

2 The characteristics of dyslexia

Introduction

Dyslexia is a word used to describe a specific learning difficulty that can affect children in a variety of different ways. Although dyslexia in children is manifested primarily through literacy difficulties, it can also affect the child's everyday living. It is not always recognized that the challenges dyslexic children face are manifested also in a much wider context than those experienced during the mastering of literacy skills.

Teachers and parents will be aware of just how the dyslexic child's difficulties often extend beyond the learning situation. Some of the problems that appear to be associated with dyslexia, such as a weakness in short-term memory and slowness to process information, may also affect other situations where quick responses are required. Parents will be familiar with problem of their child forgetting seemingly simple instructions such as remembering to brush their teeth. Teachers will be familiar with dyslexic children who always seems to need extra time to put on their coats when it is home time. Dyslexic children may also have difficulties in their social relationships and in coping with new situations outside school.

The multifaceted nature of dyslexia together with the reactions to the frustrations of dyslexia is discussed in this chapter. The chapter begins by outlining some of the problems faced in identifying the signs of dyslexia.

Confusion identifying the signs of dyslexia

Although teachers are usually the first to identify the signs of dyslexia in a child, it is sometimes easy for a teacher to miss these indicators. One reason for this oversight may be that not all children who are dyslexic show obvious signs of it. Dyslexia is especially difficult to identify if the child is intelligent, well behaved and helpful in class. Intelligent children can also learn to use various strategies to avoid their failures being exposed; in other words, children can easily learn to 'mask' their dyslexia. Conversely, some dyslexic children can give the false impression that they are of low intelligence, especially if they are introverted in temperament and shy of social contact. In these circumstances, it is not unknown for parents to be informed by teachers that their children are of limited ability when the parents firmly have evidence to the contrary. Parents usually defend their children in this instance with comments asserting that their children are 'different at home'. Many children probably are 'different' in the security of the home environment where they can more easily be themselves.

It would be easy for parents to become defensive in the face of a teacher's opposite view of their child's ability. However, it is important that this tendency is resisted and that the parents remain positive. They should discuss these conflicting impressions with the child's teacher and give reasons why they feel their child is bright. Most teachers under these circumstances would be only too ready to listen to the parents. It may be advisable also to seek an interview with the school's Special Needs Coordinator (SENCO). Parents will find often that the SENCO is the person in the school who is most experienced and knowledgeable regarding the concept of dyslexia and its management.

Another major reason why it is not always easy to notice the signs of dyslexia is that it takes many different forms. Dyslexia is a multifaceted problem. Dyslexia can so often be mistaken for other learning difficulties that manifest similar signs.

Additionally, some children may appear to have dyslexia when the causes of their problems lie in other areas than dyslexia. For example, they may have simply missed much of the early years of schooling. One example of this was the situation of an eight-year-old girl referred to the author because she was manifesting signs of dyslexia. On further investigation it was discovered that the family had moved their

place of abode frequently and the child had attended six different schools. The reason for the girl's problems was that she had not stayed long enough in any one school to profit from the education provided.

A further problem in identifying possible signs of dyslexia is that all children, during the early stages of development, show some of the characteristics of dyslexia. It is only when a child is introduced to the learning of literacy skills and shows difficulties in acquiring these skills that dyslexia might be suspected. This is why one would be unlikely to be able to confirm dyslexia at the preschool age. For instance, most preschool children have yet to establish lateral dominance.

Once in school many children have still not established a lateral dominance. This is why children have a tendency to reverse letters when first introduced to reading and writing. This means that many children will show some characteristics of dyslexia during the first two years of schooling without necessarily being dyslexic. The difference for the child with dyslexia is that the characteristics may present as a cluster of behavioural signs seemingly not amenable to change. These signs persist over time and continue to cause difficulties with learning. Also, children with dyslexia may often manifest them to a more severe degree.

