and LSAs need to be aware of the relationship between behavioural difficulties and dyslexia that has been misdiagnosed or badly handled. In a

dyslexia friendly environment, the situation is reversible. This is a training issue.

- Educational psychologists need to develop a model a way of working with school staff to raise awareness and provide programmes of action in cases where such behaviours are in evidence.

Final comment:

Sections seven and eight have brought together the issues and outcomes on both a practical and a theoretical basis. Undoubtedly, the results of research ultimately lead into evolving policy and practice. It is my every hope that the results of this work will not just sit on a shelf in a university library, but will in fact be questioned, challenged and ultimately used to benefit the numerous dyslexic people internationally whose needs have as yet not been identified and fulfilled.

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Appendix One

The Case of Dana

Dana had suffered from serious ear infections from a very early age and was diagnosed with recurrent OM. Her first operation was at age two for the insertion of tympanostomy tubes (grommets). The second operation was at age three, and the third at six. Whilst waiting for the final operation, she was prescribed hearing aids that she was to use at home and in school to support her needs. She however, consistently switched them off. When asked why they were turned off, her response was simple: When they are on, everything sounds louder. I can t hear Mrs. X (the teacher) any louder because I can hear everyone and lots of banging. I then went on to ask her what voices sound like at the times that she could not hear properly. After serious reflection at age seven, she said, Have you ever put your head in the bath and tried to hear your mummy speak to you?

Dana was initially assessed by an educational psychologist at age six and diagnosed with an I.Q. of 138.

Following her progress through to her current age of 16, it is clear that she has experienced significant problems in language acquisition over the course of some years due to the existence of the combination of OM, dyslexia and bilingualism.

Dana was born abroad to an English mother and an Israeli father whose English was very poor. He spoke to her from birth in Hebrew and I spoke to her in English. Her dyslexic brother and sister were bilingual. Child raising in a bilingual environment is not unusual for such families living in Israel. She attended pre-school, which was conducted in Hebrew. She found this problematic. She was frustrated and often cried, could not make herself understood and was unhappy on a consistent basis. In order for her to cope with the spoken language of play and learning, it was suggested that the family drop the second language (English) and only speak to her in Hebrew. As a result, she quickly developed her language skills and became a much happier child. Notably, within the space of six weeks she appeared to have no understanding of English, her mother tongue, even though the rest of the family and friends continued to speak in that language around her.

Dana was aged 4. 7years when the family moved to the UK. She was placed in a school and lived in an area where no-one spoke Hebrew; she was therefore forced to speak English in infant school and when playing with friends.

To show the level of severity of the language problem I offer this anecdote: Dana was drilled in two specific sentences for the first day of school. Even though the family continued to speak English at home, when the first conversation with the class teacher took place, this is what followed:

> Hello. My name is Mrs. Y. What is your name?
>
> I am 4.
>
> How old are you?
>
> My name is Dana.

It was as though she had never been exposed to the English language. She recalled at a later date being frightened by the noise around her and her total lack of ability to understand anyone at all away from home. She spent the first few days sitting on/next to the teacher until the LEA sent in an EAL teacher as well as a speech and language therapist to work on developing her English. The family was advised to talk to her as much as possible in English and to drop Hebrew. Within four weeks, she began speaking English and had lost all ability to speak in Hebrew, the first language that she had spoken so well - despite the fact that at that time the family had taken a decision to speak Hebrew at home to maintain fluency in both languages.

As a pre-school child, the youngest of three, Dana had encountered grave difficulty in the acquisition of two languages. She began to speak late and when she did so, confused syllables in words — some from one language and some from the other. She also spoke sentences that were a confusion of the two languages. Her frustration level was clear to teachers and parents particularly when she objected voraciously to attending pre-school and the early months of primary school. She was often in trouble for not paying attention, could not follow instructions easily, could not learn nursery rhymes and found story time difficult — until teachers sat her in front of the reader so that she could lip read. She enjoyed story reading on a one to one basis when there was quiet in the room. She was described as a child who lacked confidence when

young, but her social skills were well developed, making her popular with children and teachers. She found mental arithmetic difficult, particularly the acquisition of times tables — even though she is today a good mathematician. She still finds the memorisation of formulae tedious and the subject with which she has the most difficulty is unsurprisingly, that of modern foreign languages, French. She particularly finds listening to the language spoken at speed on a pre-recorded tape the most difficult component of all. There is a great disparity between ability in her written work and that in aural and oral exercises.

Despite considerable academic success, her greatest weaknesses are in modern foreign language learning and the comprehension in English of language spoken at speed - which affects her across the curriculum. She explains that one word runs into another and particularly when there is background noise, language sounds confusing . When given the opportunity to listen to information presented in this way for a second time, she says that she finds it no easier unless it is slowed down and there is limited background noise. She tells of the tiredness experienced in the learning process due to the excessive amount of concentration needed to be an effective learner.

She is a bright and popular girl who is successful at her studies. Her behaviour is exemplary. However, when not given extra time by her teachers in a test situation, she feels a sense of frustration due to the stress placed upon her to work quicker . When reading she explains that she needs to hear her own voice as she feels that that is the best way for her to comprehend that which she is reading.

She finds school tiring; she spends a great deal of time doing her homework which she produces at a very high level — commensurate with that which would be expected in a girl with a high I.Q. Over the course of time, her spelling has improved dramatically, only showing particular weaknesses when she does not hear the individual phonemes clearly. She recalls mis-hearing words when she was young and becoming embarrassed by them:

Her stories include: Mum, why are prunes dangerous?

