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A Cognitive Approach

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Acknowledgements

This book is the result of many long discussions with children, practitioners and especially each other. We became interested in learning difficulties as a result of contact with children who experienced problems. As we attempted to analyze these problems we became increasingly frustrated by the fact that theories of cognitive development were not easily applied to cases of learning difficulties. This problem became more prominent when one of us (J. D.) was carrying out clinical work with children and devising intervention programmes in schools and clinics.

The practical experience gained by working with the children has been invaluable in our understanding of the problems and our realization of the difficulties experienced by practitioners and parents. To this end the advice provided in the field by more experienced practitioners is gratefully acknowledged. In particular Mike Gibson and Stephen Cogill helped challenge many assumptions and asked decisive questions when supervising case work. Judith Zur and Shona Munro always played an invaluable role when analysing problems and formulating intervention plans. Special thanks go to the Nuffield Hearing and Speech Centre, in particular Veronica Connery and Tony Martin and all the staff at the Nuffield Preschool Speech and Language Unit. Their clinical insight and probing questions forced us to think more deeply about the relation between theory and practice.

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several of the chapters and provided us with many helpful comments and suggestions. Vanessa Cragoe very kindly typed the references.

Our respective families have been very tolerant and supportive and we thank them for that. The cover of this book is a detail from a painting called 'The Conqueror'. Learning difficulties do not have an inevitable course. We believe that if one understands the cognitive problems experienced by children with learning difficulties practitioners will be in a better position to alleviate the problems that arise.

John McShane died tragically two weeks after we had completed checking the proofs of this book. John had a strong wish to improve our understanding of children's cognitive processes and a desire to help children with learning difficulties. He believed that it was only when we understand the basic processes of development that we would have effective applications of developmental theory. He made a significant contribution to this aim.

John was a much respected developmental psychologist and an exceptional colleague. He will be remembered with love and affection and will be greatly missed.

J.D. September 1992

Contents

1

Understanding Learning Difficulties: A Cognitive Frame of Reference

Overview

This chapter considers a number of general issues relating to learning difficulties. Our concern is to provide a framework within which the practical issues of assessment and intervention can be related to theoretically-driven research on the cognitive basis of learning difficulties. We begin by considering the prevalence and variety of learning difficulties. We then review methods of classification and raise a number of critical issues about classification. The subsequent section of the chapter discusses the task, the child, and the environment as three elements of a framework within which to understand learning difficulties. Most research and much practice is concerned with the task by child interaction. This can be addressed by considering the information processing requirements of a task and the child's current cognitive abilities. The child's cognitive system is discussed at the levels of a cognitive architecture, knowledge representation, task processes, and executive processes. Learning difficulties require assessment and intervention. The basis of these should be the child's current performance on cognitive tasks.

Children's Learning Difficulties

Many children experience difficulties in learning. The difficulty can either be specific, as occurs when a child experiences problems with some particular task such as reading, or it can be general, as occurs when learning is slower than normal across a range of tasks. In this book we shall consider both specific and general learning difficulties.

To identify a learning difficulty an assessment must be carried out. Based on the results of this a programme of intervention may be implemented. Any assessment or intervention with a child experiencing problems makes, of necessity, assumptions about the basis of those problems. For assessments to be reliable and valid the practitioner must be aware of the range of variables that can influence a child's performance on particular tasks. To transform these assessments into effective interventions the practitioner must design a programme that takes account of the task requirements, the child's behaviour and cognitive skills, and the environmental context in which intervention will occur. Both assessment and intervention require an understanding of the demands that a task places on a child's cognitive system and the abilities of that system to deal with these demands. Our major concern is to consider what is currently known about the cognitive demands of tasks such as language, reading, and number and the problems that children with learning difficulties experience with these tasks.

How prevalent are learning difficulties? Rutter et al. (1970), in a detailed study of over 2,000 children on the Isle of Wight, found that overall 16 per cent of children aged between 9 and 11 years had some handicap that hindered their educational progress. Summarizing these and other data (Kellmer-Pringle et al., 1966; Rutter et al., 1975a; Webb, 1967) the Report of the Committee of Enquiry into the Education of Handicapped Children and Young People (Warnock, 1978) concluded that in Britain at any one time about one child in six is likely to require some form of special educational provision. This figure includes both those children who are experiencing some temporary difficulty in learning and those who have more persistent long-term learning difficulties. A

similar figure has been reported by Chazan et al. (1980) from a survey of all the 4-year-olds who had been born in a six-month period in 1972 in two counties of England. Chazan et al. found that 21 per cent of their sample were judged to have special needs of a mild, moderate, or severe nature that required further investigation. The highest proportions of problems in Chazan et al.'s survey were in the areas of speech and language development and behavioural adjustment.