The characteristics of dyslexia

The following list describes some of the common characteristics of dyslexia in children:

- has difficulty reciting nursery rhymes;
- cannot easily remember verbal instructions;
- is unusually slow to write and to copy;
- has trouble distinguishing left from right;
- is easily distracted;
- has a short attention span;
- often demonstrates restless behaviour;
- shows little interest in reading;
- becomes embarrassed if asked to read in public;
- demonstrates a lack of confidence in own ability;
- easily forgets a sequence of steps, for example, tying shoelaces;
- often reverses the order of words or letters when speaking;

- easily forgets the order of events, for example, days of the week;
- shows poor ability for spatial relationships, for example, gets lost easily;
- has difficulty learning the alphabet;
- confuses the order of sounds, for example, says par cark instead of car park;
- has problems with general organization, for example, tidying up bedroom;
- often appears apathetic and unable to act without instructions;
- easily forgets verbal instructions;
- is often slow to respond to oral instructions;
- is slow to copy from a board or overhead projector;
- is slow to learn arithmetical tables.

It is important to note that this list is not exhaustive and that not all of these characteristics will be present in a single dyslexic child. Moreover, any one of these characteristics could be indicative of other specific learning difficulties, as discussed in Chapter 3. In order to ensure that the manifested characteristics are representative of dyslexia and not another type of problem, it is desirable that a qualified professional conducts the assessment. However, teachers and parents are in a good position to identify signs of possible dyslexia in the first instance, even if the final confirmation of dyslexia may need to be made by a qualified professional.

Lack of lateral dominance

A common symptom of dyslexia among the above list is a problem in choosing between left and right. All children experience this confusion until they have established lateral dominance. Eventually, most children establish a dominance of eye, hand and leg. They have a natural preference to use either their left side or their right side, according to which hemisphere in the brain has developed dominance (Harris, 1979). A minority of children usually termed 'ambidextrous' appear to be comfortable using either side. Sometimes, however, there is a developmental delay in the establishment of dominance and in some instances dominance is never properly established. Children with this

problem continue to have trouble selecting left from right. These are the children who often have a tendency to reverse letters such as 'b' and 'd'. They may eventually learn which is left and right and with practice will usually overcome the problem. However, there will usually be some delay when having to respond as the need to reverse things often persists. When dominance is not fully developed by the age of about seven or eight, the child is said to have lateral confusion, which may be a sign of dyslexia.

Weaknesses in working memory

There is agreement in the literature that a weakness in working memory is associated with dyslexia (Rack, 1994). Working memory is also referred to as short-term memory (Baddeley, 1986). A weakness in working memory is most commonly exemplified when children forget oral instructions. Parents of dyslexic children will probably remember their children having a problem in such instructions as requests to remember to brush their hair, wipe their shoes on the mat, and so on. Teachers will commonly find that the child with dyslexia has a problem recalling nursery rhymes and also with remembering verbal instructions. Unless teachers and parents understand this weakness in working memory, it can be frustrating for them when the child regularly forgets things.

There is often a difference between dyslexic children's rote short-term memory and their sequential memory. For example, dyslexic children may be able to repeat a series of unrelated numbers but find it difficult to remember their correct sequence when carrying out an arithmetical division sum. A difficulty with mathematics is common in dyslexic children, although not all dyslexic children have this problem. *Dyscalculia* is the term given to this problem with mathematics.

Possible weakness in visual memory

Although it is in the auditory sphere that the dyslexic child appears to have the main problem with short-term memory, there is some evidence that visual memory may also be a problem in some dyslexic children (Goulden and Snowling, 1991). However, rather than there being this link between visual memory *per se* and dyslexia, it has been

suggested that an apparent weakness in visual memory might be a symptom of a magnocellular impairment. Magnocells are neurones in the brain that are responsible for the synchronization of events. The role of the magnocells is discussed further in Chapter 6. In general, however, it would appear that dyslexic children have superior abilities in the visuo-spatial area and fewer problems in visual memory (Galaburda, 1989).