What she actually meant was piranhas .

And the asking for lavina ice-cream, when she actually wanted vanilla .

At sixteen she is beginning to consider a career. She has aspirations to attend university like her siblings. Despite her clear high ability, when in Hebrew speaking company has no recollection of the language whatsoever. Although her hearing today is within the parameters of normal, she still has attacks of chronic OM, particularly after swimming, which cause her immense pain and leave her hearing significantly impaired for many weeks after each bout.

Appendix Two

Key to Information in Study 1

Languages:

E = English
H = Hebrew
A = Arabic
G = German
I = Italian
F = French
R = Russian
P = Polish
Y = Yiddish
C = Czech
Hungarian
Bulgarian
Guj = Gujarati
Hindi
Greek
Dutch
Chinese

Spoken English/Reading/Written English

G = good

F = fair

P = poor

Neglig = negligible

Nil

General Success

G = good

Av = average

P = poor

Appendix Three

Otitis Media Glossary of Terms

¥ Acute suppurative otitis media (AOM): Clinically identifiable infection of the middle ear of sudden onset and short duration. Synonyms include acute otitis media and acute purulent otitis media.

¥ Chronic suppurative otitis media, or chronic otitis media: Chronic otorrhea through a tympanic membrane perforation.

¥ Otitis Media: An inflammation of the middle ear. This general term encompasses all the diseases of the OM continuum.

¥ Secretory Otitis Media: Presence of middle ear effusion behind an intact tympanic membrane without acute signs or symptoms. This category includes the clinically non-infectious forms of otitis media. Common symptoms are chronic otitis media with effusion, otitis media with effusion, nonsuppurative otitis media, serious otitis media, mucoid otitis media, catarrh, serotympanum, and mucotympanum.

¥ A tympanogram: shows how well the eardrum is working and what the pressure is like in the middle ear. A sound probe is placed in the ear canal and registers how hearing is affected by fluid in the middle ear.

Appendix Four:

Questionnaire to Study 2 Parents

General Information:

Name of child:

Address:

Telephone Number:

Date of Birth:

Age at Assessment:

Others in family with similar problems:

Medical Information:

Birth weight:

Premature birth (3 weeks or more):

Difficulties at birth:

Allergies:

Breast fed/bottle fed:

Significant bouts of ear infections: Yes/No

Seasonal ear infections: Yes/No

Age of first medical intervention:

Number of sets of grommets inserted:

Bed wetting: Yes/No Age stopped:

Difficulties leading to need for assessment:

Behavioural problems: Home/School

Weakness in learning to read:

Weakness in learning to write:

Spelling difficulties:

Weakness in learning by rote, e.g. times tables:

Concentration difficulties:

Organisational difficulties at home:

Forgetful: Yes/No

Inability to remember/understand/homework:

Speech difficulties: late/unclear/not age appropriate/confusion between two or more languages

Behavioural:

Hearing — Needs TV turned up: Yes/No

Hears clearly in a noisy background: Yes/No

Daily behaviour:

[a] quiet/introverted

[b] noisy/extroverted

[c] anxious

[d] naughty

[e] aggressive

Has the child always behaved this way? Yes/No

If no, what was the onset? School pressure/ hearing difficulty/family difficulties/other

Weaknesses with short/long term memory?

Clumsy behaviour? Yes/No

Balance difficulties:

[a] Riding a bicycle: Yes/No

[b] Playing with a ball: Yes/No

[c] At the dinner table: Yes/No

[d] Crawled as a baby: Yes/No

Enjoys fun fair rides: Yes/No

Gets on well with siblings/friends: Yes/No

Key to Parent Questionnaire

A = INITIALS OF CHILD
B = AGE
C = OTHERS IN FAMILY WITH SIMILAR PROBLEMS
D = BIRTH WEIGHT
E = PREMATURE BY NUMBER OF WEEKS
F = BIRTH DIFFICULTIES
G = ALLERGIES
H = BREAST FED
I = BOTTLE FED
J = SIGNIFICANT EAR INFECTIONS
K = SEASONAL EAR INFECTIONS
L = AGE AT FIRST MEDICAL INTERVENTIONS
M = NUMBER OF TIMES GROMMETS INSERTED

N = BED WETTING
O = BEHAVIOUR PROBLEMS (HOME)
P = BEHAVIOUR PROBLEMS (SCHOOL)
Q = WEAKNESS IN LEARNING TO READ
R = WEAKNESS IN LEARNING TO WRITE
S = WEAKNESS IN LEARNING TO SPELL
T = WEAKNESS IN ROTE LEARNING
U = CONCENTRATION DIFFICULTIES
V = ORGANISATIONAL DIFFICULTIES
W = FORGETFUL
X = NOT UNDERSTAND HOMEWORK
Y = NOT REMEMBER HOMEWORK
Z = SPEECH DIFFICULTIES
AA = LATE SPEECH ONSET
AB = UNCLEAR SPEECH
AC = SPEECH AGE INAPPROPRIATE
AD = CONFUSION OF SPOKEN LANGUAGES
AE = REQUIRES TV TO BE LOUD
AF = HAS TROUBLE HEARING IN BACKGROUND NOISE
AG = BEHAVIOUR: QUIET
AH = BEHAVIOUR: NOISY
AI = ANXIOUS
AJ = NAUGHTY
AK = AGGRESSIVE
AL = HAS THE CHILD ALWAYS BEHAVED IN THIS WAY?
AM = IF BEHAVIOUR DIFFICULT, WAS ONSET CAUSED BY SCHOOL PRESSURE?
AN = IF BEHAVIOUR DIFFICULT, WAS ONSET CAUSED BY HEARING DIFFICULTIES?
AO = IF BEHAVIOUR DIFFICULT, WAS ONSET CAUSED BY FAMILY DIFFICULTIES?
AP = WAS ONSET OF DIFFICULT BEHAVIOUR CAUSED BY REASONS OTHER THAN AM , AN OR AO ABOVE?
AQ = WEAKNESS IN LONG TERM MEMORY
AR = WEAKNESS IN SHORT TERM MEMORY
AS = CLUMSY
AT = BALANCE DIFFICULTIES — BICYCLE
AU = BALANCE DIFFICULTIES — BALL
AV = FREQUENT SPILLAGES AT DINNER TABLE
AW = SHUFFLED AS A BABY RATHER THAN CRAWLED
AX = FINDS FAIRGROUND RIDES DIFFICULT
AY = GETS ON WELL WITH FRIENDS
AZ = GETS ON WELL WITH SIBLINGS

