DYSLEXIA AND LEARNING STYLE

A Practitioner's Handbook
Second Edition

Tilly Mortimore

John Wiley & Sons, Ltd

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CONTENTS

PREFACE TO THE SECOND EDITION

My aim has been to continue to chip away at the academic and social barriers confronting those individuals with dyslexia who attempt to realise their potential. I hope this book will contribute in some way to their emancipation.

This second edition was inspired by two things. The first was the enthusiasm with which practitioners took up the teaching strategies offered in the first edition, which was the first practical book to apply learning style research to dyslexia. The second was the scorching critique of Learning Style Theory offered by the Learning and Skills Development Agency (LSDA) report of 2004 which forced me to re-evaluate the role that could be played by style for those of us who work with vulnerable learners.

The book is intended to continue to provide a bridge between theory and practice, to share some further teaching techniques that have been successful with dyslexic students in schools and colleges, and to place these within the context of updated research into style, memory, learning and dyslexia.

In my work, I have always been fortunate to have the support of talented colleagues who will, no doubt, recognise their contribution, as will those dyslexic students themselves who have taught me so much about the different ways in which learning can be accomplished. The range of ingenious and creative ways in which these students approach their learning is a continuing joy.

I remain indebted to the inspiration I have received from my students and colleagues at Mark College, the Hornsby International Dyslexia Centre, Southampton University and Bath Spa University, to my research supervisor Professor Ray Crozier, and to the generous permission given by many dyslexia practitioners to share their work. As always, I could not have completed this edition without the support of Phil, Lekki, Elly and Max Wdowski and Mary Mortimore.

ADVANCED ORGANISER

Some learners find an advanced organiser or preview of the contents of a book extremely helpful. Here is one for this book.

Part one: Learning Style

Chapter 1

Provides and discusses definitions for cognitive or learning style. Cognitive style is a person's relatively consistent way of dealing with incoming information from the environment. Learning style is this cognitive style applied in a learning situation. Controversial aspects are discussed, and the Riding model for diagnosis of cognitive style is introduced.

Chapter 2

Examines why certain ways of presenting information can cause difficulties to some learners. Considers the evidence in favour of matching learning and presentational style. Weighs up two major approaches to diagnosis and presents a range of tools for diagnosing style.

Part two: Dyslexia

Chapter 3

Discusses definitions of specific learning difficulties or dyslexia, the underlying causes and ways of identifying the condition.

Chapter 4

Looks at the patterns of differences associated with dyslexia throughout an individual's lifespan and how they might affect learning. Considers some other learning difficulties, which can sometimes co-exist with dyslexia.

Chapter 5

Considers the strengths often exhibited by learners with dyslexia and examines the evidence for the possession of superior visuo-spatial talents by some dyslexic people.

Part three: 'It's no use if you can't use it'

Chapter 6

Provides more detail about the importance of cognitive or learning style to the development of learning strategies in education for students who might or might not have dyslexia. Emphasises the importance of encouraging students to become more flexible in their approaches. Introduces the research background to the strategies described in this book – schema theory and memory function.

Part four: Strategies for wholistic and analytic learners

Chapter 7

Provides a description of the likely learning preferences of learners with a wholistic approach and a range of strategies for absorbing, processing, revising and producing information.

Chapter 8

Provides a description of the likely learning preferences of learners with an analytic approach and a range of strategies for absorbing, processing, revising and producing information.

Part five: Words or pictures?

Chapter 9

Provides a range of strategies to utilise and develop visualising skills.

Chapter 10

Provides a range of strategies to help students develop and utilise the verbal mode.

Part six: What were those last 10 chapters about?

Chapter 11

Provides strategies for students with and without dyslexia to reduce memory overload, interact with material to be learnt, use the creative power of imagery and the imagination and use structures to organise material.

Part One

LEARNING STYLE

Chapter 1
DIFFERENT WAYS OF SEEING

Introduction

Jack is 12 years old, and he is angry. Despite regular attendance at a good village school and all the attention paid to him by concerned teachers, his reading and writing skills have simply failed to develop. While classmates are in the process of becoming good readers, Jack still struggles with the most basic sight words. For all the years spent trying, Jack has barely progressed beyond being able to write his own name. The humiliation of having his younger sister quickly outpace him is already a bitter memory.

Jack's anger is born of frustration. No one can explain to him why he should be so hopeless in this all-important area, especially when he is very good at other things. This is a lively, articulate boy, full of ideas, both practical and imaginative. He has helped to build car engines at home. He adores drawing up plans for fantasy machines and futuristic houses. These plans are scrupulously detailed and competently executed, and Jack can explain his ideas to a listener in a most engaging way. Not only this but also the quick understanding he shows in discussion – the ready ability to draw links and inferences – coupled with good general knowledge and an associated fund of references with which to back his opinions are skills one immediately associates with an able 12-year-old, not with a boy of Jack's reading age.

For Jack, at 12, this is a dangerous time. He has watched teachers trying to do their best for him. He has listened to his parents' constant words of encouragement. He has tried, and tried again: tried to improve, tried to learn how to read those troublesome words, to trap those ideas on paper. If only he could. All these efforts appear to have been entirely in vain. There is a limit, after all. At the same time that Jack is beginning to question the point of continuing to try to improve, he is facing the upheaval of the tricky transition from junior to secondary school – a transition fraught with extra difficulties for him. Rapidly growing in size and strength, his energy levels are increasing. His parents are increasingly concerned. Will Jack gravitate towards the more disruptive element among the students at the new school? Will he seek to bolster his self-esteem in unproductive ways, venting his frustrations on the system that has evidently failed him? He is already angry and confused. What will he be like at 16?

Jack's case is not that uncommon. What is going wrong for him and how does 'learning style' come into it? Fortunately, his story has a happy ending, but this is not always the case. Jack's difficulties, in fact, stemmed from his severe dyslexia, which was identified, and supported appropriately by specialists. He is now an independent, if not enthusiastic, reader, uses IT to communicate his ideas and has gone on to higher education as the first step to becoming an engineer.

His success is the product of three things:

1. his own grit and determination
2. appropriate teaching methods
3. discovery of his learning style preferences, which allow him to use his strengths and compensate for his weaknesses.

It is swiftly evident to anybody who has attempted to teach a class of students, co-operate on a project with a group of colleagues, or simply negotiate a survivable holiday route through a foreign city with partner or family without coming to blows that we do not all solve problems in the same way. We do not process incoming information in the same way, neither do we store it, organise it, or retrieve it in the same way. Some people can always remember a face but cannot put a name to it. Others can memorise telephone numbers or birthdays simply by reciting them. Some teachers cannot recall the names of their students until they have seen them written on exercise books; others only need one rehearsal before they can identify any student anywhere in the room. Some travellers can follow oral directions unerringly; others can find their way swiftly to any previously visited destination by retracing their steps but are unable to give reliable directions. These all illustrate the diversity of the survival techniques people use spontaneously in everyday life.

Take a household example. It is 8 am. Everyone is getting ready for work and school. The cry goes up, 'Where are my football boots?' How do you locate them? Do you picture a nightmare bedroom in your mind's eye with the boots peeping out from under a pile of Beano comics and last night's pyjamas or do you logically think through the steps they and their owner might have taken between football practice and this morning? Either of these approaches can locate the boots, and the approach you take spontaneously can give you some idea as to your preferred processing or *learning style*.

What is Jack's preferred style? Is he a 'pictures' or 'words' man?

His strengths are his active practical mind, his inventiveness, his ability to visualise and to create visual representations, his ability to remember detail when really engaged and his willingness to experiment with ways of working in order to take responsibility for himself. However, he finds it hard to remember anything other than the basic outlines of information if it is only presented verbally. At 14, although writing clear accounts and simple stories, he remained reluctant to expand his writing beyond what was strictly necessary. He resisted any form of playing with written words and stated that he was hopeless at poetry. This may, of course, have been due to a lack of confidence and to the difficulty he still experiences with spelling However, many members of his group with equally severe dyslexia were poets, attempted to write at length and experimented with words. This did not seem to come naturally to Jack, despite the fact that his received-vocabulary score was well above average, and he was a persuasive talker. He also responded far more strongly to material presented through film or diagrams and spontaneously adopted visual ways of mapping out ideas.

This pattern would suggest that his style of learning is far more visual than verbal and that he prefers to use mental pictures rather than words. He is likely to flounder in an environment where words are the only tools of communication. However, he is not extreme, as he is fortunate in that he both understands a wide range of vocabulary and expresses himself well orally. Many able learners with visual strengths are far less able to deal with words than Jack and are therefore even more disadvantaged in learning situations that do not take this into account.

Being verbal or visual is not, however, the whole story of learning style. Jack was also one of those students who always wants to know in advance what the group will be doing and likes to plan in advance rather than taking things step by step as they come. He always prefers reading or listening to action stories or practical information. When really involved in a story, and able to visualise events, he not only gets the gist of events and makes interesting links and inferences but remembers details really well. However, he still finds the retention of step-by-step information harder than the overall concept, particularly if the texts are longer and more theoretical and therefore less easy to visualise. This tendency to respond more to the overall scope of a topic than its step-by-step structure is another aspect of learning style and one that is as crucial to successful learning as the pictures or words.

Current research into patterns of learning behaviour has provided a wealth of information about the influence learning style can have on the success people make of their lives – particularly in the world of education with its specific demands and restrictions. No one approach or style is said to be in itself more or less effective than any other. The crucial factor is whether it is suited to a particular everyday task or situation. It is when individuals are placed within an educational context and the pressure is on to retain and utilise information that some students may begin to find that their particular approaches are less well catered for by the ways in which information is structured and presented to them. This is when research into learning style may offer insights into ways of making academic information more accessible to the diverse groups of learners in our schools and universities.

Before introducing the more practical aspects of using learning style to help students learn, it is necessary to present some of the theoretical and research background to the whole area of cognitive or learning styles since it has recently become a strongly contested area.

What are cognitive or learning styles?

Interest and research in cognitive and learning styles has been ongoing since the 1930s when Allport (1937), who was interested in theories linked to personality, defined cognitive style as *an individual's habitual or preferred way of processing information*. The term *cognitive* may be unfamiliar. *Cognitive* means to do with *cognition*. Cognition refers to knowing, and the study of cognition examines the ways in which people structure and organise knowledge, including the higher-order mental processes, such as reasoning and problem solving, through which humans attempt to understand the world. Learning style is one aspect of cognitive style. However, in the vast range of literature about style, these two terms are often used interchangeably, which can be misleading. For clarity, learning style should be seen as the application of a person's preferred cognitive style to a learning situation.

These distinctions are important since *cognitive* style has been seen as the spontaneous almost automatic way in which an individual processes incoming stimuli and *learning* style is seen more in terms of the strategies a student adopts to cope with learning tasks and situations. Researchers have suggested that cognitive style is a relatively fixed characteristic of the individual (Allport, 1937; Schmeck, 1988), which is hard-wired into the system and, with age, becomes crystallised into a characteristic mode of thinking, remembering and problem solving, which partly controls and underlies the more fluid strategies for learning that we use in everyday activity. Messick (1996) suggested that cognitive style varies across individuals and is linked to personality differences. The learning strategies, or learning styles, that arise from an individual's particular cognitive style will reflect this style although these strategies may be more amenable to change than the underlying cognitive style.

Any area of research inevitably throws up as many controversial questions as it answers. Style researchers are broadly in agreement over the suggestion that *cognitive* style is an individual's characteristic and relatively consistent way of processing incoming information from the environment, while learning style describes the strategies used in a learning situation; however there is consensus over little else in the field.

Recently, the world of education has picked up and run with the concept of learning style. It has been current in texts written for practitioners (see, for example, Babbage, Byers & Redding, 1999; Given & Reid, 1999; Prashnig, 1998; Pritchard, 2005; Reid, 2005), reflections on practice (Rayner, 2001), commentaries on school improvement (Burnett, 2005; Cheminais, 2002) and referred to by both DfES websites and Ofsted documentation, which have provided teachers with style criteria to be met within classroom planning. However, it could be argued that too much has been taken for granted in terms of the validity of the models of learning style adopted, the ways in which style might be assessed and, indeed, the usefulness of a style approach to teaching and learning. The field is currently adjusting to a highly critical review (see Coffield, Moseley, Ecclestone & Hall, 2003; Coffield, Moseley, Hall, & Ecclestone, 2004), which cast doubts on all of these and suggested that attaching style labels to learners could constrict rather than liberate. Those of us who put theory into action need to be clear about the contested nature of style theory and whether, as this book suggests, it does have something significant to offer to learners and practitioners.

Aside from the concerns raised by Coffield and his colleagues, three interlinked controversies continue to bedevil the style field.

1. How far is cognitive or learning style genetically determined and how far environmentally developed and changeable?
2. Is cognitive or learning style specific to a particular situation or task, or does it remain consistent over a range of tasks and areas of life?
3. Does learning style change and develop with age?

How far is cognitive or learning style genetically determined and how far environmentally developed and changeable?

The old nature-nurture debate emerges in this first question. Are tendencies towards particular personality traits and behaviour patterns laid down in the genes a newborn baby inherits from its parents or is a baby born as a blank slate later to develop consistent patterns of learned behaviour through interaction with the environment? The consensus among researchers is that the evidence from behaviour, genetics and personality research (Blakemore & Frith, 2005) suggests that brain pathology provides individuals with a range of potential that can be shaped and developed as they interact with the opportunities the environment presents. Cognitive style, or the individual's characteristic approach to organising and processing information, influences their approach to learning, and approach to learning influences the nature of the learning outcome. Schmeck (1988) has suggested that these traces are set down early in a learner's experience and then are gradually crystallised through regular reinforcement. He quotes Shapiro (1965) who wrote,

> *what we perceive is a result of what we attend to, and what we attend to is a result of the actual stimulus situation plus what we remember about that type of situation from our last experience of it. If we form global impressions, we will remember global impressions and notice global features in the future.* (p. 371)

So, for example, school situations are approached with a mind-set developed and reinforced through past experiences of school. Success in tasks utilising a particular style predisposes continued use of this style. This mind-set becomes less and less flexible. This would suggest that this crystallisation is a subconscious process beyond the control of the individual learner.

Some contemporary research into the biochemical basis for learning (Blakemore & Frith, 2005; Hulme & Snowling, 1997) suggests that these learning outcomes may result both in chemical changes within the brain and the formation of neural traces and pathways, which in effect change the nervous system, thus altering the learner's cognitive style and hence learning strategies or style.

In other words, genes predispose people to a particular style of processing, but this is shaped by experience. Yes, the newborn baby already has inherited tendencies towards particular types of behaviour, but the infant brain is so plastic and malleable that neural pathways are shaped by experience to create a person's own characteristic ways of dealing with life. Nature is moulded by nurture to create each individual. If this is the case, how consistent will style be?

Is cognitive or learning style specific to a particular situation or task, or does it remain consistent over a range of tasks and areas of life?

Schmeck (1988) argues that style remains consistent in varying situations, across different moments. Do styles persist regardless of the content or delivery of lessons? If students tend towards particular ways of storing information, will they stick to these methods across the curriculum regardless of the content and demands of the tasks?