Behavioural consequences of dyslexia

Children with dyslexia may experience intense frustrations so would be at risk of developing behavioural difficulties. This is especially so if their dyslexia is not identified early and appropriate help given. The reason for this frustration is that they are continually expected to perform in areas they find difficult. The following frustration reactions are commonly observed if dyslexic children do not receive appropriate help.

Lack of confidence

A familiar consequence of consistent failure in schoolwork for many children is a general lack of confidence. Research has consistently shown a positive correlation between low self-esteem and a failure to achieve in schoolwork (Lawrence, 2006). Children with any kind of learning difficulty, including dyslexia, are always at risk of developing low self-esteem.

Children with low self-esteem achieve less and tend to demonstrate more behavioural difficulties. Low self-esteem affects not only children's ability to learn but it may also affect their performance in everyday pursuits. Without help, their failure in literacy skills tends to generalize to the whole personality, so that before long they begin to feel failures generally and lack confidence in most situations. This is why it is important that dyslexic children are identified early in their school career, before they have too many experiences of failure.

With prolonged failure, children with dyslexia will become discouraged and eventually stop trying to achieve. Their self-image is changed from perceiving themselves as children who can learn to children who fail. Eventually, they will accept this new negative self-image. If, on the other hand, their dyslexia is identified early,

they will receive appropriate teaching and their self-esteem will be maintained. The topic of self-esteem and dyslexia is discussed in more detail in Chapter 9.

External locus of control/learned helplessness

Locus of control is a learned characteristic and a term used to describe the extent to which people feel responsible for their behaviour, including their academic performance. It is a term coined by Rotter (1954) and refers to people's belief in their ability to control events in their life. Locus of control can be measured along a continuum with internal locus of control at one end of the continuum to external locus of control at the other end of the continuum. Most people lie in the middle of this continuum. Those people who consider their behaviour and their performance to be totally the result of factors outside of themselves are said to be *externally controlled*. Those who consider that they are totally responsible for their behaviour and their performance are said to be *internally controlled*. Clearly, extreme attitudes of both external and internal control would be unhealthy. This is because some things, such as chance events occurring, are out of our control. It is unhealthy to believe that everything that happens to us is a result of our own efforts. On the other hand, to believe that we have no control over anything at all is unrealistic and equally unhealthy.

Dyslexic children are always at risk of developing external control. Those who do not receive help with their dyslexia become discouraged. No matter how hard they may try, they do not seem to be able to succeed. Consequently, they begin to feel that they have no control over what happens to them. Eventually they become totally accepting of their inability to succeed and become apathetic, lacking the motivation to achieve. This characteristic of external control has been termed by Seligman (1991) as 'learned helplessness'.

Aggressive behaviour

A common reaction to frustration of any kind is aggression. The child with dyslexia is particularly at risk of experiencing frustration, both at school and at home. Without appropriate help, they are inevitably going to be frustrated by their inability to keep up with other children. At the very least this can make them appear 'bad-tempered', both at

school and at home. At home they may be regarded by their parents as noncompliant and be inappropriately chastised. In school, they may become outwardly aggressive and are often seen fighting other children. On the other hand, they may react with 'silent aggression', that is, by refusing to attempt to cooperate. Whether aggression is manifested outwardly in an extroverted fashion or silently in an introverted fashion depends on the innate temperament of the child. The temperamentally extroverted child would be the one most likely to shout and to pick a quarrel with other children. The temperamentally more introverted child would be more likely to react by sulking or withdrawing from the scene. Strategies for coping with these problems are discussed further in Chapter 9.

Summary

Dyslexia is a multifaceted learning difficulty. The fact that there are many characteristics of dyslexia is one reason why it is sometimes difficult to identify. Moreover, most young children will show some characteristics of dyslexia during the early stages of development. An example of this is a 2 year old child who has not yet achieved lateral dominance and so is likely to use both hands interchangeably. If the same child demonstrates this behaviour at about the age of 8 years, then it may well be a sign of dyslexia. Another reason why it is sometimes difficult to identify the signs of dyslexia is that some children are able to 'mask' their dyslexia by using various strategies to avoid being seen to fail.