In the United States, the US Department of Education statistics indicate that approximately 12 per cent of children between the ages of 3 and 21 years received special education services in 1987 (Meisels and Wasik, 1989). The major types of difficulty in order of prevalence were 'speech impairment, mental retardation, learning disabilities, emotional disturbance, crippling conditions and other health impairments, hearing impairment, visual impairment, deafness, and multihandicapped problems'. Although the figures for the US are lower than the figures for Britain, the basis of calculation is different: the US figures record the proportion of children receiving special education services; the British figures record the proportion of children believed to be in need of special education services.

It is evident that there is a sizeable group of children that can be regarded as having a learning difficulty on either a temporary or permanent basis. But what are learning difficulties, and how does one determine whether or not a child has a learning difficulty? These are questions to which there are no simple answers. Despite considerable research effort and many attempts at definition, there is still no generally accepted operational definition of what constitutes a learning difficulty. As Hooper and Willis (1989) point out, this is because learning difficulties are a heterogeneous group of difficulties.

The most obvious distinction is between children who have general learning difficulties and thus experience problems with most types of subject matter, and those who have a specific difficulty – with reading or mathematics, for example. The latter groups are sometimes said to have a specific learning difficulty because their major problem is with one type of material and not with all forms of learning. However, the distinction between general learning difficulties and specific learning difficulties is not as

straightforward as it might seem: children said to have a specific learning difficulty often experience difficulties with more than one type of subject matter, without necessarily experiencing difficulties with all subject matter. Given the variety of types of learning difficulty, it is necessary to consider in what ways they can be classified.

Classification of Learning Difficulties

Classification systems can have a variety of purposes. Aetiological systems of classification are concerned with classifying learning difficulties in terms of the originating cause. Functional systems are concerned with classifying on the basis of the current level of functioning, which may be measured in a variety of ways.

Aetiological classification systems group difficulties together as a function of their cause. This is of considerable benefit when the aim is to examine the range of difficulties to which a particular aetiology can give rise. It can also be of benefit in predicting the long-term outcome of a difficulty, provided that many similar difficulties have been encountered in the past. It is worth distinguishing between two different types of aetiological classification systems: those in which there is an identifiable cause of a difficulty and those in which there is an hypothesized cause. In cases of identifiable damage, such as to the peripheral sense organs, it is often possible to intervene at the organic level. Many cases of hearing or visual impairment, or motor abnormalities such as cleft palate, can be improved either by surgical intervention or the provision of sensory aids. Organic diagnosis is useful because there is the possibility of organic intervention. In cases of a suspected learning difficulty it is of vital importance to ensure that thorough tests of the relevant sensory systems are conducted. This applies especially to the auditory system, where defects often go undetected.

However, aetiological classification systems have two disadvantages for those concerned with dealing with learning difficulties. First, a large number of difficulties have an unknown aetiology. Thus they can be assigned only to a default category of 'difficulties with an unknown origin' in an aetiological classification

system. Since these difficulties may have no homogeneity, either in terms of cause or outcome, this is an unsatisfactory category. The second disadvantage of an aetiological classification system is that difficulties that have a similar origin may, nevertheless, have different manifestations, and may require different intervention strategies. It would be better, from the point of view of those required to intervene, to be able to classify learning difficulties in terms of the child's performance on specific tasks and to be able to relate this to possible strategies of intervention.

If we turn from aetiological to functional classification, the basis of the classification shifts from the cause of the difficulty to some measure of the child's current level of performance. In functional classification systems two groups of children are often distinguished on the basis of measures of intelligence. The first group consists of those children whose level of intellectual development is significantly below average (as assessed by an intelligence test) and who are therefore likely to perform less well than age matched peers on a range of intellectual tasks. These children are often called 'slow learners', and in more severe cases 'mentally handicapped'.