Appendix Five:

Questionnaire to Study Three Teachers

General Information:

Name of child:

Address:

Telephone Number:

Date of Birth:

Age at Assessment:

Attitude to learning:

Keen/disinterested/work appears beyond child s capabilities

General comments by other teachers - attitudinal:

[a] art/drama: good/poor
[b] sciences: good/poor
[c] languages (spoken): good/poor
[d] languages (written): good/poor
[e] P.E.: good/poor

Organisational skills: good/poor

Sequencing skills: good/poor

Does writing seem to reflect knowledge? Yes/No

Behavioural problems:

School: Yes/No

Weakness in learning to read: Yes/No

Weakness in learning to write: Yes/No

Spelling difficulties: Yes/No

Weakness in learning by rote, e.g. times tables: Yes/No

Concentration difficulties: Yes/No

Organisational difficulties: Yes/No

Forgetful: Yes/No

Inabiiity to remember/understand/homework:

Difficulty remembering/understanding classwork:

Speech difficulties: unclear/not age appropriate/confusion between two or more languages

Behavioural:

Hears clearly in a noisy background: Yes/No

Daily behaviour:

[a] quiet/introverted
[b] noisy/extroverted
[c] anxious
[d] naughty
[e] aggressive
[f] appears lacking in self-esteem

Has the child a history of difficult behaviour? Yes/No

If yes, what might have been the catalyst? School pressure/ hearing difficulty/family difficulties/difficulty with specific staff/other?

Weaknesses with short/long term memory?

Clumsy behaviour? Yes/No

Has untidy/laboured handwriting?

Balance difficulties: In P.E. Yes/No

Gets on well with friends: Yes/No

Gets on well with staff: Yes/No

Key to Teacher Questionnaire:

A = INITIALS
B = AGE
C = ATTITUDE: KEEN
D = ATTITUDE: DISINTERESTED
E = ATTITUDE: WORKS BEYOND CAPABILITY
F = GENERAL COMMENTS: ART/DRAMA: GOOD
G = GENERAL COMMENTS: ART/DRAMA: POOR
H = GENERAL COMMENTS: SCIENCES: GOOD
I = GENERAL COMMENTS: SCIENCES: POOR
J = SPOKEN LANGUAGES: GOOD
K = SPOKEN LANGUAGES: POOR
L = WRITTEN LANGUAGES: GOOD
M = WRITTEN LANGUAGES: POOR
N = P.E.: GOOD
O = P.E.: POOR
P = ORGANISATIONAL SKILLS: GOOD
Q = ORGANISATIONAL SKILLS: POOR
R = SEQUENCING SKILLS: GOOD
S = SEQUENCING SKILLS: POOR
T = DOES WRITING REFLECT KNOWLEDGE?
U = ARE THERE BEHAVIOUR PROBLEMS IN SCHOOL?
V = WAS THERE A WEAKNESS IN LEARNING TO READ?
W = WAS THERE A WEAKNESS IN LEARNING TO WRITE?
X = IS THERE EVIDENCE OF SPELLING WEAKNESSES?
Y = IS ROTE LEARNING DIFFICULT?
Z = ARE THERE CONCENTRATION DIFFICULTIES?
AA = IS THE CHILD FORGETFUL?
AB = INABILITY TO REMEMBER HOMEWORK?

AC = INABILITY TO UNDERSTAND HOMEWORK?
AD = DIFFICULTY REMEMBERING WORK DONE IN CLASS?
AE =DIFFICULTY UNDERSTANDING WORK DONE IN CLASS?
AF = SPEECH DIFFICULTIES: UNCLEAR
AG = SPEECH DIFFICULTIES: NOT AGE APPROPRIATE
AH = SPEECH DIFFICULTIES: CONFUSION OF LANGUAGES
AI = HAS DIFFICULTY HEARING IN NOISY BACKGROUND
AJ = BEHAVIOUR: QUIET/INTROVERTED
AK = BEHAVIOUR: NOISY/EXTROVERTED
AL = ANXIOUS
AM = NAUGHTY
AN = AGGRESSIVE
AO = LACKING IN SELF-ESTEEM
AP = ARE THERE NOTICEABLE BEHAVIOURAL CHANGES?
AQ = CAUSE OF CHANGE? SCHOOL PRESSURE
AR = CAUSE OF CHANGE? HEARING DIFFICULTY
AS = CAUSE OF CHANGE? FAMILY DIFFICULTIES
AT= CAUSE OF CHANGE? STAFF INCOMPATABILITY?
AU = WEAKNESS WITH LONG TERM MEMORY
AV = WEAKNESS WITH SHORT TERM MEMORY
AW = CLUMSY BEHAVIOUR
AX = UNTIDY/LABOURED HANDWRITING
AY = BALANCE DIFFICULTIES: P.E.
AZ = POOR SOCIALISATION SKILLS: PEERS
BA = POOR SOCIALISATION SKILLS: STAFF

If you are dyslexic and bi-/multilingual, or if you know such a person who is willing to assist with our survey, please copy this form, complete and return it to:

Lindsay Peer,

British Dyslexia Association,

98, London Road,

Reading, RG1 5AU

U.K.