As dyslexia may take many forms, simply describing a child as dyslexic communicates nothing about the nature of that child's difficulties. To describe a child as 'dyslexic' merely informs that the child has a learning difficulty. In order to understand a child's dyslexia it is important to know the age of the child, how the dyslexia is being manifested and to what degree.

Although dyslexia is generally considered mainly to be a language difficulty, it is important to recognize that the problems facing the dyslexic child are much wider than this. The difficulties faced by the child with dyslexia in the learning of literacy skills may also affect their everyday living. One example of this is the dyslexic child with a weakness in short-term memory who continually forgets to carry out delegated tasks. Unless the wider aspects of dyslexia are recognized,

the child will become frustrated and behavioural difficulties are likely to occur. Negative behaviour may also arise in the dyslexic child unless their dyslexia is identified early and appropriate help and support provided. These are strong arguments for all teachers and parents of dyslexic children to be sensitive to the signs of dyslexia and the needs of dyslexic children.

3 Defining dyslexia

Introduction

Although there is much agreement on the possible manifestations of dyslexia, there is no international consensus over its definition. Teachers and parents often ask, 'How common is dyslexia?' This is not an easy question to answer, because there are many different definitions of dyslexia. A variety of definitions have been used in incidence surveys and inevitably have produced different results. Consequently, we can only talk in terms of an estimated incidence of dyslexia. Despite the lack of consensus regarding the definition of dyslexia, most educationalists throughout the western world would agree that at least 10 per cent of the child population are probably dyslexic. In real terms, this means that you would expect to find one or two dyslexic children in every class in any school.

This chapter reviews the different definitions that exist and the probable reasons why defining dyslexia has been problematic. Three probable reasons for this difficulty are outlined. The first reason is due to the attempts to incorporate the multifaceted nature of dyslexia into a single definition. The different manifestations of dyslexia between children and adults most readily illustrate this problem defining dyslexia. The second reason is because of the different research perspectives taken in regard to the causes of dyslexia. The final reason is a result of trying to incorporate into a single definition other related specific learning difficulties that often overlap with dyslexia.

The chapter outlines, categorizes and critically examines current definitions of dyslexia. The chapter concludes with a suggested definition that incorporates previously defined descriptive and causal definitions with the addition of a discrepancy perspective.

The multifaceted nature of dyslexia

It has proved to be a challenge to embrace the presentation of the different characteristics of dyslexia in a single definition. Also, attempts to formulate a definition that would apply equally to adults and to children has proved to be an almost impossible task. There has been a tendency to assume that dyslexia is similar in both children and adults, when in fact there are several differences. The ways in which dyslexia is manifested in an adult compared with the ways in which it is manifested in the child are much more complex. Unlike the dyslexic child, learning to read is rarely the main problem for the adult. Most adult dyslexics have learned to read quite well even if they may continue to have problems with spelling. The adult may well show some of the problems with literacy like the dyslexic child but the adult with dyslexia has also to cope with demands in society outside school that the dyslexic child rarely encounters.

Different theoretical research perspectives

There appear to be three major theoretical research perspectives apparently impeding the formulation of a single definition of dyslexia. These perspectives can be grouped into the neurological/biological, the cognitive and the educational. They comprise both causal and descriptive definitions, each one reflecting a different field of research interest. Inevitably their conclusions have been reflected in their own definitions of dyslexia. Accordingly, the researchers themselves may have hindered the search for a consensus unwittingly. Although, without doubt, the different research perspectives taken have enhanced our general understanding of dyslexia, they may well have hindered a consensual definition. An attempt to accommodate the different research perspectives into a single definition of dyslexia continues to prove difficult.