A range of researchers would answer 'yes' to these questions (Entwistle, 1981; Gregorc, 1982; Schmeck 1988; Witkin, 1969). They suggest that personal characteristics influence the response to a learning situation and that these characteristics are stable enough to lead to consistency in behaviour across a range of both academic and social situations.

Cassidy (2003) illustrates this with a motherboard/software analogy where the motherboard/hard wiring is seen as representing style and the software as the strategies used in different situations. Thus a style may exist in some structural or stable form but still be to some degree responsive to the individual demands of a situation and capable of adapting. The suggestion is that cognitive style may be stable but the learning style may be more adaptable.

Maybe it is more realistic to suggest that an individual's disposition promotes preferences for a particular way of working that may become less flexible and more entrenched with maturity. Curry (1990) devised a model she termed the 'onion' which illustrated this. She suggests that a learner operates at three different levels, rather like the layers of an onion. The innermost layer is a cognitive personality style – hard wired and more inflexible. The middle layer includes information processing intellectual approaches and learning strategies – more flexible. The outer layer involves instructional preferences which tend to be more adaptable and situation specific. She claims that the educational environment has the greatest influence on the outer layer, less on the middle layer, and none on the inner core. The issue of whether style varies across contexts remains unresolved. Some researchers (Entwistle, 1988; Geisler-Brenstein & Schmeck, 1995; Loo, 1997) favour consistency. They cite studies which suggest that students who are encouraged to change style to reflect an altered situation will still reveal the influence of their original style, or that fundamental changes in the direction of flexibility are not easily accomplished since, by adulthood, styles of functioning and personality are deeply engrained. Chinn and Ashcroft (2006) argue against this. There is perhaps a consensus that individuals have a tendency to a preferred style but that there is potential for change and that most learners will select the style that is appropriate to the demands of the situation. There is, however, a view (Miller, 1991) that it is not only a waste of time but psychologically damaging to attempt to change styles in the direction of versatility.

These positions remain somewhat at odds. Nisbet and Shucksmith (1986) carried out research into traits shared by successful learners. Their findings indicated that these people:

1. will be acutely aware of their learning style
2. will be aware of the requirements of each learning situation
3. will have developed a range of strategies that they can then apply according to their own style.

It must not be forgotten that these are the characteristics of successful learners and might not be so useful or accessible for those who are struggling. The emphasis here is on the use of metacognition or conscious knowledge of one's own patterns of behaviour in a learning situation. This should allow particular skills and approaches to be selected intentionally rather than automatically (Das et al., 1988, cited in Schmeck, 1988) and encourage students to take personal responsibility for making use of their learning strengths. This should give students greater self-awareness and a positive academic self-concept or image of themselves as learners. The importance of a metacognitive approach will be discussed in more detail in a later chapter.

Does learning style change and develop with age?

There are two ways in which style could be said to change with age. One is as part of a staged developmental process. The other is in response to learning experiences.

What is a staged process? Generally, stage theorists, of whom Piaget can be said to be the most well-known educational figure, contend that all humans go through common stages of development in a set order in a journey towards maturity. Thus a teenager should, for example, be capable of some abstract reasoning where a 5-year-old is probably not. There are no value judgements implicit in this. There is no suggestion that 5-year-olds are somehow lacking because they have trouble with philosophy. It is just the stage they are at and everyone has to go through it. Thus expectations of behaviour change according to age. It is a physiologically determined developmental process and, for example, very young children should not be expected to be able to work out the implications of their actions in the same way as their older teenage brothers and sisters.

Figure 1.1 gives an example of how stage theory can be applied to learning style.

This is an illustration of the approach taken by a number of the stage theorists (Entwistle, 1981). It shows how they favour a stage model of academic learning style as going through distinct stages starting, in this case, with rote memorising and progressing to the higher-order skills of level 3, where true understanding necessitates either a 'versatile' or 'flexible' style (Pask & Scott, 1972, cited in Schmeck, 1988) or a 'synthetic' style (Kirby, 1988), which merges both analytic and imaginative reasoning culminating, in a flexible integrated learning style that takes advantage of the features of the preceding stages. These theorists imply that students will ideally move towards a flexible integrated approach which will allow versatility in the use of learning style. Most older students do gain in self-knowledge and see reality from new points of view as they mature; however, one study of university students found such versatility to be rare (Entwistle, 1988). Few students seemed able to carry through all the component processes demanded by a full and deep level of understanding!

Such stage theorists would strongly suggest that learning style changes with age, even if many people never achieve full maturity. This is the first way in which learning style can be said to change, although it is still unclear whether

Level 1	associative thinking (rote or memorising)	
Level 2a	analytic reasoning	seen as two distinct learning styles
Level 2b	imaginative thought	
Level 3	synthesis of 2a and 2b into a versatile (Pask & Scott, 1972, cited in Schmeck, 1988) or synthetic (Kirby, 1988) style	

Figure 1.1 A stage theorist's perspective showing the development of a versatile or synthetic learning style, levels 1-3.

this development involves a complete change in style or more an increased flexibility and adaptability. Entwistle does not, however, discuss to what extent his findings throw light on the question of the role played by development in learning or cognitive style. It is also open to discussion as to whether this way of interpreting learning style is truly comparable with models of style that involve cognitive processing – this will be discussed later in this chapter.

The second way in which cognitive or learning style may change with age is in response to learning experiences. We have already suggested that genes predispose individuals to behave in a particular way but that experience can alter the formation of neural traces and pathways, which, in effect, may actually alter the learner's cognitive style and hence learning strategies or style. The environment is thus seen to be playing a very strong role in the setting down of the particular neural pathways that determine a person's cognitive style. The approach does change with maturity, but, if cognitive style is rigid, fundamental changes in the direction of flexibility are not easily accomplished in adulthood since styles of functioning and personality become deeply engrained (Geisler-Brenstein & Schmeck, 1995). It seems rather pessimistic to consider that, if cognitive style changes with maturity, it is only to become more entrenched and less flexible.

One way of investigating whether style changes with age would be to carry out longitudinal studies. Unfortunately, very few longitudinal studies have been completed (Bagley, 1998; Geiger & Pinto, 1991; Zhang, Allinson & Hayes, 2005). They do suggest that changes may occur, but further research is needed in this area.

Summary

It is clear that these three controversies are inextricably linked and remain unresolved. If cognitive style is genetically determined, does it develop with age? Can it change in response to the environment? Will it remain consistent across tasks and domains? Will this also be true of learning style? Research evidence seems to indicate an interrelation between 'hard and soft wiring' here, however, as yet there is no evidence for genetic markers so the nature-nurture controversy remains unresolved. With reference to the changeability of learning style, the majority opinion seems to be that an incipient style is crystallised through experience and interaction with the environment, however, there are dissenting voices. With regard to maturation and style, the evidence is unclear. More targeted research will be needed to resolve these issues and they in no way help to dilute the criticisms of style theory levelled by Coffield and his colleagues.

RECAP

So far in this chapter the following points have been established:

Cognitive style describes the way in which an individual processes information from the environment; learning style is cognitive style applied to a learning task.

A body of research supports the existence of learning style and its importance in both day-to-day life and education; however, it has recently been questioned.

It has also introduced a range of underlying controversies to which, as yet, there are no conclusive answers:

1. ***How far is cognitive or learning style genetically determined and how far environmentally developed and changeable?***
2. ***Is cognitive or learning style specific to a particular situation or task, or does it remain consistent over a range of tasks and areas of life?***
3. ***Does learning style change and develop with age?***

In the light of criticisms and uncertainty, should we perhaps forget about making use of style theory to help learners? I would argue that this is to throw babies out with bath water. It is, however, crucial to consider the impact of recent criticisms of learning style research and to understand the theoretical framework that underpins the strategies provided throughout this book. Until comparatively recently, the research presented so far might have been considered an adequate review of the theoretical basis for learning style and the practitioner could feel safe to move quickly on to practical ways of identifying and using style theory to support individuals. However, this is no longer the case.

Many of us are faced by the challenge of including and supporting vulnerable learners such as those with dyslexia. The temptation to adopt any strategy that seems promising can be pressing. Learning style theory has indeed been introduced into some mainstream settings and seems particularly relevant to the inclusion agenda with its emphasis on changing the learning environment to accommodate diversity (Mittler, 2000). As Harry Chasty of the UK Dyslexia Institute suggested in 1985, 'If the child cannot learn from the way you teach, you will have to teach in the way that the child learns.' The suggestion that teachers need to adapt their strategies to enable vulnerable learners to reach their potential also chimes with the perspective, embodied in the social model of disability, that it is up to institutions to embrace change and to remove barriers to diverse learners at all levels, physical, psychological and pedagogical (Mortimore, 2004). However, the widespread oversimplification and uncritical application of style theory to educational practice along with the suggestion that the UK Government might plan to invest scarce funds in initiatives based around learning style theory rather than other avenues has stimulated a strong critique (Coffield et al., 2003, 2004) of the robustness of the theory and has led to questions as to whether it is a truly positive way in which to structure practice.

There are real dangers inherent in oversimplistic stereotyping where learners can be labelled as ‘verbalisers or imagers’, ‘left or right brained’ and exclusively taught in ways that match the label. Tools can be applied in ways for which they were not designed, by practitioners who are unfamiliar with the original source and context. Thus an instrument designed for management training may be used in an educational setting or a questionnaire designed for adults used with children. Those practitioners who work with vulnerable learners need to be doubly certain that their approaches and actions will not waste time or resources or in any way contribute to their students’ difficulties. Decisions and choices need to be based on a clear understanding of all aspects of any controversial area and it is therefore important to examine the theoretical base to understand why it has been criticised and what aspects we feel confident to adopt. It will help to be completely clear as to what we mean when we talk about ‘learning style’.

Models of cognitive or learning style

The learning style arena is anything but simple, although some sources do tend to oversimplify it. A study of the research literature makes it clear that every researcher will tend to see cognitive or learning style in a different way and that, although the difference between the two terms has been established earlier in this chapter, some researchers use the terms cognitive and learning style interchangeably (Price, 2004). The review carried out by Coffield and his colleagues (2003, 2004) unearthed over 70 models, or constructs, of learning style and ways of identifying them. This comprised a major criticism of the field. They went on to find fault both with models of style and with style assessment methodology. What exactly do researchers mean when they talk about a model or construct of learning style?

When a researcher sets up a project to measure an aspect of behaviour, certain research methodology questions must be settled before any investigation begins. In particular, anyone looking at the results of an experiment needs to be absolutely clear as to what was being measured. A research team will agree on a particular model or construct of what they think the behaviour involves. For example, if they wished to measure levels of anger, would they measure levels of adrenalin or blood pressure across a range of stressful situations? In that case they would be creating a medical model or construct of ‘anger’ in terms of reflex bodily responses. They could, alternatively, use a questionnaire asking people to rate their anger levels from 1 to 5 in intensity in a range of situations. This would be creating a different model or construct of anger as an emotional state, measured by self-report. These are just two of a whole possible range of different models or constructs of anger, each of which would involve measuring or describing the behaviour in different ways. In the same way, before a researcher is able to measure someone’s learning style, the model of learning style being used must be clear.

Some models are related to areas of the brain; others are rooted in theories of personality or motivation. Some are developmental and follow Piaget in suggesting that style evolves from stage to stage throughout a learner's life-time to achieve maturity. Is cognitive style a question of whether people prefer to use visual or verbal channels? Is cognitive style to do with motivation and its effect on approaches to learning? Is it to do with what strategies are used, consciously or unconsciously, to process incoming information, to select or memorise? Is it to do with how deeply or superficially people think? To put it another way, each researcher will have a different model or construct of cognitive style and the field certainly provides what can be a bewildering variety of models or constructs, each of which gives a different type of picture.

Closer inspection can allocate each of these varying approaches to one of a number of categories of model. Reid (2005) suggests four categories based on personality styles, environmental influences on learning, cognitive styles and metacognitive influences. Coffield (2003) devised six categories based on: constitution; cognitive structure; personality; learning preferences; learning approaches and strategies as a basis for understanding; and finally environmental preferences. The following six categories seem, however, to cover the field effectively. Each of the categories differs markedly from the others. However, some models may seem to combine elements of more than one type. Each one focuses on the specific aspect of behaviour that the particular researchers felt was the central factor in the way people respond to a learning situation. These aspects of behaviour usually relate to one of the following six factors:

1. personality
2. intellectual development
3. motivation
4. self-concept
5. types of processing
6. hemispheric specialisation.

Personality

Some approaches to identifying learning style examine the impact personality type has on cognitive and learning style. Some constructs are rooted in particular approaches to personality theory – is a student introverted or extroverted (Eysenck 1967, 1976), impulsive or reflective? Kolb (1977), Honey and Mumford (1992) and Myers-Briggs (Myers, 1962) were all influenced by Jungian theory when developing their style instruments. Any tests used by researchers favouring this type of learning style construct will be based on a specific type of personality theory that may not necessarily be universally accepted as valid.

Intellectual development

Another approach is that of the stage theorists who link cognitive or learning style with stages of intellectual development leading towards a particular mature style that is seen as desirable.

Motivation

Some researchers have defined learning style by the type of motivation that spurs a student on. Biggs (1987) sees style of learning as heavily influenced by types of motivation, such as personal, vocational or competitive. He suggests that there are three approaches to learning, all linked with motivation – surface, deep and achieving. Surface learners are pragmatically motivated by, for example, a desire for a qualification. Tasks are seen as demands to be met, therefore the strategies involve focusing on essentials, usually facts rather than deeper meanings authors may wish to convey. Deep learners are motivated by an intrinsic interest in the task; consequently, they adopt strategies that will satisfy their curiosity and focus on the study material as a whole with the aim of digging out the meanings the author intended to convey and linking these with their own experience and interest. Achieving learners are motivated by the competitive instinct and characterised by attempts at highly efficient task management. Biggs states that the achieving approach is usually found in conjunction with either the deep or surface approaches, and frequently the mixture of deep and achieving strategies is the characteristic of high-achievement students. There are therefore links between motivation, intellectual development and levels of processing.

Self-concept

Many researchers focus on the academic self-concept or how individuals see themselves as learners. Are they frightened of failure, and does this influence the way they take information in? Do they feel inadequate as learners and therefore copy the strategies of others? Are they able to take responsibility for their own successes and failures as learners or do they blame the environment?

Types of processing

Another group of theories are built on a processing model, where the mind is compared with a computer that processes information in a range of different ways. These theories frequently tend to deny the existence of any centralised consciousness or personality in the brain and define an individual in terms of the processing systems involved in the input of information and the carrying out of actions. Cognitive styles are seen as the patterns of processing favoured by an individual. They might be simultaneous or sequential; they may favour input from ears or eyes or even differ as to the level or depth of processing involved. For example, Ausubel (1981) defines four levels or styles of thinking:

1. *associative*, involving rote and memorising
2. *analytic*, which combines use of long-term memory and narrowly focused search strategies
3. *imaginative*, which combines long-term memory and wide-ranging leisurely strategies
4. *intelligent*, *creative*, which combines the imaginative and the analytic.