All contributions will be regarded as anonymous.

All contributors are warmly thanked for their contribution to the research.

I am completing this form relating to myself. (Please tick) ----------

I am completing this form on behalf of someone else. (Please tick)-

Background

Date of completing this form: ----------

b) Name (optional): ----------

Current Age (circle): 12-17 / 7-21 /21-30 /31-40 /41-50 /51-60 /Over 60

Gender (tick): Male:---------- Female:----------

Current address (tick): UK: England/Ireland/Scotland/Wales/ beyond UK. If beyond UK please note country----------

Are you are a school student? (tick)--------An adult? (Tick)--------

If adult, please note occupation ----------

Currently in a job---------- not in work----------

What is your first language(s)? [mother tongue]? ----------

What is your School/College/Work language?* ----------

For all languages please note whether fluent +++, competent++ or struggler+

Other languages spoken?* ----------

Languages read?*----------

Languages written?*----------

Are there other dyslexic people in your family (whether or not they are formally identified)? Yes----- No------ Not Known --------

Identification/ Diagnosis

At what age did you first become aware of dyslexia?

At what age did you first become aware of being dyslexic?

Was dyslexia identified informally------- or formally?----------

If assessed, how old were you at that time?----------

By whom were you tested, e.g. a school psychologist/specialist teacher?----------

In what language(s) were you assessed?----------

Where were you assessed? ---- school -----college-----clinic-----home-----

What are your areas of special strength/ability? (give test results if you wish):-----

What are your area of specific difficulty?(give test results if you wish): ----------

Learning Support

Did you have any learning support in primary school (5-12) Yes---- No----

If yes, what kind of support? In class ------- withdrawn----- other--------

If yes, in what language was support given?----------

Did you have any learning support in secondary school (12-17)? Yes No---

If yes, what kind of support? In class------withdrawn------- other-------

If yes, in what language was support given?----------

What kind of support was most helpful during compulsory schooling years (Pr+Sec)?

What kind of help at home is/was most effective during school years?

What advice would you offer to teachers regarding support in school/community for school age students:

Do/did you have any learning support at college or university? Yes--- No---

If yes, what kind of support? In class-----withdrawn---- other (please specify)-------

If yes, in what language was the support given?

Do/did you have any kind of learning support at work? Yes---No-----

If yes, what kind of support? ----------

Was the support appropriate? Please comment----------

Family Dyslexia Support

Are/were you/your family members of a local dyslexia support group?-Yes----- No------

If yes, in what ways did you/they find this helpful?----------

What advice would you now offer to dyslexia support groups?----------

Other

Please add/attach any further information/advice which you think may be helpful for others regarding policy decision-making or practical support? ----------

---

Thank you very much for taking time to share your views and experience.

Appendix 7. Means on the 1000 children data (groups are OM and non-OM)
Df=997

1	gender	age	Eng1st	Nlang	Dys- psy	spokEng	Writt Eng	Read Eng	Gen Succ	Beh Probs	Sig Ear Inf	OMtot	Sp Aud Pro
mean OM	1.34	13.24	0.39	2.54	1.61	2.12	0.95	1.36	1.51	0.11	1.00	1.81	0.14
mean OK	1.28	13.96	0.31	2.49	1.51	2.22	1.20	1.66	2.08	0.02	0.00	0.00	0.00

Means on the parental data (groups are OM and non-OM)
Df=62

number	OM	age	famil1 similar	birth weight	wks premature	birth diffs	birth diffs (cause)	birth diffs	allergies	breast fed	bottle fed	sig.earinfec	seasoninfe
mean OK	0.00	12.40	0.67	1.87	1.13	0.33	0.00	0.27	0.33	0.47	0.53	0.27	0.00
mean OM	1.00	10.13	0.77	1.77	1.33	0.23	0.00	0.21	0.58	0.23	0.77	0.96	0.91

age1stmed	no.grommets	bedwetting	behavprobH	behavprobS	Wlearnread	Wlearnwrite	Wspelling	Wrotelearn	concentdiff	orgdiffs H	forgetful	nounderHW	norememHW	speech diff
2.00	#DIV/0!	0.40	0.33	0.40	0.67	1.00	1.00	0.53	0.47	0.40	0.33	0.27	0.33	0.33
3.06	2.15	0.48	0.58	0.52	0.85	1.00	1.00	0.98	0.96	0.90	0.92	0.25	0.56	0.33

late speech	unclear spee	noageappro	confulangs	hearTVup	hearOKnoise	Beh: quiet	beh:noisy	anxious	naughty	aggressive	always beh	Schpressu	hearingdiff	famdiff
0.67	0.07	0.80	0.93	0.20	0.33	0.53	0.33	0.53	0.27	0.20	0.60	0.47	0.00	0.14
0.85	0.33	0.60	0.75	0.50	0.88	0.40	0.60	0.88	0.54	0.23	0.44	0.63	0.44	0.06

other	weakLTMem	weakSTmem	clumsy	baldiffbike	baldiffball	dinnertable	shuffled	enjoyfairrides	getonfriends	getonsiblin
0.00	0.27	0.40	0.27	0.20	0.27	0.27	0.43	0.56	0.67	0.60
0.02	0.15	0.92	0.38	0.23	0.29	0.54	0.54	0.40	0.75	0.54