Other specific learning difficulties overlapping with dyslexia

There are several specific learning difficulties that some authorities have attempted to incorporate into a definition of dyslexia. This

would seem to have unnecessarily complicated the formulation of a single definition. It is suggested here that these other specific learning difficulties be defined separately from dyslexia. Some of these difficulties can easily be confused with dyslexia as they manifest similar behaviours and may even accompany dyslexia. They can be grouped into cognitive, sensory and behavioural problems. Examples of each would be dyscalculia, scotopic sensitivity and attention deficit hyperactivity disorder (ADHD), respectively. These other specific learning difficulties are defined and discussed in more detail in Chapter 4.

Definitions of dyslexia

As well as the variety of definitions introduced by different research workers, formal definitions of dyslexia have been introduced by special interest groups such as the *British Dyslexia Association*, the *British Psychological Society*, *Dyslexia Action* and the *International Dyslexia Association*. An analysis of these definitions that have been generated by interest groups can be divided into the two major categories of causal and descriptive definitions. These are explained as follows.

Causal definitions

This type of definition has emerged from the research into the neurological and biological causes of dyslexia. Causal definitions have been concerned with the differences in brain functioning displayed by dyslexics. They are concerned with apparent deficits in the ways in which some people interpret and process information that comes in through the senses. The focus in this type of definition has been on the inclusion of abnormalities and deficits in brain functioning. This has been achieved using the functional magnetic resonance imaging (fMRI) technique in which the activated parts of the brain can be identified. The research into a genetic basis for dyslexia would also come into this category.

Descriptive definitions of dyslexia

This type of definition is concerned with the manifestations of dyslexia. These definitions have focused on difficulties with the processes of writing, reading, spelling and general organization of

everyday tasks. The description of weaknesses in levels of cognitive functioning such as phonological processing would come under this category and would also include the problems of working memory as displayed by dyslexics. A more detailed review of the research findings illustrating the different perspectives on dyslexia is presented in Chapter 6.

The main definitions that have been postulated over the years are outlined in this section. A critique is made for each definition generated by committees and individual professionals. The critique demonstrates how different research perspectives are reflected in the various definitions of dyslexia.

The World Federation of Neurology (1968)

This definition was one of the first to include both causal and descriptive perspectives.

Dyslexia is a disorder in children who, despite conventional classroom teaching experience, fail to attain the language skills of reading, writing and spelling commensurate with their intellectual abilities.

The word *disorder* implies a medical abnormality, which is clearly considered by the authors of this definition to be the cause of dyslexia. The definition also includes a descriptive type of definition when referring to educational attainments.

The International Dyslexia Association

This definition is a further example of one that incorporated both causal and descriptive aspects. It also takes the view that dyslexia is caused by a neurological abnormality. It is perhaps more inclusive of the signs of dyslexia than the previous definitions. However, this definition would not appropriately describe the adult with dyslexia.

Dyslexia is a specific learning disability that is neurological in origin, often familial. It is characterised by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is

often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience can impede growth of vocabulary and background knowledge.

British Dyslexia Association

This is the first definition to recognize that dyslexia may produce strengths as well as weaknesses. It is a *descriptive* definition of dyslexia. It does not attempt to include possible neurological or biological causes of dyslexia.

Dyslexia is best described as a combination of abilities and difficulties that affect the learning process in one or more of reading, spelling, writing. Accompanying weaknesses may be identified in areas of speed of processing, short-term memory, sequencing and organisation, auditory and/or visual perception, spoken language and motor skills. It is particularly related to mastering and using written language, which may include alphabetic, numeric and musical notation. Some dyslexics have outstanding creative skills. Others have strong oral skills. Some have no outstanding talents. They all have strengths. Dyslexia can occur despite normal intellectual ability and teaching. It is independent of socioeconomic or language background.

This definition makes no reference to the more complex difficulties faced by the adult as opposed to the child with dyslexia. Also, as it stands, it could apply equally to people with a general learning difficulty. It is not clear that this definition refers to a specific learning difficulty.