The second group consists of those children whose overall level of intellectual development is normal but who nevertheless have specific difficulty with some particular task, such as reading. On assessment, children with specific difficulties usually have a performance profile in which there is a marked difference between their level of achievement in their area of specific difficulty and their levels of achievement in other areas of cognitive functioning. Because of this, such children are often said to show a discrepancy between their achievement and their aptitude in the area of difficulty. Such children are said to have a 'specific learning difficulty' in Great Britain, or a 'learning disability' in the United States.

The method of distinguishing between general and specific difficulties in terms of discrepancies in cognitive profiles is problematic. In the first place, there are many methodological limitations in the way in which discrepancy scores are computed (Reynolds, 1984–5; Shepard, 1980). Second, the concept of discrepancy between achievement and aptitude, while intuitively plausible, has never been operationalized in a satisfactory manner

(Epps et al., 1983). Third, children who initially experience a specific learning difficulty sometimes then experience other difficulties as a result: language difficulties can lead to difficulties with reading because reading draws upon the language system (see chapter 4); while reading difficulties can lead to difficulties with arithmetic because arithmetic requires reading abilities (see chapter 5). Finally, children who experience general learning difficulties often show considerable competence in a specific area of cognitive functioning. This observation is particularly striking when different aetiological groups of general learning difficulties are considered separately (Burack et al., 1988).

Until recently in Britain, children with learning difficulties were classified into eleven categories, which had been introduced following the Education Act of 1944. These categories included blind, partially-sighted, deaf, partially-deaf, delicate, diabetic, educationally subnormal, epileptic, maladjusted, physically handicapped, and those with speech defects (Pritchard, 1963). The Warnock Report argued that this system of classification had a number of faults:

- It pinned a single label on each child, many of whom suffered from more than one disability
- It unnecessarily stigmatized children and schools
- It promoted confusion between a child's disability and the form of special education required
- It focused attention on only a small proportion of children who were likely to require some form of special educational provision
- It suggested that a child categorized as, for example, 'educationally sub-normal' suffers from an intrinsic deficiency whereas often the deficiency has been in the social and cultural environment
- It perpetuated a sharp distinction between two groups of children – the handicapped and the non-handicapped

The report therefore recommended 'that the statutory categorization of handicapped pupils should be abolished'. In its place, the report recommended that children in need of special educational provision should be identified on the basis of a detailed profile of their needs following assessment. However, the report

recognized that some specialist terminology was required for children who require special educational provision. Accordingly it recommended 'that the term "children with learning difficulties" should be used in future to describe both those children who are currently categorized as educationally sub-normal and those with educational difficulties who are often at present the concern of remedial services'. The report also suggested that learning difficulties might be described as *mild*, *moderate*, or *severe*, and children with particular difficulties only, such as a reading difficulty, should be described as having a *specific learning difficulty*.

The move from categorical labels to statements of educational needs has much to recommend it because it recognizes that assessment should be related to intervention. But removing the seeming comfort of categorical labels turns the emphasis onto the behavioural and cognitive profiles of children with special educational needs. What, for example, is a specific reading difficulty? Are all specific reading difficulties the same? How does one identify and assess reading difficulties? And the same questions can obviously be posed for other specific difficulties and also for general learning difficulties. Needs can only be identified if the child's current difficulties can be identified. In fact Warnock's proposal is not the abandonment of classification but a call for a new system of classification. This new system will not necessarily be categorical; it is much more likely to be dimensional, reflecting a profile of the relevant strengths and needs that the child currently possesses on dimensions that are relevant to the execution of an educational skill. As Doris (1986: 39) has remarked: 'The diagnosis of an entity in either medicine or education is an academic exercise unless it is related to prognosis, therapeutic intervention, and/or prevention.' At present, there is very little direct relation between classification of learning difficulties and effective forms of intervention (Forness, 1988).

In this book we shall be concerned with the cognitive basis of specific learning difficulties in the areas of language, reading, and mathematics; and with general learning difficulties. The central question that we shall address is this: In what ways are the cognitive systems of children with learning difficulties less well able to deal with task demands than are the cognitive systems of children developing normally?

A Framework for Understanding Learning Difficulties

There are three parts to our framework for understanding learning difficulties: the task, the child, and the environment. The analysis of each has a contribution to make to the understanding and treatment of learning difficulties. The task or tasks with which a child has difficulty must be analysed so that the component skills necessary for successful performance are understood. The child is the person currently experiencing difficulty with the task, so obviously it is important to have methods to assess the child's current cognitive abilities, together with any other relevant psychological attributes. Once these have been assessed, the cognitive demands that are made on the child's current abilities can be determined. The environment is the external context in which the child's difficulty is manifested; and aspects of the environment may be contributory factors to the child's difficulty. Understanding the role of the environment may be especially important in relation to learning difficulties. Children with learning difficulties may be more dependent on their environment than normal children, while children without learning difficulties may be robust and buffered against environmental factors or situations that may have a serious effect on children with learning difficulties.