Appendix 7. Means on the teacher data (groups are OM and non-OM)
Df=62

number	OM	age	attitudkeen	attitudisint	worktoohard	artdramagd	artdramapo	scienceg	sciencepo	spoklangg	spoklangp	writlangg	writlangp
mean OK	**0.00**	**12.40**	**0.67**	**0.27**	**0.60**	**0.73**	**0.27**	**0.40**	**0.53**	**0.53**	**0.50**	**0.00**	**1.00**
mean OM	**1.00**	**10.13**	**0.63**	**0.38**	**0.44**	**0.75**	**0.25**	**0.42**	**0.58**	**0.40**	**0.58**	**0.02**	**0.92**

PE good	PE poor	org skill g	org skill p	sequen g	sequen p	writelesskn	behavprobs	wklearnread	weaklearwrit	spell diffs	weak rote	concen diff	forgetful	forget h/w
0.80	**0.20**	**0.53**	**0.47**	**0.60**	**0.53**	**0.87**	**0.40**	**0.60**	**0.93**	**1.00**	**0.47**	**0.53**	**0.47**	**0.27**
0.67	**0.33**	**0.29**	**0.65**	**0.31**	**0.65**	**0.08**	**0.58**	**0.79**	**0.98**	**1.00**	**0.98**	**0.73**	**0.81**	**0.52**

nounderh/w	forgetclass	nounderclas	unclearspe	spageinapp	confu-langs	porhearback	pers - quiet	pers - noisy	anxious	naughty	aggressive	porself est	beh change	schoolpress	hearing diffs
0.27	**0.47**	**0.27**	**0.07**	**0.60**	**0.93**	**0.13**	**0.60**	**0.33**	**0.47**	**0.33**	**0.20**	**0.67**	**0.20**	**0.33**	**0.00**
0.27	**0.50**	**0.38**	**0.35**	**0.75**	**0.65**	**0.85**	**0.48**	**0.52**	**0.79**	**0.44**	**0.31**	**0.94**	**0.67**	**0.58**	**0.60**

family diffs	spec staff	weakLTMEM	weakSTmem	clumsy	labourhand	balandiffPE	porsocialper	porsocialstaff
0.20	**0.07**	**0.13**	**0.53**	**0.27**	**0.33**	**0.27**	**0.27**	**0.27**
0.27	**0.25**	**0.08**	**1.00**	**0.50**	**0.58**	**0.25**	**0.56**	**0.46**

Appendix 8: Correlation Coefficients for Studies 1,2 and 3

Correlations for whole data sets (B) and split into OK and OM groups.

Items in bold are not significant

**= all the data was of one value (i.e. all 1) and correlation was not possible.

Study 1: 1 000 Child Sample: Correlations across (B) and within groups (OK/OM)						
No.	Item 1	Item 2	set	r	d.f.	p
11	Success at spoken English at School	English spoken at home as a first language	B	0.40	997	<0.0001
			OM	0.37	701	<0.0001
			OK	0.40	294	<0.0001
12		Number of languages spoken	B	-0.33	997	<0.0001
			OM	-0.28	701	<0.0001
			OK	-0.46	294	<0.0001
13	Number of languages spoken	Assessment carried out by educational psychologist rather than specialist diagnostic teacher	B	0.43	997	<0.0001
			OM	0.41	701	<0.0001
			OK	.049	294	<0.0001
14	Spoken English	Written English	B	0.39	997	<0.0001
			OM	0.38	701	<0.0001
			OK	0.39	294	<0.0001
15		Reading in English	B	0.34	997	<0.0001
			OM	0.30	701	<0.0001
			OK	0.44	294	<0.0001
16		General success at school	B	0.22	997	<0.0001
			OM	0.22	701	<0.0001
			OK	0.21	294	<0.001
17		Behaviour problems	B	-0.28	997	<0.0001
			OM	-0.33	701	<0.0001
			OK	**-0.07**	**294**	**NS**
18	Behaviour problems	Reading in English	B	-0.32	997	<0.0001
			OM	-0.34	701	<0.0001
			OK	**-0.05**	**294**	**NS**
19		Written English	B	-0.30	997	<0.0001
			OM	-0.36	701	<0.0001
			OK	**0.00**	**294**	**NS**
20	General success at school	Significant ear infection	B	-0.37	996	<0.0001
			OM	**	701	<0.0001
			OK	**	293	<0.0001
21		OM	B	-0.33	996	<0.0001
22	Significant ear infection OM	OM	B	0.83	997	<0.0001
23		Speed of auditory processing	B	0.22	997	<0.0001

			OM	**	701	<0.0001
			OK	**	294	<0.0001
24		Speed of auditory processing	B	0.54	997	<0.0001