Dyslexia Action (formerly the British Dyslexia Institute)

This definition of dyslexia encompasses both causal and descriptive definitions and is inclusive of most of the difficulties faced by a dyslexic child.

Dyslexia causes difficulties in learning to read, write and spell. Short-term memory, mathematics, concentration, personal

organisation and sequencing may also be affected. Dyslexia usually arises from a weakness in the processing of language-based information. Biological in origin, it tends to run in families, but environmental factors also contribute. Dyslexia can occur at any level of intellectual ability. It is not the result of poor motivation, emotional disturbance, sensory impairment or lack of opportunities, but it may occur alongside any of these. The effects of dyslexia can be largely overcome by skilled specialist teaching and the use of compensatory strategies.

As with the previous definition, it is an optimistic definition, recognizing that dyslexics often have strengths as well as weaknesses. However, this definition appears to be over-optimistic, especially when considering adults with dyslexia. The basis of this statement is the belief that dyslexia can be overcome. It is agreed that compensatory strategies can help but from available evidence it seems that most dyslexics will always have weaknesses in short-term memory that can continue to affect their lives in general.

British Psychological Society

This is a wholly descriptive definition and notable for its brevity. It may be deliberately brief with the purpose of providing a practical definition that avoids reference to possible causes of dyslexia.

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

This definition is purposely narrow and although it may well have its uses when applied to children, it most certainly does not adequately define the problem faced by adults. Moreover, as with the British Dyslexia Association's definition, it does not distinguish between children with a general learning difficulty as opposed to those with a specific learning difficulty. However, as a descriptive definition of dyslexia, it avoids the controversy over the origins of dyslexia and offers a positive view of dyslexia with a focus on the remediation of the child's difficulties.

Individual professionals

McLoughlin et al. (2002) provide a further example of a definition that comprises both causal and descriptive aspects of the problem.

Developmental dyslexia is a genetically inherited and neurologically determined inefficiency in working memory, the information processing system fundamental to performance in conventional educational and work settings. It has a particular impact on verbal and on written communication as well as on organisation, planning and adaptation to change.

This definition is probably the most accurate and concise definition of dyslexia to date. It describes the difficulties experienced as being undetermined by a weakness in working memory. It also includes possible neurological and genetic determinants. It also accurately refers to the manifestations of the problem, measured in literacy performance. Finally, it is a definition that could be usefully applied to both children and adults. The only criticism of this definition is that it would not distinguish between those with a general learning difficulty and those with a specific learning difficulty.

The critique

There are two main criticisms that can be applied to all the above definitions of dyslexia. First, apart from the McLoughlin et al. (2002) definition, they all clearly refer to dyslexia as a childhood condition with no reference to adult dyslexia. The fact that the challenges faced by adults with dyslexia are more complex than those faced by children is ignored in these other definitions. As emphasized by McLoughlin et al. (2002), dyslexia in the adult is rarely manifested solely by literacy difficulties. As stated earlier, the problems faced by the adult with dyslexia are much more complex than those of children. Although dyslexia in a child is manifested mainly by difficulties in learning the basic literacy skills, dyslexia in the adult presents challenges to the individual also in the wider social world. The adult dyslexic has to display competence not only in literacy skills but also in the areas of finance, employment and communication. Although dyslexia in children is also manifested in their general environment outside school, children are not usually subjected to the same environmental pressures as adults.

It is claimed in this book that an accurate definition of dyslexia should comprise not only causal and descriptive perspectives but also a third one, namely, a discrepancy perspective. The discrepancy referred to is the presence of a significant discrepancy between working memory and reasoning ability in either verbal or non-verbal spheres. Reasons for including memory and reasoning ability in a definition of dyslexia are presented below. Before presenting the definition, working memory and the significance of a discrepancy between working memory and reasoning ability are explained.