Style 1 is seen as more superficial involving less-extensive processing while the others bring deeper levels of processing into play.

Hemispheric specialisation

The brain is not perfectly symmetrical. In the majority of individuals, the left hemisphere or side of the brain is usually more specialised for language performance and the right side for spatial and mathematical tasks – hence the term lateralisation or hemispheric specialisation (Byrnes & Fox, 1998). The development of brain-imaging techniques, such as positron emission tomography (PET), has confirmed, through pictures, that the left side of the brain is more active during language tasks and the right side more active during mathematical tasks. However, this is an oversimplification and these pictures also show that most tasks, for example reading and listening, involve many areas of the brain (Posner et al 1988, cited by Vasta, Haith & Miller, 1992) and that one hemisphere is just as efficient as the other in performing certain functions (Woolfolk, 2007). A number of researchers, such as West (1997) or Torrance and Rockenstein (1988), suggest that there are links between a particular learning style and an individual's tendency to favour a particular hemisphere when processing incoming information. The right hemisphere has been linked with the non-verbal, wholistic, concrete, spatial, creative and intuitive style. The left hemisphere is said to favour the verbal, analytical, abstract, temporal and digital style. This is, however, not supported by neuroscientific research (Goswami, 2004) and the 'left-brain – right-brain' approach to teaching and learning has been heavily criticised (see Pritchard, 2005 for a very accessible review). Perhaps the labels of right-brained or left-brained, which are sometimes applied to learners or types of learning/teaching, should not be taken as a literal representation of the underlying brain activity but more as a shorthand for the two types of learning approaches detailed above. Stanovich (1998) reminds us that the only type of student who could be termed 'right-brained' would be one who had had the left-hemisphere removed.

Summary

Each of these six categories of approach to learning style involves a very different interpretation of what cognitive or learning style is and therefore how it can be measured in any individual or how it might be used to help that person in the world of education. The diversity of these models makes it clear that there is no universally accepted single model which can be termed *learning style* and that it is misleading to talk of models from different groups as though they represent the same thing. When researchers select a particular model or construct, they take the risk either of oversimplifying the picture or of overextending the construct in a way that might invalidate findings (Dunn & Dunn, 1991; Moran, 1991). In some cases both risks may co-exist. Educational practitioners need also to be very clear what type of style model they select to discuss or utilise.

Can this picture be further simplified?

Simplifying the picture – two inclusive approaches

Prior to the Coffield review, attempts had been made to simplify the proliferation of constructs in two ways. Some researchers aimed to correlate a range of models into a few non-contradictory, all-inclusive models, which could then form the basis for research projects, style diagnosis and educational strategies (see, for example, Riding & Cheema, 1991). Others such as Curry (1990), with her multi-layered onion, attempted to create a framework which could reconcile models through incorporating different levels of understanding.

An overview of the literature seems to suggest that there could be, in fact, two major ways of looking at learning style, which can gather many of these seemingly disparate models under two umbrellas. They could perhaps be termed a broadly based 'style mapping' approach and the 'cognitive processing' approach. Both of these approaches appear in the practical education literature on style (see, for example, Reid, 2005).

The 'style mapping' approach incorporates cognitive, emotional, sociological, environmental and physiological aspects of the individual's styles into what is termed a cognitive style 'map' or 'profile'. It will affect and be affected by an individual's preferences across these fields. This will be discussed in more detail in Chapter 2. Keefe (1987) and Gregorc (1982), who were instrumental in devising this model, divided style into two types: reception styles, or ways in which people absorb information, and concept formation and retention styles, or ways in which people store information. They suggested that the pattern of behaviour and performance that an individual brings to educational experience can be termed their learning style. This pattern arises from the interplay between the developing structure of neural pathways in the learner's brain and the learning experiences gained from home, school and society in general. Once established, however, these learning styles will persist regardless of experience of teaching methods or content.

The 'cognitive processing' approach focuses on the way in which people process incoming information from the environment (Riding & Rayner, 1998). Riding (1997) argues that research has established correlations or links between many of these labels and that a number of the seemingly different style constructs which other researchers have labelled are actually describing the same thing. Although Riding and his associates do not deny the existence of other models for cognitive style, Riding and Cheema (1991) concluded that all the different styles described can be boiled down into two principal cognitive style groups. Their aim was to devise a broadly based model that not only is of practical use for research and diagnosis but also is of benefit in education and the workplace. This clear, broadly based, two-dimensional model would both encompass a wide range of related constructs and offer a simple and accessible way of analysing style. The model also aimed to measure cognitive style objectively by comparing the approaches of different individuals to the simple cognitive tasks that underlie many of the skills needed for learning. Having established the validity for these two broadly based constructs, Riding and Mathias (1991) cite research to back the grouping of other constructs, within these two dimensions. In this they are independently supported by Schmeck (1988), who collected and reviewed a large number of these cognitive style constructs and states in that he considers all cognitive styles to be reflections of a single dimension that he labels 'global versus analytic' (p. 327).

Riding and Rayner called these dimensions the Wholistic-Analytic and Verbaliser-Imager style continua and they can be summed up as follows:

> *The Wholistic-Analytic continuum is whether an individual tends to process information in wholes or parts. The extreme wholistic learner is at one end of the continuum, the extreme analytic at the other.*
>
> *The Verbaliser-Imager continuum is concerned with whether an individual is inclined to represent information during thinking in words or in mental images. Extreme verbalisers form one end of this continuum, extreme imagers the other.*

Figure 1.2 is adapted from Riding and Rayner (1998, p. 99) and shows the two cognitive style continua or dimensions. Each is a very broadly based, clearly distinct style continuum linking two extreme styles. Each individual learner's style falls somewhere along each continuum from extreme wholistic to extreme analytic and at another point along the second continuum from extreme verbaliser to extreme imager. These two dimensions are independent – where an individual falls on the Wholistic-Analytic style continuum will have no bearing on their position of the Verbaliser-Imager continuum. There is no suggestion that any type of cognitive style is more or less effective than any other.

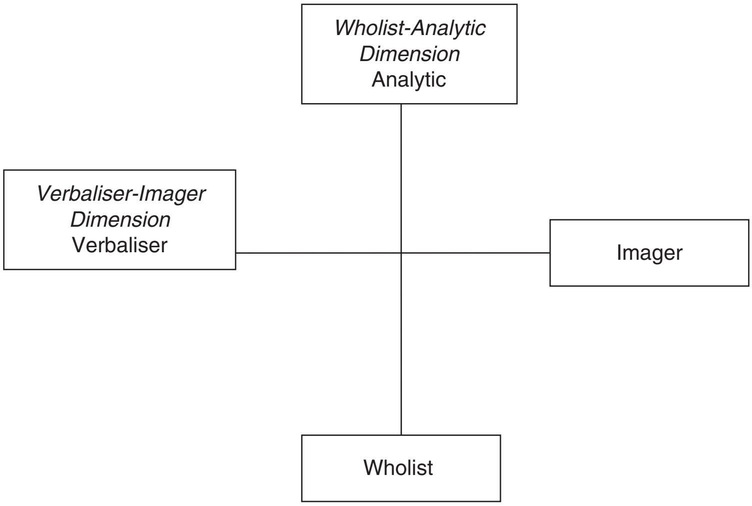


Figure 1.2 The cognitive style dimensions (adapted from Riding & Rayner, 1998).

On the first continuum, the Wholistic-Analytic, individuals can be assessed as to how far they take a broadly based inclusive approach or one that is sharply focused. On the second continuum, the Verbaliser-Imager, can be determined their tendency to use verbal or visual pathways to process and store information. Taken together, the two scores will comprise an individual profile that includes both aspects of learning – preference for structure and preference for mode of presentation or expression.

Bearing the two dimensions of the model in mind, it is useful to refer back to Jack, the student described earlier. Judging from his most successful ways of learning, he is likely to fall towards the imager end of the Verbaliser-Imager continuum and the Wholistic end of the Wholistic-Analytic continuum. When he was formally assessed using Riding's instrument, this was confirmed. When helped to use his particular style to compensate for his difficulties, his school life began to be more successful. For all these reasons, Riding's model of cognitive style analysis is the one that will be used as a basis for diagnosis and practical action for students, parents and teachers.

Should style theory go out of the window?

The review published by Coffield and his associates (2004) criticised every aspect of style theory from validity of constructs, reliability of assessment methodologies to its usefulness in the field of education. It questioned both the impact of labelling or stereotyping learners and the matching hypothesis, which suggests that students learn more effectively when their learning styles are both acknowledged and catered for (Dunn & Dunn, 1995; Riding & Rayner, 1998). The report caused upheaval in the learning style world, but it could be argued that this was overdue, that many models and practices had been accepted with little supporting evidence and that researchers and practitioners have now been forced to reconsider previously accepted models and practices and select more cautiously those approaches that do seem to work for individuals within the classroom.

Two undoubted benefits of the fashion for style has been firstly the shining of a spotlight onto the nature of learning, the acknowledgement that there are different ways of learning the same information and that these differences are not necessarily deficits. Secondly, there is evidence of the widespread implementation of a far broader range of teaching techniques linked with style theory, such as those described in this book and in the work of Reid (2005), Saunders and White (2002) and others suggested in the reading lists at the end of this book. Research has long suggested (Ott, 2007; Pumfrey & Reason, 1998; Schneider & Crombie, 2003) that vulnerable learners find multi-sensory techniques more accessible and effective and one outcome of style theory is to encourage teachers to pay more attention to the visual and kinaesthetic aspects of learning and teaching, thus helping more students to experience multi-modal learning – even if only as a bi-product of the intended style approach.

Practitioner experience, but as yet little hard empirical evidence, indicates that utilising the learning style approach and the many strategies offered in this book, seems to offer to all students a chance to consider how they learn and, to vulnerable students, respect for their particular ways of dealing with a learning task and a chance to rebuild confidence and to enhance their relationships with their teachers. There is a serious need for theoretical development and research but, in the meantime, it would be a pity, to lose the style baby with the bathwater.

Chapter summary

Definitions for cognitive and learning style are provided and discussed.

> *Cognitive style is an individual's characteristic and relatively consistent way of processing incoming information of all types from the environment.*
>
> *Learning style is the application of this cognitive style to a learning situation.*

The major controversies around cognitive and learning style have been presented:

- Is cognitive style a stable, long-lasting trait?
- What role does the environment play in the development of cognitive style?

- Does the learning style of students change in a developmental way?
- How do different teaching styles affect learners?
- How flexible is learning style?

Slightly differing research backgrounds to the variety of contemporary approaches to cognitive and learning style (termed the 'cognitive processing' and broad 'style mapping' approach to distinguish them) have been described.

The Riding two-dimensional cognitive style model, which both encompasses a wide range of approaches and offers a simple way of analysing style, is presented as a reliable and practical approach to the definition and diagnosis of cognitive or learning style. Based on the two style dimensions, Wholistic-Analytic and Verbaliser-Imager, it is the model that will be used as a basis for diagnosis and practical action for students, parents and teachers.

Chapter 2 explores the different methods of learning adopted by students with dyslexia and how style theory can be used to identify preferences to enrich their experiences.

Chapter 2

DIFFERENT WAYS OF LEARNING

Introduction

The previous chapter introduces a body of fairly academic information, much of which may have been new, particularly to readers whose primary interest may well be dyslexia rather than learning style. How would you go about remembering the bulk of this new information? Anyone familiar with the work of Tony Buzan (1982) might create a mind map (see Figure 2.1).

How do you respond to this? Does it resonate with and reinforce the impressions of Chapter 1 that you have carried with you or does it irritate you? What are the implications of your response for your knowledge of your own learning methods?

Concept maps – a visuo-spatial tool

Students are frequently encouraged to use this form of noting information when 'brainstorming' or collecting ideas for writing, and the later chapters on visual and wholistic methods will look into creating and using these for students with dyslexia. They are, however, also invaluable as a tool for storing or revising information and, once students feel confident with them, many frequently find themselves using them for virtually everything, whether it be revising for secondary-school examinations or planning the layout of a book. However, does this approach work for everyone?

It is likely that in any group of students there will be one or more who complain that concept maps 'do their heads in'. The previous chapter should have given some indication as to why this might be. A mind map is primarily a visual tool. Frequently, words are kept to a minimum, and some students will use symbols where appropriate.

Ideas are not spelled out verbally and emphasis is placed on the brain's ability to make connections in order to retrieve associated items or details from memory. Another characteristic of a concept map is that it is a map of the whole of a topic, and it is not, at first glance, orderly or sequential. Where does it start? Where does it finish? Can the reader follow it step by step? For some students it is simply a bewildering spidery maze that gets between the

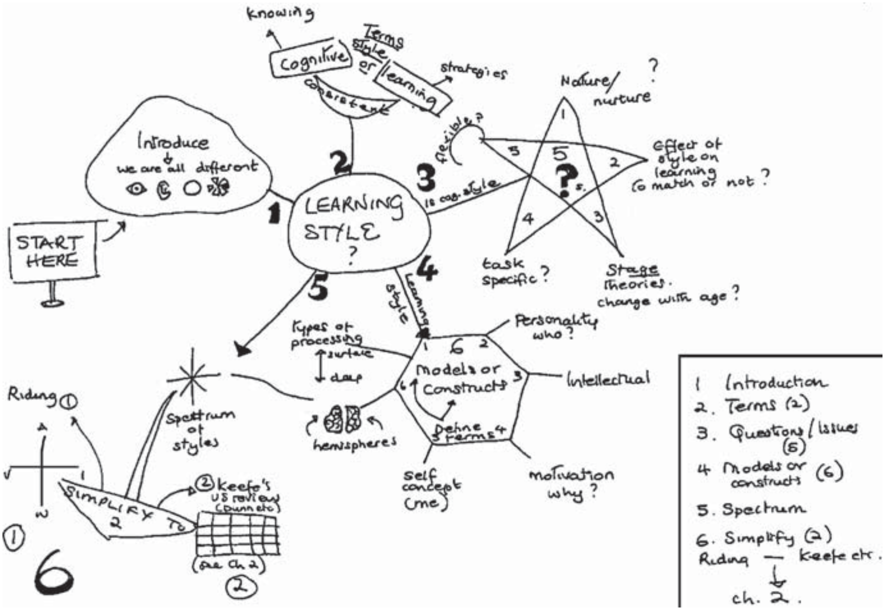


Figure 2.1 A mind map.

student and the information, increasing tension and reducing their ability to retrieve the facts they need.

Which students might find themselves in this predicament? Arguably, it will be those whose style strengths and preferences are not predominantly visual or wholistic – the student whose first tool is language, whose preferred type to learning is linear, detail orientated and focused on a logical approach to learning where aspects of any topic are learned separately and stored in a logical, orderly sequence. These students will probably find other methods more congenial, unless they are shown ways in which to adapt the concept map approach to their own style preference. (Chapters 7 and 8, which explore the needs of analytic and wholistic learners, should provide some help here.)

Helping students cope with the teaching methods of secondary school

Recently, many teachers in secondary schools have been introducing some of these more visuo-spatial methods into their classrooms (see for example, Cogan & Flecker, 2004), and this is to be welcomed greatly for the following reasons.