In order to understand the reasons why a child performs a cognitive task less well than the norm it is necessary to get a clear picture of what is involved in successfully performing the task in question, and then use this understanding to analyse where the problems lie for the child with learning difficulties. Thus, cognitive models of learning difficulties must include analysis of the demands of the task, how it is performed by children developing normally, and the current performance capabilities of the child with a learning difficulty.

The types of difficulties with which we are particularly concerned are those that impede educational achievement, such as difficulties with language, reading, or mathematics. We shall call these areas *domains*. We might expect to find that general learning difficulties involve processes that are shared by many domains (but domain-specific processes may additionally be

involved). Specific learning difficulties are likely to involve only domain-specific processes. Thus, for example, if a child is experiencing a specific difficulty with reading, then we might expect to find that the nature of this difficulty lies within the cognitive processes that are dedicated to reading. If, on the other hand, reading difficulties are only one of a range of learning difficulties experienced by the child, then we might expect to find that general cognitive processes are implicated, and possibly domain-specific processes also. However, these are empirical matters, which can only be addressed by research.

Learning difficulties occur for a variety of reasons. One reason is that the child has some inherent cognitive difficulty that makes learning some skill or skills more difficult than normal. However, some difficulties – perhaps the majority – are the result of educational or environmental problems that are unrelated to the child's cognitive abilities. Ineffective teaching strategies can seriously affect a child's level of achievement (Brennan, 1979). Early school failure can lead to a lack of self-confidence with subsequent detrimental effects on learning (see chapter 7). A variety of variables associated with home background can also contribute to learning difficulties (Rutter et al., 1975b). Sometimes all of the different factors are intertwined. But, whatever the primary cause, children with learning difficulties have fallen behind their peers in mastering some important aspect of learning. The practical tasks are to find out why this is so, and then to try to do something about it.

As an example of this analytical framework let us consider a child (Susan) who has difficulty learning how to write her own name. By the time children reach school age they bring with them a repertoire of skills which should be sufficient to cope with the demands of the school environment, one of which is to write one's own name. If a child is having difficulties with this task the contributory factors may come from the child, the environment, or both. Let us consider how Susan's problem might have arisen and how it might be dealt with.

First, the problem might have an environmental cause. If Susan, for some reason, had not had a range of experiences with fine-motor coordination in her preschool years she would not be in a position to profit from the instruction provided in the

classroom. Tasks that are too difficult for her might lead to repeated failures and this would exacerbate rather than ameliorate her difficulty. In this case her early environment failed to provide appropriate experiences and later the school was insensitive to her needs.

Alternatively, Susan might be lacking in the movement skills necessary to function in the school environment. Some children arrive at school lacking in movement skills despite having had a range of appropriate preschool experiences. Sugden and Keogh (1990) point out that children with such fine motor skill problems do not constitute a homogeneous group. Problems may occur in the planning of motor movements, and in unsteady or uncoordinated movements, or there may be an inability to interpret sensory inputs. A range of explanations has been offered for these problems (Sugden and Sugden, 1991). For some children these problems will result in writing difficulties and intervention will be required for the child to cope with the demands of the curriculum. The critical factor for designing an intervention programme for Susan, irrespective of the origins of the problem, would be an analysis of the task demands.

We must now ask what are the requisite skills for writing one's name so that an intervention programme can be designed. To do this we must break the task down into its basic components (see below). This analysis of the task needs to be grounded in an understanding of the skill acquisition of the developing child. The task requires a certain degree of fine motor skill, which the child will usually be presumed to have on entering school, and a knowledge of how to form the letters of the alphabet, which will usually be taught in school. Once the basic components of the task have been accurately identified, the child's performance on each component can be gauged. The assessment will need to evaluate the child's performance in context and not on a single test. An accurate description of the precise problems that the child shows should lead to appropriately matched interventions. That is, assessment should result in a prescription for intervention and a means by which the consequences of the intervention may be evaluated and measured (see chapter 2). The intervention will need to be designed so that the environment can adequately support it. There is no point designing a programme