Defining working memory

Working memory refers to the processing of images, events and ideas transmitted through the five senses. The concept of the human memory is one of the most highly researched and complex areas of investigation in the field of psychology (Baddeley, 1986). There are many models postulated to explain different kinds of memory. However, the primary division of memory is into short- and long-term memory. Each involves the storing of information from all the senses. Memory traces from the senses can be brought into consciousness without doing anything with it. However, when short-term memory is activated and is involved in processing information, it is referred to as 'working memory'.

An example of working memory would be the process involved when engaged in mental arithmetic. The successful completion of a mental arithmetic problem involves several intellectual tasks. It is necessary to be able to record the information through the auditory receptors, to understand the information, to retain the information, to manipulate the information and finally to verbally express the answer. Both auditory short-term memory and intelligence are involved when completing a mental arithmetic problem. This is why an assessment of mental arithmetic ability is a useful part of an assessment for possible dyslexia.

Weakness in working memory in a definition of dyslexia

There is ample research evidence suggesting an association between working memory and dyslexia that would support the inclusion of

a weakness in working memory as part of a definition of dyslexia. Perfetti (1985) found that tests of working memory in young children were predictive of their future reading ability. Nicolson et al. (1992) found a deficit among dyslexics in the part of the cerebellum that involves working memory. Stanovich et al. (1997) found that children with phonological difficulties had more working memory deficits than a matched group without phonological difficulties. Finally, Rack (1994) refers to inefficiency in short-term memory as a frequent characteristic of dyslexia.

Most definitions of dyslexia recognize that a weakness in working memory is a common characteristic of dyslexia. This holds true even if authors have sometimes differed in the prominence that they have given to the weakness in working memory in arriving at a definition of dyslexia. So it would not be unreasonable to include a weakness in working memory in a definition of dyslexia.

The inclusion of a discrepancy between working memory and reasoning ability in a definition of dyslexia is further supported in a study by the author, soon to be published. This work consisted of an analysis of the test results from a sample of 447 students in further and higher education. This sample of students had been referred over an eight-year period for testing for possible dyslexia. The majority of these referrals were made following various college screening procedures that had shown the students had difficulties with academic work. Subsequent testing on the *Wechsler Intelligence Scales* revealed that 94.6 per cent of the students assessed as having a significant discrepancy between scores on subtests measuring working memory and scores on subtests tests measuring reasoning ability in either verbal or non-verbal spheres. The remaining 5.4 per cent were seen to have other reasons for their learning difficulties. These other difficulties included lack of ability, motivational factors, scotopic sensitivity or emotional problems.

Discrepancy definitions of dyslexia

Since the work of Stanovich and Stanovich (1997), arguments for the inclusion of intelligence in a definition of dyslexia have been shown to be invalid. Stanovich rightly showed that there was no correlation between a reading disability and a child's measured intelligence. As recognized by Miles and Miles (1999), children at any level of intelligence could have a specific learning difficulty. As a result of this kind of research evidence, discrepancy definitions of dyslexia have been

discredited. However, there would appear to be grounds for the inclusion of a different discrepancy in a definition of dyslexia. It is suggested here that a definition of dyslexia should include a discrepancy between reasoning ability in either the verbal or the non-verbal spheres and working memory.

Tests of reasoning ability and working memory often form part of a test of global intelligence. Measures on these subtests would be important in deciding whether a child with literacy difficulties would be considered to be dyslexic or simply had a general learning difficulty. There would need to be a discrepancy between working memory and reasoning ability for the child to be considered as possibly dyslexic. If the child with literacy difficulties had a weakness in both reasoning ability and working memory, then it would be more likely that the child had a general learning difficulty. In this case, there would probably be deficits also in other areas of mental functioning, so the term 'dyslexia' would not be applied.

A new definition of dyslexia

A new definition of dyslexia is proposed in this book. It incorporates aspects of other existing definitions, especially that proposed by McLoughlin et al. (1994) but with the addition of a significant discrepancy between working memory, reasoning ability and the speed of processing information.