Several research projects, including Galton and Willcocks (1983) and Lunzer and Gardner (1979), have highlighted the key differences in teaching and presentation styles between primary and secondary classrooms. Although there is evidence, both anecdotal and in the increasing number of texts written for teachers (e.g. Brent, Gough & Robinson, 2001; Clausen-May, 2005), that one outcome of the focus on the importance of style may have been to make secondary school teachers reconsider the different ways in which information can be presented, entry to secondary school frequently means:

- a move away from practical work and from the presentation of concrete or abstract ideas supported by an environment that contains objects and activities to clarify and make 'concrete' the spoken message – 'context-embedded referents'
- a move towards the verbal introduction of more abstract ideas despite the fact that many young adolescents do not consistently show competence in working with abstract ideas at this stage (Coleman & Hendry, 1989)
- the tendency to spend substantially more time sitting listening to oral material presented by a teacher (Lunzer & Gardner, 1979)
- the change from group work, where students interact with the teacher on an individual or small-group basis, to the whole-class work situation, where information is delivered from the front of the class by the teacher, frequently verbally, with little opportunity for visual cues or concrete experience
- an increase in the cognitive and linguistic demands of the language used, for example, in a study about weather, the use of cognitively undemanding terms such as hot/cold, sunny/cloudy, in the primary school changes in the secondary school to abstract meteorological terminology, such as *pressure*, *fronts* and *humidity*, where words may either be previously unknown, such as *humidity*, or given a distinct context-specific technical meaning, such as *front*, which the students probably last came across in relation to doors or dinner queues.

Overall, these changes, particularly the move from concrete to abstract reasoning, can do considerable damage to the progress of a significant minority of pupils (Galton & Willcocks, 1983). This is exacerbated by the fact that many of these transferring children have not yet reached the stage of development where they are ready for this more abstract and verbal mode of presentation. In the previous chapter reference was made to Piaget's concept that children move through distinct stages in their cognitive development, as presented simply here. (This is not the place for detailed discussion of controversies around Piaget's stage theory. For further detail and discussion, see Piaget, 1969; Wood, 1988; Woolfolk, 2007.)

A summary of Piaget's Four Stages (Woolfolk, 2007) is given in Table 2.1. Only at stage 3, the concrete operational stage, do children begin either to be able to see the world from any standpoint but their own or to be able to

Table 2.1 Piaget's Four Stages.

Stage	Approximate ages	Area of development
1. Sensory motor	Birth–2 years	Begins to use imitation, memory and thought.Moves from reflex to intentional action.Can only see world and events from own perspective
2. Pre-operations	2–7 years	Develops use of language and ability to think symbolically.Develops awareness of logical sequence of actions.Still cannot reliably see from another person's perspective
3. Concrete operations	7–11 years	Begins to develop a logically consistent system of thinking based on physical reality and concrete systems that can be organised and manipulated
4.	From 11 years	Application of logical thought to abstract problems

provide logical or sensible answers to practical problems closely related to the immediate concrete environment. Abstract reasoning does not begin until the child reaches the fourth stage of formal operations, where they begin to be able to go beyond defining problems in terms of physical actions and their outcomes and to be able to apply logical thought to abstract problems and concepts, for example issues of morality, religion or politics. It is only at this stage that students begin to be able to hold and test a range of hypotheses in their heads, and it is debatable as to whether many students are capable of doing this effectively even by the age of 15, let alone 11 when, in the UK, they transfer to secondary school.

Some learning style theorists have also suggested the possibility of stages of development. Carbo (1995, cited in Dunn 1995) suggests the following progression:

tactual/kinesthetic ⇨ psychomotor ⇨ visual ⇨ auditory

However, this is much less extensively researched and not necessarily accepted. It would, however, suggest that a verbal style, based on listening, is the most mature style and that many students might not have developed this.

Both these stage theories would suggest that those students particularly at risk at transfer time would be those whose learning preferences are less verbal or auditory, who have survived the practically orientated, context-rich curriculum of the primary school and now find themselves floundering in a sea of abstract academic language. Carbo does actually suggest that a significant proportion of students entering the secondary school are still predominantly kinesthetic learners and this would link with Piaget's suggestions of the need for 'concrete' experience to enable understanding. Appendix 2 contains a few suggestions as to how to help them learn.

For these students, the introduction of visuo-spatial techniques and some of the accelerated learning ideas developed by the Accelerated Learning Centre (Smith, 1998; Smith, Lovatt & Wise, 2003) are beginning to provide some counterbalance to the predominantly verbal, abstract and theoretical delivery of the curriculum in the secondary school. However, it would be unwise to expect all learners to respond positively to this approach. It thus seems vital to be able to develop awareness of style preferences, in both teachers and learners, as they will inevitably affect both the teacher's preferred modes of presentation and the student's receptiveness.

Matching the mode to the style

It seems clear that different modes of presentation suit different students. However, is it simply a matter of matching the presentation mode to the student's preferred style for optimum results? As always, nothing is quite that simple.

Common sense might suggest that the most effective learning would take place when instruction and style are matched. As Chasty suggests (1985), if a student cannot learn in the way a teacher teaches, the teacher must teach in the way the student learns. Using a preferred processing style is likely to be more spontaneous, to use up less energy and neural space and therefore to leave more potential for other simultaneous processing activity, such as reflection or analysis (Dunn & Dunn, 1991; Vance, 2007). This is sometimes termed 'the matching hypothesis'. However, this hypothesis is not universally accepted, despite the fact that the majority of studies, based on a range of the models already presented, suggest that matching style preference with presentation mode does give rise to more successful learning outcomes.

Studies have been undertaken within the style mapping approach. Dunn (2003) refers to 800 studies that indicate the benefits of individualising teaching to match learning style preferences, as measured by the Dunn and Dunn Learning Style Model, with particular gains occurring at the initial presentation of new learning either for students with strong style preferences (Dunn, 1995) or in a situation where the small size of the group, or the level of student maturity, allowed greater focusing on metacognitive processes. The methodology used and scale of the studies have, however, been strongly criticised (Coffield et al., 2004; Given & Reid, 1999).

Riding and Rayner (1998, using their cognitive processing model) summarise a number of studies that indicate that style matching leads to success and that students spontaneously choose the type of materials that echo their cognitive style preferences. There are some predictable findings. For example, secondary-school students, when given a choice of versions of a sheet giving information, instinctively choose the materials that suit their own styles (Riding & Watts, 1997). Riding and Staley (1998) suggest that, even though university students are not very consciously aware of their style strengths, their performance is still improved by a match between presentation and verbaliser-imagery styles, although this finding was not echoed in a similar study (Mortimore & Crozier, 2006a), which found no significant impact from style matching. It was, however, within the area of gender differences where expectation of the positive impact of style matching was not confirmed.

There is much ongoing research in the area of gender differences in learning and academic achievement from the much-publicised concern over the comparative underachievement of boys in secondary schools to suggested differences in underlying cognitive processing in boys and girls. Interpretation is always difficult as it is hard to distinguish between cultural and biological influences on behaviour. It is therefore useful to look at the most basic levels of information processing and how this is expressed in cognitive style. There do not appear to be overall gender differences with respect to cognitive style (Riding & Rayner, 1998).

However, there was a suggestion that there is a difference in the processing of information with males processing information faster but more as a superficial scan while females were slower and more thorough. This may be linked with a gender difference in the location of activity within the brain. There is also a suggestion that, in some situations, females, unlike males, do better when their cognitive style does not theoretically suit the task. These issues of gender and brain activity are examined more thoroughly later in relation to dyslexia and its impact on each particular learning style.

The overall conclusion of Riding and his associates is, however, that any student's learning performance will be affected by the interaction between cognitive style and three aspects of any study material – the structure of the material, the mode of presentation and the type of content. The overall thrust of these studies supports the matching hypothesis. Stellwagen (2001) and Desmedt and Valcke (2003), however, suggest that there is little reliable empirical evidence and state that style matching is a teacher-driven concept of education, which is now being superseded as students are being encouraged to take responsibility for their own learning processes. Once again, we find disagreement among researchers in the field of style. How is the practitioner to move forward?

It is true that it is difficult to attribute learning success to a match between style preference and presentation rather than to any of a range of other influences in the classroom, including teacher skill, group dynamic, and student motivation. However, despite the criticisms, anecdotal reports from practitioners and students continue to give credence to the matching hypothesis and there is considerable, if not incontestable, evidence of success being achieved through matching instruction to learning style. Practitioners could therefore be encouraged to follow Given and Reid's (1999) example in exploring methodology that seems to work and to leave the researchers to continue the debate. It would seem crucial to give both students and teachers a chance to explore their own underlying preferences and to take responsibility for using the approaches that work best for them and for the full range of their students.

The next question, of course, is how?

Identifying cognitive or learning style

To enable a learner to make use of style theory, the style preferences must be identified. Rayner (2007) suggests that an awareness of learning style or of the self as a learner is key to establishing the design of curriculum and instruction for what he terms 'best-fit pedagogy' (p.28) and that this must include an assessment-based approach within the educational institution. Currently style can be assessed using activities such as written or computer-delivered questionnaires, interviews or observation of behaviours. A quick search on Google using 'learning style assessment' threw up over five million hits. Hit number 300 was offering yet another seemingly plausible questionnaire. This is bewildering – how can we be selective? Coffield and his colleagues (2004) suggested that all assessment measures for learning style should meet four psychometric criteria in terms of internal consistency, reliability and validity. They evaluated 13 style models, which are included in Appendix 6. Of all the assessment tools they investigated, only one met those standards. However, this is not to say that these assessment instruments should all be abandoned. They can be used carefully as a way of developing awareness of style and how it affects learning. It is, however, important here to stop and consider exactly why one might be attempting to make a 'diagnosis' of style and what this 'diagnosis' might be used for.

If we are aiming to develop a learner's awareness of how he learns, we must remember that any form of labelling can be as much of a stigmatising burden as a benefit. Difficulties will arise if students are labelled, judgements are then made about individuals' learning styles, and linked teaching strategies are implemented rigidly. This can end up with a teacher being confronted by a student stating 'It's no good talking to me – I'm a visual learner and I don't do words'. Application of learning style theory has limited rather than liberated this learner.

Unresolved controversies as to stability of style across time and context should also not be forgotten.

It is also important to distinguish between identifying style for research purposes and exploring learning preferences for educational reasons. If, as a researcher, I want to use a quantitative or statistics-based method to investigate whether a particular style is characteristic of a particular group – architects or students with dyslexia, for example – it is essential that the model of style and instrument I use for measuring meets stringent psychometric criteria or my findings will be worthless. Coffield and his colleagues based much of their criticism of style assessment on the type of psychometric research paradigm that demands validity and reliability over time.

On the other hand, as a teacher, my aim may be different – to encourage learners to explore the ways in which they learn best. Thus, the assessment tool becomes a means of establishing a dialogue between students and teachers. This can provide opportunities for students to discuss and develop their learning power (Deakin Crick, 2006) and for mutual acknowledgement that ways of learning which may be different from the standard ways accepted in an institution are respectable. This can empower students and allow them to transform what may formerly have been dependent or humiliating relationships with teachers into ones built on trust and mutual respect. Coffield's team admitted that research supports the suggestion that students become more motivated to learn by knowing more about their own strengths and weaknesses as learners and that the provision of a language to discuss the way in which they learn, will allow them to begin to understand the processes and to feel more in control of them (Desmedt & Valcke, 2003). There seems to be growing agreement that it is both helpful academically and emotionally empowering to develop people's awareness of how they learn, along with their ability consciously to use a range of strategies, visual, practical, kinaesthetic, over and above the conventionally verbal modes prevalent, particularly in secondary education, in the UK.

If the development of this dialogue and self-knowledge is our aim, rather than to 'diagnose' style and label learners, does it much matter what means of assessment we use? It could be argued that there are three criteria we need to consider:

1. Are we comfortable with the theoretical underpinnings to the assessment instrument? We must be certain that we understand any assumptions made and are aware of any research backing?
2. Are we comfortable with the nature and range of the activities/questions undertaken and the design of the questionnaire/rating scale? Do they really assess what they claim to?
3. Are we certain as to the suitability of the instrument for our purpose, the context and the age group?

Chapter 1 reviewed the broad range of models of cognitive and learning style. It also outlined the basic differences in focus and scope between two major approaches:

1. the style mapping profile
2. the cognitive processing model.

Both can be used as a basis for identifying an individual's style preferences.

The style mapping profile

A style mapping or profiling approach is the more broadly based of the two approaches and takes into account a range of domains of experience. Given and Reid (1999) describe in detail the Dunn and Dunn Learning Styles Model, a representative and well-used example of this approach (Figure 2.2). This has been extensively researched in classroom settings and covers five domains of experience: the reflective, emotional, sociological, physical and psychological. Stylistic preferences within these five domains influence learning outcomes.

1. the *reflective* covers environmental factors, such as sound, light and temperature, and internal factors, such as tendencies to reflect, explore, record and analyse performance
2. the *emotional* covers motivation, responsibility, persistence and personal goals
3. the *sociological* covers the kind of social groupings or relationships a student prefers for maximum success
4. the *physical* involves the need for mobility or tactile experiences and the physical influence of surroundings
5. the *psychological* covers cognitive needs, such as a preference for a particular mode of presentation or for a wholistic or analytic approach.

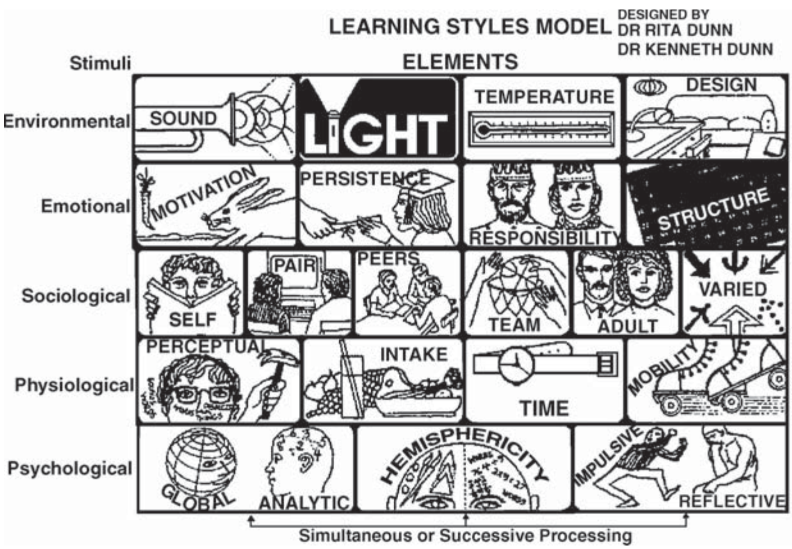


Figure 2.2 The Dunn and Dunn Learning Styles Model. From Dunn and Dunn: Teaching Secondary School Students Through Their Individual Learning Styles. Published by Allyn and Bacon MA. Copyright 1993 by Pearson Education. Reprinted by permission of the publishers.