Study 2: Parent Assessment: Correlations across (B) and within groups (OK/OM)						
No.	Item 1	Item 2	set	r	d.f.	p
17	OM	Age of child	B	-0.35	61	<0.01
18		Seasonal ear infection	B	0.85	61	<0.001
19		**Incidence of allergies**	**B**	**0.21**	**61**	**NS**
20		**Breast feeding**	**B**	**-0.22**	**61**	**NS**
21		Unclear speech	B	0.26	61	<0.05
22		Rote learning	B	0.57	61	<0.001
23		Concentration difficulties	B	0.57	61	<0.001
24		Organisational difficulties	B	0.51	61	<0.001
25		Forgetful	B	0.60	61	<0.001
26		Problems hearing in noisy background	B	0.53	61	<0.001
27		Turns the TV up to hear better	B	0.26	61	<0.05
28		**Behaviour problems at home**	**B**	**0.21**	**61**	**NS**
29		**Noisy behaviour**	**B**	**0.23**	**61**	**NS**
30		Anxiety	B	0.36	61	<0.01
31		Hearing difficulties	B	0.40	61	<0.01
32		Weak STM	B	0.54	61	<0.001
33		**Problems with balance at dinner table**	**B**	**0.24**	**61**	**NS**
34		Significant ear infection	B	-0.72	61	<0.01
35	Another member of the family experiencing similar difficulties	Bed wetting	B	0.32	61	<0.05
			OK	0.58	13	<0.05
			OM	**0.23**	**46**	**NS**
36		**Behaviour problems at home**	**B**	**0.25**	**61**	**NS**
			1 OK	**0.20**	**13**	**NS**
			OM	**0.24**	**46**	**NS**
37		**Rote learning**	**B**	**0.22**	**61**	**NS**
			2 OK	**0.47**	**13**	**NS**
			OM	**-0.08**	**46**	**NS**

38		Forgetful	B	0.30	61	<0.05
			3 OK	**0.50**	**13**	**NS**
			OM	**0.19**	**46**	**NS**
39		Noisy behaviour	B	0.34	61	<0.01
			4 OK	**0.20**	**13**	**NS**
			OM	0.37	46	<0.01
40		Naughty behaviour	B	0.26	61	<0.05
			5 OK	**0.11**	**13**	**NS**
			OM	0.29	46	<0.05
41		Weak STM	B	0.33	61	<0.01
			OK	0.58	13	<0.05
			6 OM	**0.19**	**46**	**NS**
42		When a baby: shuffled on bottom rather than walking	B	0.39	61	<0.01
			OK	0.65	13	<0.01
			OM	0.29	46	<0.05
43	**Low birth weight**	**Number of grommets inserted**	**OM**	**-0.21**	**46**	**NS**
44		Had difficulties learning to read	B	-0.31	61	<0.01
			OK	**	**	All 0
			OM	**-0.17**	**46**	**NS**
45		Late speech	B	-0.32	61	<0.01
			OK	-0.61	13	<0.05
			7 OM	**-0.17**	**46**	**NS**
46		Unclear speech	B	-0.35	61	<0.01

		8 OK	**-0.38**	**13**	**NS**
		OM	-0.35	46	<0.05
47	Weak LTM	B	-0.57	61	<0.01
		OK	-0.60	13	<0.05
		OM	-0.58	46	<0.001
48	Weak STM	B	-0.25	61	<0.05
		9 OK	**-0.26**	**13**	**NS**
		OM	**-0.26**	**46**	**NS**
49	Balance difficulties with a ball	B	-0.27	61	<0.05
		10 OK	**-0.36**	**13**	**NS**
		OM	**-0.23**	**46**	**NS**
50	Seasonal ear infections	B	0.60	60	<0.001
		OK	**	**	All 0
		11 OM	**-0.06**	**45**	**NS**
51	**Anxiety**	**B**	**0.23**	**61**	**NS**
		12 OK	**-0.04**	**13**	**NS**
		OM	**-0.08**	**46**	**NS**
52	Hearing difficulties	B	0.28	61	<0.05
		OK	**	**	All 0
		OM	-0.03	46	NS
53	Weak STM	B	0.42	61	<0.01

			13 CK	**-0.19**	**13**	**NS**
			OM	**-0.26**	**46**	**NS**
54		Enjoyment of fun fair	**B**	**-0.22**	**57**	**NS**
			14 CK	**-0.10**	**9**	**NS**
			OM	**-0.26**	**46**	**NS**
55	Number of sets of grommets inserted	Bed wetting	OM	0.32	46	<0.05
56		Behav problems at home	OM	0.34	46	<0.05
57		Parents understanding that there are serious behavioural problems at school	OM	0.57	46	<0.001
58		Had difficulties learning to read	OM	0.29	46	<0.05
59		**Had difficulties learning to write**	**OM**	**0.27**	**46**	**NS**
60		Concentration difficulties	OM	0.39	46	<0.01
61		**Inability to remember homework**	**OM**	**0.21**	**46**	**14.1.1 NS**
62		Speech not age appropriate	OM	0.33	46	<0.01
63		Naughtiness	OM	0.29	46	<0.05
64		Aggression	OM	0.36	46	<0.05
65		Clumsiness	OM	0.38	46	<0.01
66		Difficulties balancing a ball	OM	0.45	46	<0.01
67		**Clumsiness at the dinner table**	**OM**	**0.22**	**46**	**NS**
68		Not getting on with friends	OM	-0.41	46	<0.01
69		Not getting on with siblings	OM	-0.40	46	<0.01
XTR	Another member of the family experiencing similar difficulties	Anxiety	OK	-0.66	13	<0.001
XTR		Age first diagnosed	OK	-0.52	13	<0.05
XTR		Get on with sibs	OM	-0.402	46	<0.01
XTR		Noisy behaviour	OM	0.370	46	<0.01
XTR		Naughty behaviour	OM	0.294	46	<0.05
XTR		Behaviour probs Sch	OM	0.37	46	<0.01
XTR	Low birth weight	Gets on with friends	OK	0.53	13	<0.05
XTR		Speech diffs	OM	-0.35	46	<0.05