The task of obtaining a consensus on a definition of dyslexia has often been made difficult by the existence of other related conditions such as dyscalculia, scotopic sensitivity syndrome, dyspraxia, and so on that are often subsumed under the umbrella of dyslexia. However, to be accurate and also to be useful, it is suggested that a definition of dyslexia should exclude these other related conditions. The definition of dyslexia suggested here does not include these other specific learning difficulties.

In the light of the foregoing research and the various theories of dyslexia that have emerged, the following definition of dyslexia is suggested. This definition incorporates causal, descriptive and discrepancy theoretical perspectives.

Dyslexia is a specific learning difficulty of neurological and biological origin that is most often characterized by a

significant discrepancy between measures of working memory and reasoning ability together with a weakness in the speed of processing information that may be manifested through weaknesses in a variety of educational attainments, particularly in literacy skills, as well as in everyday tasks.

There are five significant features in this definition that meet the criticisms that prevented previous definitions from gaining universal acceptance.

- Causal, descriptive and discrepancy definitions of dyslexia are included.
- It is based on significant research findings.
- The different theoretical research perspectives are reflected.
- It reconciles previous definitions of dyslexia.
- This definition would apply equally to children and to adults.
- It recognizes that children at any level of cognitive ability may have dyslexia.

In conclusion, despite a lack of consensus over how best to define dyslexia, there is universal agreement that there is an identifiable group of people who experience specific learning difficulties in the development and expression of literacy and language skills. Although the most outstanding characteristic of this group is probably their difficulty with linguistic skills, they also tend to have problems in general organization and may also have problems in social spheres. There is agreement that their difficulties appear to be inherited and associated with neurological deficits. It is agreed that dyslexic people usually demonstrate a weakness in working memory. Finally, there is agreement that the term dyslexia should be used to describe this group.

Finally, as further research takes place and our knowledge of dyslexia increases, it is possible that a future definition of dyslexia may also need to include reference to dyslexia as a difference and not as a weakness.

Summary

There is still no international consensus on a definition of dyslexia. There are three possible reasons for this lack of agreement. The first

most likely reason is the multidimensional nature of dyslexia. The second possible reason is the different research perspectives adopted. Finally, the third reason for this lack of a consensus would seem to be the attempts to incorporate other types of specific learning difficulties into a single definition.

The popular existing definitions of dyslexia can be grouped under causal and descriptive definitions. However, each one of these definitions can be criticized on both theoretical and practical grounds. Accordingly, a new definition of dyslexia is proposed in this book. This new definition is suggested after consideration of the current research as well as a critique of the popular current definitions of dyslexia. This new definition would incorporate discrepancy, causative and descriptive factors and be applicable to both children and adults. It is recognized that this definition may need to be modified in the light of future research to take into account the notion that dyslexia may be a difference of functioning and not a weakness.

4 Dyslexia and other specific learning difficulties

Introduction

The characteristics of dyslexia have much in common with several other kinds of learning difficulty. This is why dyslexia can sometimes be confused with other types of problem. For instance, children with many other kinds of learning difficulty manifest a weakness in working memory and often have a short attention span, just like many dyslexic children. Although sometimes there is an overlap, there are several important differences between other learning difficulties and dyslexia. Therefore, it is not surprising if occasionally a child is referred for a dyslexia assessment and is subsequently discovered not to have dyslexia.

This chapter outlines the other most common specific learning difficulties that can be confused with dyslexia. It is advocated that these other difficulties should be defined separately. The chapter begins by contrasting a specific learning difficulty with a general learning difficulty.

General and specific learning difficulties contrasted

A general learning difficulty is manifested by weaknesses in most areas of intellectual functioning. Test scores perhaps best illustrate the difference between general and specific learning difficulties. The child with a general learning difficulty would roughly score below-average test results on all intellectual abilities tested. This would be in contrast to the test results obtained in the case of a child with a specific learning