If the intention is to tailor a learning situation to suit a student, it is necessary to have a clear picture of the student's learning style profile. This can be compiled in a number of ways:

Using a formal standardised inventory

Dunn and Dunn's Learning Styles Inventory is one example that has been studied extensively. It is widely in use in the United States of America with much reported success. It does, however, have various drawbacks, not the least being the practical fact that it has 104 items and therefore takes considerable time to administer. It has also been criticised on statistical grounds. It could be argued too that this type of learning styles profile is, in fact, trying to cover too wide a range of learning situations and is therefore unreliable as students' preferences could vary from situation to situation. However, unless we are concerned with labelling students and issues of reliability and validity for research purposes, this should not prevent its use as a way of helping students to think about how they like to learn. For example, do they find it easier to learn with music playing or in silence, alone behind a shut door or surrounded by activity, in a group through discussion or carrying out independent research? Does time of day, the need to move about, or the need to eat affect them? Dunn (2003) suggests that, although robust learners may not be deeply affected by situations that do not complement their preferences, vulnerable learners, or those tackling a new or really challenging task, can be thrown off track by seemingly minor circumstances that could easily be altered. It also has implications for classroom organisation, which will be discussed in Chapter 6.

Using informal questionnaires

A huge number of these are now available and can be very useful, both as diagnostic measures and as ways of raising a student's or teacher's awareness as to their own preferred styles. There are, however, drawbacks in the use of self-report questionnaires in that they have to be carefully designed to be reliable (Denscombe, 1998) and are never guaranteed to be an accurate reflection of what a person actually does. Any questionnaire should be reviewed carefully to ensure that they meet our criteria as described in this chapter. Some will be designed for the students themselves to answer, as in Ostler and Ward (2001). Others are for teachers to record observations about children or to monitor their own style of teaching. Figure 2.3 shows Given and Reid's (1999) questionnaire for the student, designed to raise their awareness of preference for style from the following range: visual, auditory, tactual and kinesthetic. Many questionnaires are based on the Visual, Auditory, Kinaesthetic (VAK) or Visual, Auditory, Reading and Kinaesthetic (VARK) models, the validity and reliability of which aroused particularly severe criticism from Coffield and his team on grounds ranging from the nature of the model, which seems to suggest that the role of the different senses within cognitive processing can be untangled in some way, to the crude design of some of the questionnaires, which frequently made judgements based on a minimum number of responses.

Understanding preferred learning styles

In order to maximise learning, it is useful to understand preferred learning styles. Preferred learning styles refer here to the auditory, visual and physical/motor skill strengths and weaknesses. Through this understanding you can maximise your learning potential.

Learning Style Inventory

Name: ______________________________

Date: ______________________________

Score 3 for mostly, 2 for sometimes and 1 for rarely.

Tick what applies to you	*Mostly*	*Sometimes*	*Rarely*
1. I am physically demonstrative and find clapping, hugging, patting friends on the back quite natural.			
2. I find it easier to learn by listening rather than by reading.			
3. I follow verbal directions more easily than written ones.			
4. I prefer to 'talk my way' through illustrations, charts and diagrams.			
5. I prefer to transfer written text into illustrations, charts and diagrams to understand them.			
6. I prefer written instructions to verbal instructions.			
7. I need to highlight keywords in order to understand the question.			
8. I tape notes to help me revise.			
9. I prefer text that is written on pastel rather than white paper.			
10. My hand aches if I write for more than ten minutes.			
11. I learn best through physically undertaking a task when possible.			
12. I remember best by creating a mental picture of information.			
13. I close my eyes to 'see' a word that I cannot spell easily.			
14. I have two or three tries at some spellings to 'see' which one looks correct.			
15. I find it easier to listen if I can 'fiddle' with something like plasticene or a ball of paper.			
16. I need to read information or an instruction aloud in order to understand it.			
17. When reading silently I mentally 'hear' the words and add emphasis in my mind where necessary.			
18. I recognise friends' voices on the telephone with ease even if I haven't seen them for ages.			
19. I chew the ends of pens and pencils when thinking.			
20. I enjoy research-type activities where I can search out information on the Internet or in the library.			
21. I enjoy walking round when revising where possible.			

Figure 2.3 Given and Reid's questionnaire. Reproduced by permission of the authors.

It might well be risky to utilise such a style instrument in a research study. However, as a way of helping students to think about and discuss their preferred ways of learning, a carefully designed example like this one, is helpful. Like many others it is based on a range of academic and everyday tasks and makes the students think about how they go about tackling them.

Reid and Strnadova's Pupil's Assessment of Learning Styles (PALS) (2004, quoted in Reid, 2005) provides a useful example of an assessment for primary and secondary students This measures the student's social, environmental, emotional, cognitive and metacognitive preferences and involves two rating scale instruments, one for the teacher's observations and one for the student to allow cross-referencing.

It is becoming increasingly common in Further or Higher Education in the UK to issue questionnaires to students on induction to encourage them to think more about their learning preferences and develop an objective attitude to their learning. Some, such as Studyscan (Zdzienski, 1997), which is combined with a screening for dyslexia, are computer administered and scored. Others are pen and paper. The one illustrated in Figure 2.4 comes from Bridgwater College, Somerset.

Finding out your preferred learning styles
Look at each question and then decide which method you would choose to help you learn – there are no right or wrong answers. Put a tick in the box to make your choice.

1. Times table/Multiplication
   (a) Cover over and picture it ☐
   (b) Saying out aloud ☐
   (c) Adding on fingers ☐
2. Spelling a word
   (a) Write it down ☐
   (b) Imagine what it looks like ☐
   (c) Say each letter out ☐
3. Learning a foreign word
   (a) Repeating it out loud to yourself ☐
   (b) Writing it out over and over again ☐
   (c) Looking at a picture next to the word ☐
4. Learning a history fact
   (a) Watch a video ☐
   (b) Listen to a person on a radio explaining what happened ☐
   (c) Role play- act out what happened ☐
5. Learning how something works
   (a) Take the object apart and try to put it back together ☐
   (b) Look at a diagram or a picture on the board ☐
   (c) Listen to a speaker telling you about it ☐

Figure 2.4 Bridgwater College's student questionnaire.

6. Learning a story
   - (a) Tell someone else the story ☐
   - (b) Draw pictures /cartoons to tell the story ☐
   - (c) Imagine the story ☐
7. Learning a new sport
   - (a) Watch a demonstration ☐
   - (b) Repeat back instructions to the coach ☐
   - (c) Do it ☐
8. Learning a new move on a trampoline
   - (a) Let the coach support you through the movements so you feel how to do it ☐
   - (b) Look at diagrams of the move on cards (flash cards) ☐
   - (c) Talk through the movements with a friend ☐
9. Learning how to use a new tool in the workshop
   - (a) Listen to your friend explain how to use it ☐
   - (b) Teach someone else how to use it ☐
   - (c) Watch someone else use it ☐
10. Learning how to make a surry
    - (a) Look at the instructions on the packet ☐
    - (b) Listen to a tape about what to do ☐
    - (c) Try to make it ☐
11. Learning to count in a foreign language
    - (a) Sing the words ☐
    - (b) Look at cards/posters ☐
    - (c) Play French bingo ☐
12. Learning how the eye works
    - (a) Listen to a Doctor telling you ☐
    - (b) Make a model ☐
    - (c) Look at a diagram of the eye ☐

Figure 2.4 (*Continued*).

This questionnaire again focuses on auditory/listening, practical and visual/seeing styles. It takes as its basis a range of academic and everyday tasks and makes the student think about what kind of approach they would take to each one. Each answer is allegedly linked to a particular mode and as such throws up questions, such as whether saying letters out loud when learning spellings really represents an auditory method. It is simplistic, fairly representative of its kind and useful as a way of getting students to focus on the way they learn, possibly for the first time in their academic lives.

All self-report style questionnaires have inherent weaknesses, including individuals' conscious or unconscious distortion of the truth, unwillingness to make the necessary effort to respond accurately and their bias due to social pressures or a desire to please or irritate. These 'blunt instruments' have a real role to play in increasing awareness but, if greater accuracy and consistency is required, they need to be combined with more in-depth measures such as observation.

Professor Ian Robertson has published a fascinating book *The Mind's Eye* (2002), which is recommended reading for those who are interested in understanding how neuroscience might underpin some of the suggestions as to how we differ individually in our tendencies to use the mind's eye to capture and express our world. He also provides a useful range of exercises and strategies to demonstrate the theory that he explores. He suggests two ways of investigating where an individual might fall on a verbaliser-imager dimension, one of which is based on a type of questionnaire. Firstly he describes a test devised by Professor David Marks (1999, cited in Robertson, 2002) that measures how vividly you can devise a picture in your mind's eye. It contains tasks where you have to create a mental picture of an absent friend and rate yourself on how vivid the image is. Robertson also (p. 123) provides six questions adapted from the questionnaire developed by Paivio (1971, cited in Robertson, 2002) who studied the different elements of processing implicit in memory:

1. Do you often use the mind's eye to solve problems with mental pictures?
2. Can you easily see objects moving in your mind's eye?
3. Can you do arithmetic by imagining the numbers written up on a board?
4. Do you find it hard to create a mental picture of anything?
5. Do you prefer problems based on words (e.g. crosswords) compared with those that need you to use mental images (e.g. will a particular wardrobe fit in your bedroom)?
6. Is most of your thinking verbal – in other words do you tend to speak to yourself in your head?

The first three indicate the imager, the last three the verbaliser. The majority of people will tend to be somewhere in the middle although many are more extreme. Robertson also suggested that the comparative speed with which an adult reads two passages of equal length (50 words), one full of vivid images, the other more abstract, can indicate preferences. All readers will take longer to read the visual passage but the visualisers will be much slower than the verbalisers on this passage while reading the abstract piece at roughly the same speed. They will, however, be able to remember more of the visual passage than the verbalisers.

Using observation

The advantages of observing behaviour are that it occurs in real or natural settings across alternative situations, it is direct rather than relying on reported strategies, it is diagnostic and it can go on informally within ordinary class work. The focus can be on the student's behaviour, use of strategies or, as above, the way in which certain tasks are completed. It does need to be systematic, and ideally a teacher or classroom assistant should use an observational record sheet they have devised to suit the requirements of the situation. For example, when trying to determine which modality – visual, auditory or tactual – a student favours, Given and Reid (1999) suggest that some of the following aspects of behaviour can be significant:

1. Use of language – visual learners will often tend to use 'visual' vocabulary: 'I see what you mean. Do you get the picture? I don't like the look of this!'
2. Auditory learners may use expressions like 'That sounds like a good plan. Talk me through that.'
3. Spontaneous choice of ways of showing knowledge – would it be writing, drawing, talking or demonstrating?
4. What type of learning generates signs of tension?
5. What types of instructions does the student find easiest to follow – written, oral, visual or demonstrated?
6. What does the student choose to do with spare time – listen to music, draw, construct, play sports or other physical exercise?
7. Does the student spontaneously use maps, diagrams, notes or oral rehearsal when trying to remember something?

Checklists

It might be convenient and time saving to devise a checklist that can be used by a number of observers to build up a comprehensive picture of a student's approach to learning over a variety of tasks and a period of time. It would be possible to do this across all or some of the five domains – reflective, emotional, sociological, physical and psychological – according to the teacher's focus. Figure 2.5 shows an example based on Riding's cognitive processing model.

Using a combination of techniques: style and mathematics

Style is as relevant to mathematics as it is to any other area of the curriculum. However, there is insufficient scope within this book to deal with this area in detail although discussion of the impact of dyslexia on mathematical learning and some strategies for helping with mathematics will be found in

Example of an Observational Checklist

Choose a range of lessons or activities and observe the incidence of the following types of behaviour. Tick appropriate column each time behaviour is observed.

Date ____________ Lesson ____________________ Observer ____________________

	Yes	No
Verbal		
• Follows oral instructions successfully		
• Shows ability to follow verbal events		
• Asks questions		
• Follows answers		
• Listens attentively		
• Contributes to discussions		
• Fluent communicator – good vocabulary		
• Willing to work in groups		
• Works successfully in groups		
• Chooses to learn from books, tapes and text		
• Good at explaining things		
• Likes to take notes		
• *General comments*		
Visual		
• Chooses to learn from film, illustration, diagrams etc.		
• Good with maps and graphs		
• Chooses to use symbols, pictures to store information		
• Observant		
• Visualises, sees things in mind's eye		
• Good navigator		
• Uses visual terminology		
• Chooses to spend time drawing etc.		
• *General comments*		
Wholist		
• Asks for advance organisers		
• Sees links between ideas		
• Looks for patterns and relations		
• Finds retention of detail difficult		
• Finds lists and sequences difficult		
• *General comments*		
Analytic		
• Able to follow logical sequences		
• Likes to follow step-by-step instructions		
• Enjoys sequential problem solving activities		
• Uses lists spontaneously		
• Doesn't automatically see links and patterns		
• Good recollection of detail		
• *General comments*		

Ticks in the No column of the verbal section may be an indication of a visual learning preference.
Ticks in the No column of the wholist section may be an indication of an analytic learning preference.

Figure 2.5 Example of an observational checklist.

Chapters 4, 6 and 9. Those whose role includes the teaching or support of dyslexic mathematicians should consult Chinn and Ashcroft (2006), Chinn (1996, 1998, 2004), Kay and Yeo (2003), Yeo (2002), Butterworth and Yeo (2004) or Clausen-May (2005) who provide excellent combinations of theory and detailed practice. Chinn and Ashcroft also provide discussion as to the relationship between dyscalculia and dyslexia, which remains unresolved.

Two distinctive styles of maths learning personalities have also been identified, quantitative and qualitative learners or 'inchworms and grasshoppers' (Bath, Chinn & Knox, 1986). Quantitative learners shares many of the qualities of Riding's analytic learner. They are methodical, like to follow rules and proceed step by step. Qualitative learners are more intuitive and holistic – they tend to make use of what may be a more visual approach to see patterns and to reach conclusions without making use of step-by-step calculations. As with

	Inchworm	Grasshopper
I. Analysing and identifying the problem	1. Focuses on the parts and details; separates	1. Tends to overview; holistic; puts together
	2. Looks at the numbers and facts to select a relevant formula or procedure	2. Looks at the numbers and facts to estimate an answer or restrict the range of the answer; controlled exploration
II. Solving the problem	3. Formula, procedure orientated	3. Answer orientated
	4. Constrained focus; uses a single method	4. Flexible focusing; methods change
	5. Works in serially ordered steps, usually forward (rifle)	5. Often works back from a trial answer; multi-method (shot gun)
	6. Uses numbers exactly as given	6. Adjusts, breaks down/builds up numbers to make an easier calculation
	7. More comfortable with paper and pen; documents the method	7. Rarely documents the method; performs calculation mentally
III. Checking and evaluating	8. Unlikely to check or evaluate the answer; if check is done, uses the same procedure or method	8. Likely to appraise and evaluate answer against original estimate; checks by an alternate method
	9. Often does not understand procedure or values of numbers; works mechanically	9. Has good understanding of the numbers, methods and relationships

Figure 2.6 Maths learning personalities. Reproduced from Chinn and Ashcroft (2006) with permission from the authors.

other areas influenced by style, neither is preferable – the efficacy will depend on the context and the skill of the user. The inchworm needs to be helped to see why particular strategies are needed to solve a problem. The grasshopper needs to be encouraged to document methods and check the details of answers. Chinn and Ashcroft (2006) emphasise the importance of the teacher being aware of and responding to the individual's preferences and using a range of styles and techniques to enable the lesson to reach as wide a range of learners as possible. Figure 2.6 shows the characteristics of grasshoppers and inchworms at different stages of mathematical activity.