XTR		Rote learning	OM	-0.33	46	<0.05
XTR	Significant ear infection	Family difficulties	OM	-0.38	46	<0.05
XTR		Unclear speech	OM	-0.30	46	<0.05
XTR		Weak STM	OM	0.31	46	<0.05
XTR	Number of grommets inserted	Noisy behaviour	OM	0.40	46	<0.01

Study 3: Teachers Assessment: Correlations across (B) and within groups (OK/OM)						
No.	Item 1	Item 2	set	r	d.f.	p
16	OM	**Organisational skills**	**B**	**-0.22**	**61**	**NS**
17		Sequencing skills	B	0.25	61	<0.05
18		Problems writing that which they know	B	-0.75	61	<0.001
19		Rote learning	B	0.62	61	<0.001
20		Forgetful	B	0.33	61	<0.01
21		Unclear speech	B	0.27	61	<0.05
22		Confusion between languages	B	-0.27	61	<0.05
23		Poor hearing when there is background noise	B	0.66	61	<0.001
24		Anxiety	B	0.31	61	<0.05
25		Low self esteem	B	0.35	61	<0.01
26		Behavioural changes	B	0.40	61	<0.01
27		**Pressure at school**	**B**	**0.21**	**61**	**NS**
28		Hearing difficulties in class	B	0.52	61	<0.001
29		Poor STM	B	0.63	61	<0.001
30		**Laborious handwriting**	**B**	**0.21**	**61**	**NS**
31		Poor social skills with peer group	B	0.25	61	<0.05
32		Early reading found difficult	B	-0.25	61	<0.05
33		**Disinterested attitude to schoolwork**	**B**	**0.01**	**61**	**NS**
34		Age inappropriate language	B	-0.27	61	<0.05
35	Disinterested attitude at school	Poor behaviour	B	0.48	61	<0.001
			OK	0.74	13	<0.01
			OM	0.39	46	<0.01
36		Poor social skills with staff	B	0.40	61	<0.01
			OK	0.66	13	<0.01
			OM	0.32	46	<0.05
37	**Good at Art/ Drama**	**Forgetful**	**B**	**-0.19**	**61**	**NS**
			OK	**-0.04**	**13**	**NS**
			OM	**-0.28**	**46**	**NS**
38		**Noisy behaviour**	**B**	**-0.25**	**61**	**NS**
			OK	**0.11**	**13**	**NS**
			OM	-0.36	46	<0.05
39		Naughty behaviour	B	-0.25	61	<0.05
			OK	**0.11**	**13**	**NS**
			OM	-0.36	46	<0.05
40		Aggressive	B	-0.28	61	<0.05
			OK	**-0.08**	**13**	**NS**
			OM	-0.34	46	<0.05
41		Under pressure at school	B	-0.26	61	<0.05

			OK	**0.11**	**12**	**NS**
			OM	-0.39	46	<0.01
42	Good spoken language	Had difficulties learning to read	B	-0.37	61	<0.01
			OK	**-0.49**	**13**	**NS**
			OM	-0.31	45	<0.05
43	Poor spoken language	Poor social skills	B	0.29	61	<0.05
			OK	**0.32**	**12**	**NS**
			OM	**0.28**	**46**	**NS**
44	Problems writing that which they know	Rote learning	B	-0.57	61	<0.001
			OK	**-0.42**	**13**	**NS**
			OM	**0.04**	**46**	**NS**
45		Forgetful	B	-0.36	61	<0.01
			OK	**-0.42**	**13**	**NS**
			OM	**-0.05**	**46**	**NS**
46		**Unclear speech**	B	**-0.23**	**61**	**NS**
			OK	**0.11**	**13**	**NS**
			OM	**-0.07**	**46**	**NS**
47		Poor hearing when there is background noise	**B**	-0.43	61	<0.001
			OK	**0.15**	**13**	**NS**
			OM	**0.13**	**46**	**NS**
48		Poor self esteem	B	-0.31	61	<0.05
			OK	**0.14**	**13**	**NS**
			OM	**-0.23**	**46**	**NS**
49		Weak STM	B	-0.58	61	<0.0001
			OK	**-0.37**	**13**	**NS**
			OM	**	**	All 1
50		Had difficulties learning to read	B	0.34	61	<0.01
			OK	**0.39**	**13**	**NS**
			OM	0.30	46	<0.05
51	Behaviour probs	Concentration difficulties	B	0.26	61	<0.05
			OK	**0.49**	**13**	**NS**
			OM	**0.15**	**46**	**NS**
52		Forgetful	B	0.30	61	<0.05
			OK	**0.33**	**13**	**NS**
			OM	**0.24**	**46**	**NS**
53		Forget homework	B	0.41	61	<0.001
			OK	**-0.19**	**13**	**NS**
			OM	0.54	46	<0.0001
54		Don't understand class	B	0.48	61	<0.001
			OK	**0.43**	**13**	**NS**
			OM	0.48	46	<0.001
55		**Unclear speech**	B	**0.23**	**61**	**NS**
			OK	**-0.22**	**13**	**NS**
			OM	**0.27**	**46**	**NS**
56		Aggressive	**B**	0.58	61	<0.0001