They recommend using a combination of techniques to create a maths profile, which includes a measurement of cognitive style in mathematics. Kay and Yeo (2003) suggest that some standardised tests lend themselves to diagnostic use and suggest the Wide Range Achievement Test (WRAT3, available from the Dyslexia Institute), the Basic Number Screening Test, Graded Arithmetic Mathematics Test, or Mathematics Competency Test (all available from Hodder and Stoughton), which should be administered in such a way as to give the learner the opportunity to explain how items were worked out. Other assessment instruments include Denvir and Bibby's Diagnostic Interviews in Number Sense (www.beam.co.uk), Smith and Lord's (2002) Spatial Reasoning Tests (available from NFER Nelson). Chinn has developed the Test of Thinking Style in Mathematics, (Chinn, 2002) an Informal Assessment of Numeracy Skills, which is a diagnostic battery of tests, including a cognitive style test. They also suggest that observation of the way a learner tackles maths will give a very clear indication of their predominant style. Chinn and Ashcroft suggest that observation of the mathematical strategies a child uses, such as whether fingers are counted to add the numbers 8 and 7 or (2 x 8) minus 1 is used, or how a subtraction sum such as 1000 minus 699 is done, will give a good idea as to whether the child is a quantitative or qualitative learner. For example, they provide a chess board and ask the learner to decide how many squares are black. The inchworm is likely either, at the most basic level, to count the squares or, slightly more sophisticated, to use some computation of multiplying the number of black squares on each side with the number of black squares on the other – this is misleading! The holist grasshopper may work on the idea of multiplying the total number of squares on each side of the board to work out the total and then halve it. It is either a parts to whole or a whole to parts approach.

Chinn and Ashcroft also support Sharma's suggestion (1989) of using the order in which the Rey Osterrieth Complex Figure (see Figure 2.7) is copied as an informal method of diagnosis. Sharma predicts that a qualitative learner will start with the outline, whereas a quantitative learner will start with the detail.

This combination of testing and observation of the learner's behaviour while carrying out mathematical learning tasks is a good example of the combination of a range of assessment measures to compile a style profile. The Riding Cognitive Styles Analysis (CSA) (1991a, see next section) can also be used alongside others to identify wholistic/analytic preferences. This multi-method approach to assessment can be applied to other curriculum areas.

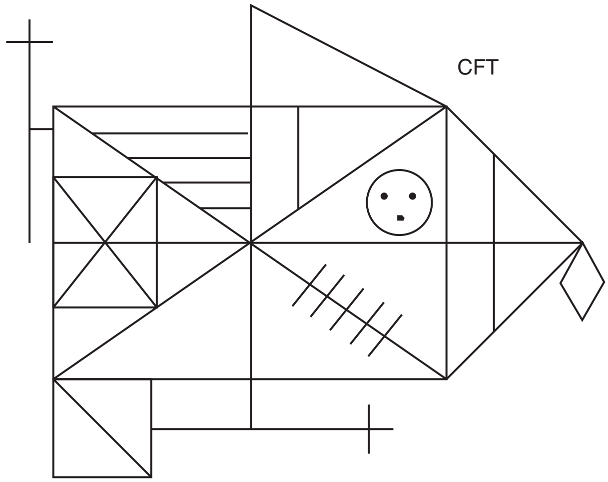


Figure 2.7 The Rey Osterrieth Complex Figure.

The cognitive processing model

As practitioners, we are concerned with developing the skills of our students and many of these skills could be said to boil down to the processing that underlies the learning. The kinds of preferences that create a learning profile, as revealed by an instrument such as the Dunn and Dunn Learning Inventory, is of real interest to us but, arguably, finding ways in which we can enhance the students' processing powers, once social, emotional or environmental preferences are understood, is just as crucial. The assessment measures explored so far frequently include measures of visual or auditory/verbal processing but they all suffer from the disadvantages inherent in questionnaire or rating-scale based procedures. The Cognitive Styles model devised by Riding (1991a, 1991b) and described in Chapter 1 (Figure 1.2) concentrates on how we process information and hence, through adopting the matching hypothesis, suggests a picture of a learner's preferred modes of presentation and operation. It focuses on the cognitive basis for organising incoming information and establishes a style profile based on this. There is, however, also a body of research that links particular cognitive styles with social behaviours and suggests that it may also be possible to ascertain the social settings that will be most congenial to learners. This is described in Chapter 6. As explained earlier, Riding's simple two-dimensional continuum does actually contain a whole range of other models of cognitive style within itself; so, although it is simple, it is not simplistic.

A computer-presented assessment

Riding has developed the Cognitive Styles Analysis (1991a) to assess an individual's cognitive style. It has the following advantages:

- It is a computer-presented assessment, which is quick and simple to administer. It takes about 20 minutes and does not need teacher input.
- It offers an alternative way of identifying learning preferences – measuring not what a learner says but what they actually do across a number of simple tasks.
- It is self-explanatory and consists of a series of very simple tasks, which most adults and children are able to perform with ease.
- It avoids using self-report or questionnaires, because of their inherent weaknesses.
- It assesses more directly the underlying sources of an individual's behaviour patterns by assessing performance on simple tasks, which might then be representative of an individual's general characteristics of processing. Although simple in themselves, they reflect very fundamental underlying tendencies within the individual's information processing system and so allow the cognitive styles to be detected.
- It is not threatening or intrusive, because it does not ask for personal details or attitudes and only requires simple neutral judgements. It is, therefore, relatively stress-free and is unlikely to raise anxiety levels that might change an individual's approach.
- It is free from culture and context and unaffected by literacy skills.
- It prints out an individual score for both the Wholistic-Analytic and Verbaliser-Imager dimensions showing at what point on each continuum it falls. An accompanying handbook (Riding 1991b) gives information as to the learning and behavioural implications for this style.

How does it measure each dimension?

- For the Verbaliser-Imager dimension, the Cognitive Styles Analysis (CSA) assesses the balance between verbal and imagery representation by comparing the ease and speed with which an individual responds to a statement that requires a verbal judgement with the ease and speed for one that is based on a mental image. It does this by comparing a person with themselves; so it is not a test of overall speed but of a person's performance in the verbal mode relative to their performance in the imagery mode. The computer records the response time to each statement and calculates the Verbaliser-Imager ratio. A low ratio indicates a Verbaliser and a high ratio an Imager with the intermediate position being described as Bimodal. In this approach individuals have to read both the verbal and the imagery items so that reading ability and reading speed have no effect on the outcome (Riding 1997).
- With respect to the Wholistic-Analytic dimension, the CSA assesses the balance between the ability to see a figure as a whole and the ability to dis-embed or see it divided into its parts. This reflects the way an individual organises information – either in parts or as a whole.
- Each individual will be placed at some point along each dimension; the higher or lower the score, the more extreme the cognitive style and the

more difficulty the individual may have in absorbing information presented in the less-favoured mode. It is likely that a person will be further from the central position on one style than on the other, and this will mean that the effect of one style will probably be more noticeable and will be dominant.

Is the CSA considered empirically sound?

The CSA had become a widely-used tool, particularly within the field of education where a number of research studies showed its practical implementation for classroom use. Research was also emerging into its use within the world of the workplace (see Riding & Rayner, 1998, for an overview). Unfortunately the CSA did not emerge unscathed from the Coffield Review despite the fact that Riding (1997) and Riding and Rayner (1998) provide considerable evidence, through a range of studies that it is valid or, in other words, that it does measure what it claims. An index of reliability is, to some extent, built into the CSA by the speed index and percentage correct scores which indicate (1) how carefully an individual did the CSA and (2) whether they were able to do it. It had previously been criticised by Peterson and her colleagues (2003a) who had been concerned by the lack of research on its stability and internal consistency and constructed a parallel version of the test to carry out test-re-test reliability examinations on the original and their devised parallel forms. Their conclusions were that there were questions over the validity of the Verbaliser-Imager construct, that neither dimensions remained consistent over time and that the test needed to be lengthened to establish consistency in the Wholist-Analytic dimension. Riding, in his turn (2003), criticised the methodology Peterson and her colleagues had used in her reliability test, cited a number of studies he had carried out to establish the validity of the dimension (Riding & Taylor, 1976; Riding & Anstey, 1982; Riding & Calvey, 1981; Riding & Dyer. 1980) and focused on evidence for a relationship between his style dimensions and objectively measured performance including EEG differences (reviewed by Riding, 2000, 2001). Peterson and her colleagues (Peterson, Deary & Austin, 2005) have now designed a new measure for the Verbaliser-Imager dimension, which is awaiting publication and will hope to provide a reliable alternative. As with so many things in the style field, it is impossible to be totally confident.

The simplest and most accurate way of determining an individual's cognitive style would be obviously to use a reliable instrument designed for the purpose. The CSA is still well regarded and Peterson's instrument offers opportunities. However, the same methods of questionnaires and observation referred to earlier in this chapter can be used. It can also be instructive to try delivering teaching material in different structures and modes of presentation, to compare results and to discuss students' feelings about the methods. This will not have the same precision or objective validity as using the assessment instrument.

Once a cognitive style profile has been assessed, students or teachers can choose to investigate social and behavioural implications of style as indicated by the Riding research or to get involved in some of the other domains discussed earlier. At this point, observation techniques to gather information about preferences in other domains can be used if required, but this is not essential. It is obviously up to educators to come to their own conclusions about this method and its implementation.

RECAP

This broad-based approach to learning style has its supporters and its detractors.

Supporters claim:

- *using a range of diagnostic methods can enable an individual's unique learning style profile to be mapped*
- *the range of domains covered takes into account the variety of factors that influence successful learning*
- *lessons can be planned and executed to address students' basic psychological needs*
- *students can be encouraged to learn about their learning and take responsibility for it*
- *its efficacy has been shown in a range of classroom studies.*

Critics suggest:

- *there are dangers inherent in the labelling of style*
- *the diagnostic tools have technical flaws which render them unreliable*
- *they are too time-consuming*
- *there is too much reliance either upon crudely constructed questionnaires or observation, both of which are subjective and can give unreliable information*
- *the range of domains covered is too wide for precision*
- *it is too easy to attribute behaviours wrongly to underlying learning styles*
- *behaviour may be more random and inconsistent than can be shown by a limited amount of observation in the time available*
- *it is not practically possible to set up the kind of differentiated classrooms that the learning style approach demands*
- *the classroom studies showing the success of this kind of teaching are empirically flawed.*

It is essential to apply the following criteria to any assessment methodology you select:

- *Am I clear as to my purpose in identifying a learner's style preference?*
- *Am I comfortable with the theoretical underpinnings to the assessment instrument?*
- *Am I comfortable with the nature and range of the activities/questions undertaken and the design of the questionnaire/rating scale? Do they really assess what they claim to?*
- *Am I certain the instrument suitable for my purpose, the context and the age group?*

A caution

Everything is open to interpretation, including this chapter. It is easy to oversimplify the results and implications of any research.

Here are three examples:

1. 'Once a student's learning style has been diagnosed, they will always respond better to material presented in the way that matches the style.' Well, if they are able students with dyslexia who score fairly highly on the verbalising continuum, this may be true… until they have enough trouble reading more complex language to prevent them understanding the arguments.
2. 'Observing a student's behaviour in a range of situations will give you a clear picture of their preferred mode of learning.' Well, yes. Until you notice that on Tuesday, when given the choice of a range of sources to research his project, Toby, a 13-year-old able student with dyslexia, chose to take notes from a fairly complex library book. On Wednesday he rejected this and insisted on using a video to make a mind map. On Thursday he used written material cut and pasted from a CD Rom and on Friday he announced he would like to present his findings as a mixture of posters and oral explanation. What is going on here?
3. 'A student who scores highly on the imaging side of the CSA continuum is bound to like mind maps.' Well, it depends how they are presented… Joe, a 16-year-old student with dyslexia and mild receptive language difficulties, strongly visual and artistic, had sat through a couple of superb and dynamic sessions on the use of mind maps or brain-imaging techniques complete with diagrams and maps. When asked to produce his own mind map of the events of the play Romeo and Juliet, he looked completely bewildered. 'What's geography got to do with Shakespeare?' he said. What went wrong there? Discuss.

Arguably the most valuable conclusion is that nothing can be taken for granted. However, there is enough evidence to suggest that the following are important:

- identification and discussion of a student's learning style preferences or a teacher's presentational style
- enabling students to try out a range of presentational and study styles to develop self-awareness of what works for them
- use of a range of styles to accommodate the range of students in any group.

This resonates strongly with one of the most established techniques of teachers working with students with dyslexia – the multi-sensory approach.

Chapter summary

This chapter examines visuo-spatial modes of presentation, such as mind maps and why not all students relate to them.

It investigates the changes in presentational style confronted by children on transfer from primary to secondary schools and the difficulties for those whose verbal or abstract skills are less fully developed.

It discusses evidence for and against the efficacy of matching learner and presentational style with the conclusion that giving the individual student the chance to identify preferences is crucial.

It presents and weighs up two major approaches to identifying style preferences:

1. the style mapping approach
2. the cognitive processing approach.

It looks at the advantages and disadvantages of a range of diagnostic tools:

- formal inventories
- informal questionnaires
- computer-administered tasks
- observation and discussion of preferred strategies
- combining techniques.

It also cautions against oversimplifying the role played in learning by style.

Chapter 3 starts to apply learning style theory to working with students with dyslexia or specific learning difficulties.

Part Two
DYSLEXIA

Chapter 3
THE 3 'D'S: DYSLEXIA, DEFINITIONS AND DIAGNOSIS

Introduction: What is dyslexia?

There is a student at the front of the class. The students are talking about the environment, the threats posed by pollution and global warming. Her hand goes up again and again. Each time her comment is both original and to the point. Not only that but she can talk at some length and discusses eagerly with her friends when they go into groups to collect ideas for written homework. Next day she hands in her work. It is half a side, untidy, simplistic. The teacher challenges her. 'Didn't have time, Miss,' she says. Another lunchtime spent in detention.

There is another student at the back of the class. His legs are stuck out across the gangway. His file seems to have exploded onto his desk. His shirt is hanging out; his tie is nowhere. When the teacher turns his back there always seems to be a ripple of counter-culture from that corner of the room. He always seems to be doodling when he should be following the text the teacher is reading, but from time to time produces a comment that shows he's taken in the content. Homework? Forget it.

There is a little boy at the side of the class. Other students seem to pick on him a bit. Written work is dragged out of him. He doesn't say a lot, but occasionally, if students have been asked to read aloud around the class, his pen will suddenly cover him with ink or he will stick a compass into the girl next to him just before he is due to read. He doesn't seem to mind being sent out of the room.

Which of these students has dyslexia or specific learning difficulties (sometimes termed SpLD)? The answer is that all or none of them could. The first girl could be stroppy, have problems at home or be severely dyslexic and unable to express herself on paper despite obvious ability. The back-row boy could be Jack the Lad or concealing his dyslexic difficulties by opting out, acting the class clown, causing trouble – the range of displacement behaviours is limited only by ingenuity. The little boy at the front could have all-round mild learning difficulties, language difficulties or could exhibit intermittent inappropriate behaviours or he could be a dyslexic virtual non-reader concealing his difficulty. It is not particularly easy to identify dyslexia in students from their behaviour.

Defining dyslexia

The difficulty is increased by the fact that the establishing of definitions, boundaries and support for dyslexia or specific learning difficulties continues to be both problematic and contentious, as indicated by the sound and fury stirred up by Professor Jo Elliott's somewhat premature announcement in 2005 of the death of dyslexia, which was roundly attacked by researchers, practitioners, parents and people with dyslexia alike at a packed conference hastily assembled to wrangle over the corpse. Dyslexia survived. However, within the realm of psychology and social science, definitions tend to be slippery things and this elusiveness persists within the dyslexia world. The difficulty arises not so much from the availability of definitions – Pumfrey and Reason's (1998) list of 11 well-accepted definitions has swollen to include over 40 presented in a recent research review (Rice & Brooks, 2004) – but from the fact that these definitions reveal considerable disagreement. Rice and Brooks go so far as to describe this lack of clarity as a 'degree of inconsistency verging on anarchy' (2004, p. 16). This is not helpful to professionals, parents or people with dyslexia.

Why should this confusion exist? It is partly the product of the fact that so many people with so many different agendas from so many disciplines are involved in researching, supporting, financing and creating policy around people with dyslexia, and each tends to base their work on a particular definition. This does not help us to understand what we might be looking for in our students, or whether it is essential for practitioners to 'diagnose' dyslexia. Can the situation be clarified?

First, the terminology

Should the discussion be about 'dyslexia' or 'specific learning difficulties'? Originally, the term 'dyslexia' referred strictly to an impairment in the processing of written language. It was later recognised (Pumfrey & Reason, 1998) that the two terms seemed to be used interchangeably to cover the particular pattern of difficulties experienced. It has also been suggested that the term 'specific learning difficulties' includes dyslexia as specific difficulty along with attention deficit disorder (ADD), dyspraxia and speech and language processing difficulties (Pollock, Waller & Politt, 2004). The term 'dyslexia' is used throughout this book with no suggestion that the characteristics are confined solely to difficulties with written language.

Secondly, what is dyslexia?

How can we make sense of over 40 definitions with no two exactly the same? It helps to bear in mind that each definition tends to reflect one, or both, of two elements – the contextual purpose of the definition and the causal theory or research that underpins it. It is also helpful to be aware of how developments in research and attitudes lead to changes in definitions. Early research into dyslexia focused on literacy. Thus the World Federation of Neurology in 1968 focused on literacy when it stated:

> *Dyslexia is a disorder manifested by difficulty in learning to read, despite conventional instruction, adequate intelligence and socio-cultural opportunity. It is dependent upon fundamental cognitive disabilities which are frequently of constitutional origin. (p. 21)*

Apart from suggesting that cognitive disabilities underpin dyslexia, this definition does not explore causes and has been criticised as vague. It is a 'deficit definition' based on limitations observed in behaviours or skills and suggests the existence of a discrepancy between intelligence and reading skills as a crucial part of the definition. A 'deficit' definition characterises a condition by what it lacks rather than by any positive characteristics. Controversy exists around both this type of definition and the use of discrepancy definitions involving a gap between achievement in literacy and potential according to measures of intelligence (Reason & Frederickson, 1996) for reasons which will be explored later.

This definition also focuses on reading, which implies that, once literacy difficulties are overcome, the individual ceases to have dyslexia. Miles's research (1993) had confirmed the suggestion that dyslexia consists of a pattern or syndrome of difficulties and that deficits in spelling and reading form part of a wider processing disability involving distinguishing between, and naming, forms of symbolic material, such as graphemes or number systems. This was reflected in the way the 1989 Dyslexia Institute skills-based definition broadened out the range of difficulties students may experience:

> *Specific Learning Difficulties can be defined as organising or learning deficiencies which restrict the students' competencies in information processing, in motor skills and working memory, so causing limitations in some or all of the skills of speech, reading, spelling, writing, essay writing, numeracy and behaviour. (Pumfrey & Reason, 1998, p. 14)*

By 1999, the Division of Educational and Child Psychology (DECP) of the British Psychological Society (BPS) was aiming to establish a definition which could both set baselines in the UK for a diagnosis of dyslexia as opposed to generalised reading delay and inform the provision of support to individual learners. This definition, which influenced decisions about resource allocation, stated:

> *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 of a staged process of assessment through teaching. (BPS/DECP 1999, p. 18)*

In its turn, it was criticised for a number of reasons:

- firstly, its return to a focus on literacy which ignored the existence of the 'literate' adult with dyslexia (Miles & Miles, 1992) and the situation of those adults who experience dyslexia regardless of whether they have learned to read, write and spell (Frith, 1997; McLoughlin, 2004)
- secondly, its omission of the concerns of many practitioners whose experience of working daily with learners with dyslexia convinces them that differences in dyslexic patterns of learning go beyond difficulties with literacy (Mortimore, 2003)
- thirdly its failure to engage with the impact of context on an individual's experience of dyslexia (Reid, 2003)
- finally its disregard of the question of cause (Herrington & Hunter-Carsch, 2001).

The ways in which these definitions changed reflected developments both in the focus of particular groups and in the research into causes for dyslexia.

What causes dyslexia?

By the 1990s, the dyslexia research world was involved in disputes between competing theories as to the causes of the dyslexic patterns of difficulty. What are the main explanatory theories? There are currently three major models and they have all emerged from research into the reading process, which still exerts a strong influence over dyslexia theory. They comprise:

1. The phonological deficit theory
2. The magnocellular deficit hypothesis
3. The cerebellar deficit hypothesis.

The phonological deficit theory has been the predominant causal theory throughout most of the late twentieth century. Phonological processing is the way in which people process phonemes, or sounds within words at the cognitive level rather than the hearing level. People with adequate hearing can still find it hard to identify, sequence and reproduce sounds within a word (see Frith 1995, 1997; Snowling 2000; or Stanovich 1988 for further details).

Snowling (2000), Stanovich (1988) and others suggested that phonological processing, or a difficulty in processing the sounds of the native language, is selectively impaired in people with dyslexia, while other aspects of their language, for instance vocabulary and language skills, are frequently normal. Children create phonological representations in their memory by mapping the speech sounds they hear onto the speech sounds that they produce and vice versa (Snowling & Hulme, 1994). Hatcher and Snowling (2002) suggest that the detail in these representations may be fuzzier and less finely coded in dyslexic children. This results in difficulties with verbal short-term memory. Chasty (1985) and Pickering (2004) suggested that inefficient short-term memory forms one of the basic causal factors (more detailed reviews of research are provided by Reid and Wearmouth, 2002).

A further development of the phonological deficit model arose from the work of Denckla and Rudel (1976), Tallal (1984) and Wolf and Bowers (1999). They identified a particularly disadvantaged group of individuals who suffered not only from inaccuracy of phonological processing but also from processing speed, fluency or naming-speed deficits. This was termed the 'double-deficit hypothesis'.

These difficulties with speed and memory impinge on an individual's phonological awareness, ability to read and spell across all but a very few languages, and also on the ability to follow instructions, memorise lists, store and maintain verbal information and retrieve phonological information, such as vocabulary, from long-term memory. It has been argued that these phonological difficulties are derived from abnormalities in the language areas in the brain and that these abnormalities persist throughout life, producing abnormal brain activity when dyslexic adults attempt to read (Rack, 1994). Hatcher and Snowling (2002, p.74) state,

> *The severity and the extent of phonological processing deficiencies determine the nature of the reading and spelling strategies available to the dyslexic child, and they dictate the course of reading and spelling development that the child follows.*

Although the phonological deficit hypothesis has remained the core explanation and has informed remediation in literacy, some practitioners were unconvinced by this as a sole explanation for some of the differences they encountered while working with learners with dyslexia (Mortimore, 2003) and a minority of researchers during the 1980s and early 1990s expressed interest in a possible role for visual deficits. For example, Stein and Walsh (1997) suggested that dyslexia is caused by a sensory defect in the large nerve cells in the eye, known as 'magnocells'. These cells, which form part of the pathway between the retina and the visual cortex of the brain, carry information about rapid movement or changes in the environment. Defects in these result in the brain receiving slightly unstable images – obviously causing enormous problems with the processing of print or symbols. Some suggestions were made that there might be subtypes of dyslexia which manifest in different ways (see Robertson & Bakker, 2002).

During the 1980s, however, the phonological deficit explanation reigned supreme until the work of Nicolson and Fawcett introduced the cerebellar deficit hypothesis and initiated both controversy and a broadening of the approach to dyslexia research, diagnosis and support. Their 1994 dyslexia study had revealed severe deficits in balance, motor skill, phonological skill and rapid processing in dyslexic groups when compared with controls. This led them to investigate a possible role for the cerebellum in the pattern of difficulties which characterise dyslexia.

The cerebellum is a sub-cortical brain structure situated at the back of the brain sometimes known as the hind brain. It is involved in the control of independent limb movements and especially in rapid skilled movements. Findings from Positron Emission Tomography (PET) brain scans in the 1990s suggested that it is a key brain structure for the acquisition and use of a range of cognitive skills including language dexterity, skill automatisation and balance (Nicolson, 2002). Nicolson and Fawcett's series of studies are documented by Fawcett and Nicolson (2001, 2004) and were supported with evidence from a range of research groups. In 2002, Nicolson stated,

> *Putting together the cognitive neuroscience results on the role of the cerebellum in skill automatisation, balance and language dexterity with our own findings with dyslexic children, it became clear that the cerebellar abnormality was a prime candidate for the cause of the difficulties suffered by dyslexic children. (p. 99)*

The majority of researchers did not agree. The cerebellar hypothesis still remains controversial and speculative and, during the 1980s and early 1990s, it is perhaps fair to say that these three explanations were very much at odds, each with its separate camp. However, the cerebellar hypothesis had the potential to offer a unifying causal framework for dyslexic difficulties in that cerebellar deficits can be implicated in phonological processing, central processing speed, motor skills, automatisation difficulties, some or all of which can be evident in a dyslexic profile.

However, research has moved further. John Stein's original research into the role of magnocellular neurones in the development of dyslexia seemed to be confined to the area of visual processing. These studies suggested that over 20% of differences in orthographic reading ability could be explained by visual magnocellular sensitivity (Stein, 2007). However, links are now made between the visual magnocellular system and phonological processing. The inability to keep the letters stable in the mind's eye undermines phonological skill and slows down processing. In addition to this, Stein suggests that these magnocellular neurones might not be confined to visual processing but that the auditory magnocellular system plays a part in sensitivity to the changes in sound frequency involved in distinguishing between phonemes such as (b) and (d). Thus a faulty auditory magnocellular system further undermines phonological processing to the extent that auditory and visual magnocellular sensitivity determines over half of the differences in children's reading ability. Add to this Stein suggests that the magnocellular system also plays an important part in communicating with the cerebellum, which Stein describes as the 'brain's autopilot' (Stein, 2007) and which, as we know, is implicated in co-ordination and automaticity. To summarise, the magnocellular neuronal systems of the brain are involved in the mediation of auditory, visual and motor temporal elements of speech and reading, affecting both the orthographical and phonological aspects of literacy and co-ordination and the development of automaticity. A general magnocellular impairment can therefore be seen as a serious contender in the causal theory debate. Stein is also involved in research attempting to identify the genetic linkages that might play a genetically determined role in the development not only of dyslexia but of conditions such as dyspraxia, ADHD and autism, which can sometime co-exist with dyslexia. Genes that have aroused interest are located on chromosome 6 and are linked with many of the immunity anomalies sometimes observed in dyslexia.

The past ten years has seen the influence of research into genetic markers for dyslexia (Knight & Hynd, 2002, cited in Reid, 2003) and the type of brain-based research facilitated by the development of techniques such as PET scans and Magnetic Resonance Imaging (MRI) (see Reid & Wearmouth, 2002 for further details), which are likely to throw light on the neurophysiological basis underpinning the learning differences that we see in action in classrooms and contained in more recent definitions of dyslexia. There has also been a shift away from confrontation between opposing theorists towards the beginnings of an awareness that these differing sets of behaviours or 'symptoms' may well indicate an underlying connectedness which is likely to be revealed by further research.

These issues provide some explanation as to why there should be differences over definitions and it seems difficult to reconcile all these ingredients in any systematic way. Morton and Frith (1995) however, developed a model to shows how this might be done. Frith suggests (1999) that any explanation of a developmental disorder must identify and distinguish between three levels of description. At the most fundamental level is the biological, or brain system, where causes can be identified. At the top is the behavioural level where observations of behaviours lead us to speculate as to causes. In between lies the cognitive level, the level of thought processing, which connects observed behaviours to the biological factors that influence development. All three levels interact with the environmental context. Developments in neuro-psychological techniques are beginning to reveal the brain architecture and processes that might underlie both the cognitive and behavioural levels. It is possible that similar deficits in brain function might affect cognitive processes and behaviours in different ways across different individuals.

Fawcett (2004) provides another way in which to reconcile competing theories. She uses the Hindu illustration of the elephant and the blind men – let us call them researchers: the researcher at the back describes the elephant as a little stringy rope, the ones in the middle talk of high hairy walls and the one at the front says it is a snake. Only when the blindfolds come off does the whole truth emerge.

Definitions and differences

Does this tour of the development of causal theory provide any help in establishing a definition of dyslexia? Frith provides us with a definition which, although based on deficits, does seem to incorporate the different elements of dyslexia evident throughout the research literature. She writes:

> *The consensus is emerging that dyslexia is a neuro-developmental disorder with a biological origin, which impacts on speech processing with a range of clinical manifestations. There is evidence for a genetic basis and there is evidence for a brain basis, and it is clear that the behavioural signs extend well beyond written language. There may be many different kinds of genes and different kinds of brain conditions that are ultimately responsible for the dyslexia syndrome, but in each case the symptoms have to be understood within the relevant cultural context. (2002, p. 65)*

We have seen how definitions, although changing over time in response to context and research findings, have tended to focus on deficits and we will explore later whether it is appropriate for us to conceptualise dyslexia in terms of difficulties and deficits. It should not be forgotten, however, that as educational practitioners, we are likely to come across learners experiencing the impact of classrooms on their most vulnerable areas of processing and therefore seeing their dyslexia as a source of difficulty. We are operating at the level of the learner's behaviours, their environment and the interaction between the two. For those of us who are practitioners, arguably the most important demand is to be aware of the profile of cognitive strengths and weaknesses that we might expect from a learner with dyslexic differences and to be able to provide the appropriate emancipatory support. Parents or individuals with dyslexia need to be able to understand and build on the learner's individual pattern of strengths and weakness. An understanding of how research into the causes of dyslexia has helped to inform the evolution of a definition of dyslexia that we can understand and adopt is an essential prerequisite to this. It will enable us to determine where difficulties and learning differences might emerge and to provide explanations and information for those who might consult us.