			OK	0.61	13	<0.05
			OM	0.57	46	<0.0001
57		Poor social skills with staff	B	0.65	61	<0.001
			OK	0.74	13	<0.01
			OM	0.61	46	<0.001
58		Poor social skills with peer	B	0.40	61	<0.01
			OK	**0.12**	**13**	**NS**
			OM	0.45	46	<0.01
59		Rote learning	B	0.31	61	<0.05
			OK	**0.34**	**13**	**NS**
			OM	**0.24**	**46**	**NS**
60	Concentration difficulties	Forgetful	B	0.66	61	<0.001
			OK	0.61	13	<0.05
			OM	0.67	46	<0.0001
61		Anxiety	B	0.25	61	<0.05
			OK	**0.34**	**13**	**NS**
			OM	**0.15**	**46**	**NS**
62		Naughty behaviour	B	0.43	61	<0.001
			OK	**0.38**	**13**	**NS**
			OM	0.44	46	<0.01
63		Aggressive	B	0.28	61	<0.05
			OK	**0.47**	**13**	**NS**
			OM	**0.21**	**46**	**NS**
64		Poor self esteem	B	0.25	61	<0.05
			OK	**0.19**	**13**	**NS**
			OM	**0.23**	**46**	**NS**
65		Clumsy	B	0.27	61	<0.05
			OK	**0.26**	**13**	**NS**
			OM	**0.23**	**46**	**NS**
66		Laborious handwriting	B	0.31	61	<0.05
			OK	**0.38**	**13**	**NS**
			OM	**0.25**	**46**	**NS**
67		**Balance difficulties in PE**	B	**0.24**	**61**	**NS**
			OK	**0.26**	**13**	**NS**
			OM	**0.24**	**46**	**NS**
68		Had difficulties learning to write	**B**	0.29	61	<0.05
			OK	**-0.11**	**13**	**NS**
			OM	**0.25**	**46**	**NS**
69	Age inappropriate language	**Do not understand class**	B	**0.24**	**61**	**NS**
			OK	**0.49**	**13**	**NS**
			OM	**0.15**	**46**	**NS**
70		Unclear speech	**B**	0.32	61	<0.01
			OK	**0.22**	**13**	**NS**
			OM	0.33	46	<0.05
71	Confuse languages	Poor spoken language	B	0.30	61	<0.05

			OK	**0.28**	**12**	**NS**
			OM	0.35	46	<0.05
72		Difficulties in family setup	B	0.29	61	<0.05
			OK	**0.13**	**13**	**NS**
			OM	0.35	46	<0.05
73		Problems writing that which they know	B	-0.43	61	<0.001
			OK	**0.15**	**13**	**NS**
			OM	**0.13**	**46**	**NS**
74	Poor hearing when there is background noise	Rote learning	B	0.40	61	<0.001
			OK	**0.03**	**13**	**NS**
			15 C M	**-0.06**	**46**	**NS**
75		Weak STM	B	0.41	61	<0.001
			OK	**-0.03**	**13**	**NS**
			OM	**	**	All 1

Appendix 9: Mann-Whitney U-tests for Studies 1, 2 and 3

Mann-Whitney U test results showing comparisions across the OM condition (OK/OM)

Items in bold are not significant

Study 1: 1 000 person sample)				
parametric	No.	Item	U	p
<0.05	**1**	**English 1st lang**	**96 477.50**	**0.0692**
	?	**Nlang**	**100 668.50**	**0.4176**
	2	Dys-psy	93 277.00	0.0097
<0.0714	**3**	**Spoken English**	**96 390.50**	**0.0661**
	4	Written English	82 791.50	<0.0001
	5	Read English	82 747.50	<0.0001
	6	General Success	60 845.00	<0.0001
	7	Behaviour Probs	94 257.50	<0.0001
	9	Speed of auditory processing	89 244.00	0.0004

Study 2: Parents Assessments				
parametric	No.	Item	U	p
	1	Age identified as dyslexic	191.50	0.0065
	2	Ear infection	111.00	<0.0001
	3	Seasonal ear infection	30.00	<0.0001
	4	Rote learning	199.50	0.0096
	5	Concentration diffs	183.00	0.0043
	6	Organisational diffs	181.50	0.0040
	7	Forgetfulness	150.00	0.0007
0.0430	**8**	**Unclear speech**	**264.00**	**0.1213**
0.0410	**9**	**Turning TV up**	**252.00**	**0.0814**
	10	Noisy background	165.00	0.0017
	11	Anxiety	237.00	0.0472
NS (0.0643)	**12**	**Naughtiness**	**261.00**	**0.1101**
NS (0.0680)	**13**	**Noisy behaviour**	**262.50**	**0.1156**

	14	Impression of hearing probs	202.50	0.0110
	15	STM probs	174.00	0.0027
NS (0.0643)	**16**	**Clumsiness**	**321.00**	**0.5291**

Study 3: Teachers Assessments				
parametric	No.	Item	U	p
	1	Age identified as dyslexic	191.50	0.0065
<0.05	**2**	**Organisation pro**	**273.00**	**0.1603**
	3	Writing that which they know probs	78.00	
	4	Rote learning	175.50	0.0029
	5	Forgetful	235.50	0.0445
<0.05	**6**	**Unclear Speech**	**256.50**	**0.0949**
	7	Age appropriate lang	306.00	0.3835
<0.05	**8**	**Confusion of langs**	**256.50**	**0.0949**
	9	Hearing in noise	100.50	
0.05	**10**	**Anxiety**	**243.00**	**0.0590**
<0.01	**11**	**Poor self esteem**	**262.50**	**0.1156**
	12	Behavioural change	192.00	0.0067
	13	Hearing probs	142.50	0.0004
	14	STM probs	192.50	0.0067
	15	Social skills with friends	253.50	0.0857