How can dyslexia be diagnosed or identified?

In 1994 Reid observed that about 15% of the children who were identified as having specific learning difficulties were not identified until they reached secondary education (Riddell, Duffield, Brown & Ogilvy 1992, cited by Reid, 1994). Singleton (1999) suggested that nearly half of the graduating university students with dyslexia had been diagnosed at university. The recent New Dyslexia Visions research project in West Yorkshire (Learning and Skills Council, 2004) screened staff and students at 200 public, private and voluntary organisations and discovered at least 10% of those adults screened to have undiagnosed dyslexia. The majority of these were unaware of their dyslexia but reported encountering a range of difficulties in the workplace. Singleton (2005) suggested that there is a significant group of unidentified adults with dyslexia both within the prison population and within institutions for young offenders. This all suggests that the process of identification remains anything but infallible.

The picture has in some ways been complicated by debates as to the appropriateness of medical terms such as 'diagnosis' within the context of the drive in the United Kingdom and across many other continents to implement inclusive practices within education. This position suggests that to see dyslexia in terms of a series of symptoms underpinned by biological deficits which can be 'diagnosed' and 'treated' is to medicalise it. This represents people with dyslexia as vulnerable victims of their own flawed biology, places them at the mercy of experts who will label them and stigmatise them and who will take control of the delivery of 'treatment' or 'cures'. It is a medical model that has been rejected by other disabled groups and academics (Barton, 1996). They claim that this model disempowers people with impairments, and contributes to those barriers to their success set up within society. This medical model places the blame for failure to achieve securely with dyslexic individuals rather than with barriers placed in their way by educational or social systems that have not adjusted to allow access to success. Thus, for example, the insistence that an A level history student with dyslexic type difficulties that impede her ability to express her ideas on paper, should have to write timed essays under examination conditions would be seen as placing unacceptable barriers between the student and her goal of a university place.

The situation has been altered by the Special Educational Needs and Disability Act (SENDA) 2001, which has established the right for all learners to be educated together in mainstream schools and prohibited all schools from discriminating against children with any form of disability. This legislation underpins the movement towards inclusion currently under way. Inclusion refers to being in an ordinary school with other students following the same curriculum at the same time, in the same classroom, with the full acceptance of everybody involved in the process, and in a way that makes the student feel no different from other students. It implies the need for radical changes to the curriculum, teaching approaches and the school environment. This includes the suggestion (Nind, 2005) that we must move away from a model which focuses on the 'special' student's need for diagnoses and individualised programmes towards ways of adapting our instructional goals, arrangements, lesson formats, materials, delivery style and classroom environment to help the vulnerable learner to participate successfully. It can be argued that dyslexia only becomes a disability when the learning differences are overlooked or when the support offered is inappropriate and results in a failure to thrive.

Any change in approach that will minimise difficulty for students with dyslexic type differences must be encouraged and in the ideal inclusive world we should find ourselves asking the question 'Why do we need a diagnosis of dyslexia if the appropriate support is available for all learners?' There is, however, a tension here. There is a strong argument from many parents and people with dyslexia that acquiring the label is in itself a huge relief (Heaton, 1996; Riddick, 2001). Many strides have also been made towards the establishment of what have been termed 'dyslexia-friendly' schools (McKay, 2004), including the provision of special examination arrangements aimed to remove the barriers to achievement for students with disabilities including dyslexia. However, if provision is proved inadequate and the student is still struggling, a diagnosis of dyslexia is frequently required, particularly at Further or Higher Education levels, for the learner to access special examination arrangements or other types of support.

This is not the place for further exploration of this debate but it is important to be aware that it is ongoing. The argument presented here is that knowledge of the individual learning profile of a student should enable appropriate teaching and resources, of the types described later on, to be put in place. Establishing a definition for dyslexia enables some prediction of the types of difficulty learners might experience or strengths they might bring into a mainstream classroom and how knowledge of their cognitive processes and learning style preferences might help practitioners to improve their access to and enjoyment of the curriculum.

Practical identification

The question of assessment and diagnosis is covered thoroughly elsewhere. Reid (2003) and Backhouse and Morris (2005) provide excellent overviews and practical suggestions for classroom practitioners. Practitioners who wish to develop in-depth diagnostic skills would find Turner's (1997) review useful. The current book aims to suggest the types of behaviour that might make you suspect the existence of dyslexic type difficulties rather than to provide a more in-depth analysis. Websites such as those provided by Dyslexia Action or the British Dyslexia Association offer check lists of dyslexic type difficulties. Within schools there should be provision for several levels of assessment and identification including screening and more detailed profiling. If you suspect that a learner has dyslexic type differences and you feel that it would be to their advantage to have a full assessment, you should suggest referring them to the SENCO if within a school or to an organisation such as Dyslexia Action or the British Dyslexia Association.

The range of options for initial assessment includes:

- checklists and self-report questionnaires
- behavioural observation
- screening procedures
- diagnostic interviews.

Checklists and self report questionnaires

Pollock, Waller and Politt (1994) provide a helpful guide to this kind of diagnostic approach. In general, if the answer to three or more of the following questions is 'yes', further investigation is definitely warranted.
Does a seemingly able and frequently articulate student:

1. have difficulties with expressing themselves on paper – poor and sometimes bizarre spelling, slow or poorly formed handwriting, untidy presentation?
2. seem resistant to or need extra time for written work?
3. have unexpected difficulties with reading or maths?
4. frequently seem worried, switched off or lagging behind?
5. have difficulties with organisation within time and space?
6. have difficulties with situations that involve memory (bringing the right equipment on the right day, remembering spoken instructions, remembering phone numbers, learning multiplication tables)?
7. use inappropriate behaviour to avoid classroom situations in which dyslexic-type learning difficulties might be revealed in public?

Here is a list of school age indicators. These mainly affect language/literacy development, behaviour and organisational skills. They tend to persist into adulthood.

Literacy development: does the child have

- difficulty in repeating multi-syllabic words?
- poor phonological awareness (discrimination of speech sounds)?
- inability to identify the constituent sounds in spoken words?

- difficulty in learning the letters of the alphabet and alphabetic systems?
- difficulty in mapping sounds (phonemes) onto letter symbols (graphemes)?
- literacy skills lagging behind overall performance and apparent ability?
- difficulty learning everyday sequences, for example days of week, months of year and multiplication tables?
- difficulty understanding technical language, for example mathematical terminology?

Behaviour: questions to ask

- Does the child have a poor attention span and seem easily distracted?
- Is the learner embarrassed by apparent difficulties?
- Is the learner becoming alienated from their peers, becoming isolated tending to work/play alone?
- Is the learner denying difficulties? Rejecting help?
- Does the child appear depressed?
- Has the child become the 'class clown'?
- Is the child becoming uncharacteristically aggressive?

Organisational and motor skills: does the learner have

- untidy, illegible, incorrectly formed, reversed or disproportionately sized letters or words when handwriting?
- an awkward position for writing (close to the page/head tilted)?
- inablity to keep within the lines when writing or colouring?
- difficulty in structuring written work?
- difficulty copying from the board and textbooks?
- little idea of time or the structure of the daily timetable?
- consistent forgetting of pens, pencils, P.E. kit, letters home, arrangements, etc?
- inability to follow instructions/directions – frequently arriving late?

Figure 3.1, which was devised by Matty, Chasty and Vinegrad (1994, cited in Smythe, 2000) and taken with permission from the *Dyslexia Handbook 2000* (Smythe, 2000), is an example of a checklist for adults. It is designed to help the dyslexic adult identify areas of weakness, not just in language skills, but also in other areas such as organisational skills. If the difficulties have been identified, appropriate strategies can be developed.

Behavioural observation

The use of such checklists can be enriched by information gathered from classroom observation and examination of a learner's written work or reading strategies. You can also look for a pattern of difficulties.

1. Do you find difficulty telling left from right?
2. Is map reading or finding your way to a strange place confusing?
3. Do you dislike reading aloud?
4. Do you take longer than you should to read a page of a book?
5. Do you find it difficult to remember the sense of what you have read?
6. Do you dislike reading long books?
7. Is your spelling poor?
8. Is your writing difficult to read?
9. Do you get confused if you have to speak in public?
10. Do you find it difficult to take messages on the telephone and pass them on correctly?
11. When you have to say a long word, do you sometimes find it difficult to get all the sounds in the right order?
12. Do you find it difficult to do sums in your head without using your fingers or paper?
13. When using the telephone, do you tend to get the numbers mixed up when you dial?
14. Do you find it difficult to say the months of the year forwards in a fluent manner?
15. Do you find it difficult to say the months of the year backwards?
16. Do you mix up dates and times and miss appointments?
17. When writing cheques do you frequently find yourself making mistakes?
18. Do you find forms difficult and confusing?
19. Do you mix up bus numbers like 95 and 59?
20. Did you find it hard to learn your multiplication tables at school?

Figure 3.1 Checklist for dyslexic adults.
This list is based on the work of Jo Matty, Harry Chasty and Michael Vinegrad. For a full report of the Michael Vinegrad research, see A revised Dyslexia Checklist, *Educare* No 48, March 1994.

Screening procedures

There are a number of screening procedures available, specifically designed to identify students with dyslexia, which can all be administered by teaching professionals. Reid (2003) and Backhouse and Morris (2005) provide a thorough review. They all examine performance in a range of activities not dependent on taught skills, such as reading, which give an indication of performance across areas that will include visual and auditory memory, phonological discrimination, sequencing, automaticity, laterality and others. Some of these are computer based, others involve tasks and questionnaires. Specific tests are designed for particular age-groups.

They include tests such as:

- Fawcett and Nicolson's Screening Tests (Fawcett & Nicolson, 1998; Nicolson & Fawcett, 2004)
- Lucid Research's LADS (2002), LASS (2003), CoPs (2003)
- Dyslexia Screener (Turner & Smith, 2004)
- Special Needs Assessment Portfolio (Weedon & Reid, 2003)
- Zdziensky's Study Scan (1997)

Diagnostic interviews

These are often used with adults. Klein (1995) provides both a justification and clear methodology for structuring an in-depth diagnostic interview that includes measures of specific skills, such as reading, writing, spelling, difficulties with memory, visual-motor or spatial and temporal skills. She also justifies the use of this qualitative approach rather than the quantitative or measurement-based approach of psychometric tools used by psychologists. This approach also gives more opportunity for contact with the student and the devising of an individualised support package including scope for feedback. It is, of course, very time consuming so is only really practical for use with students who have already been diagnosed as 'at risk' by other screening methods, such as reading or spelling assessments or checklists for dyslexia. There are a range of formal screening tests and checklists, varying in complexity.

All four of these types of assessment can be used to complement each other. Frequently, a formal diagnosis of dyslexia, if needed, may well arise from observation of classroom behaviours that lead the teacher to suspect that something is not right and needs investigation. An approach that is practical and matches the situation should then be followed.

Chapter summary

This chapter discussed three questions:

1. What are Specific Learning Difficulties or dyslexia?
2. What are the underlying causes of dyslexia?
3. How can dyslexia be identified?

What are Specific Learning Difficulties or dyslexia?

> *Dyslexia is a developmental disorder which results in difficulties in learning to read, write and spell. Short term memory, mathematics, concentration,*

> *personal organisation and sequencing may also be affected. (Dyslexia Institute, July 2002)*

This definition provides a clear picture of the range of difficulties experienced. It goes beyond the earlier concentration on dyslexia as being simply a difficulty with phonological processing or mastering symbolic material. It should not, however, be forgotten that dyslexia can be seen as a series of learning differences involving individual patterns of strengths and weaknesses which become disabling if misunderstood or unsupported.

Research has moved beyond both the limited definition of dyslexia as an unexpected difficulty with literacy or focusing on dyslexia as purely a phonological processing difficulty. It now indicates that dyslexia can cause a wide range of differences in information processing. At the same time, there has been a shift from the 'discrepancy' based definitions, which were closely linked with the need to rely on observable behaviours for a diagnosis of dyslexia, to the suggestion that the dyslexic cognitive profile involves strengths as well as limitations.

What are the underlying causes of dyslexia?

Despite the scope and range of research interest in dyslexia since the mid-1970s, it is still evident that, with the exception of the phonological processing deficit, which is widely accepted as a factor, there is currently no one biological or neuropsychological condition to which the pattern of difficulties termed 'dyslexia' can safely be attributed (Frith, 2002).

However, recent developments in techniques for the investigation of the underlying neural systems within the brain suggest that, even though many people with dyslexia master literacy, the brain activity involved remains different from that of people who do not have dyslexia. Dyslexia, with its accompanying strengths and difficulties, is for life (Frith, 1997).

How can dyslexic students be identified?

Individual situations will require different approaches. Choose from a combination of behavioural observation, psychometric assessment, which can identify skill discrepancies, diagnostic interviews and test batteries designed for the purpose.

Chapter 4 explores some of the ways in which life can be challenging for people with dyslexia.

Chapter 4

DYSLEXIA – CURSE OR BLESSING?

Introduction: What impact does dyslexia have on daily life?

As we have seen in the previous chapter, the dyslexic profile can include both strengths and difficulties. However, since the differences that accompany dyslexia can cause trouble if misunderstood or unsupported, this chapter focuses on the difficulties.

Traditionally, the classic 'dyslexic' individual has been seen as a bright student with difficulties focused on reading, spelling and handwriting. It is, however, absolutely clear to anyone who lives or works with a person with dyslexia that the condition frequently affects more than the ability to read and write. In 1993, the Moray House Centre for Specific Learning Difficulties consulted a wide range of professionals and concluded that dyslexia can be identified in terms of patterns of information-processing difficulty, ranging from the very mild to the extremely severe, which can result in not only literacy restrictions but also discrepancies in performance throughout the curriculum (Reid, 2003).

This makes two important points very clear:

- Within the distinctive pattern of differences that constitutes dyslexia, each student is an individual with their own relative areas of strength and difficulty and own learning style. Thus an individual with dyslexia can be relatively good at reading but poor at maths, or good at reading yet unable to spell, or very poor at reading and writing but an inspired mathematician or designer.
- Different people show widely differing degrees of difficulty.

The pattern of difficulties

Difficulties associated with dyslexia can be broadly divided into two types:

1. Day-to-day organisational problems linked with unreliable memory or organisational skills. Parents of these children have already found that life is less simple than they had hoped. Their children have already discovered the day-to-day hurdles dyslexia can present.

2. Difficulties associated with the processing of symbols, whether they be letters or numbers. Difficulty with the processing and manipulation of symbols must mainly be associated with formal education. Not all individuals with dyslexia seem to suffer from organisational problems, therefore for some parents there is no clue, pre-school, that their child may have any kind of learning difficulty.

Dyslexia at home

Life is just so confusing. (Alan, 15, dyslexic student)

Organisational problems are all-pervasive, they colour home and school. Everyone is capable of suffering from embarrassing 'dyslexic-type' moments when words get mixed up or equipment forgotten because of tiredness or loss of concentration. The essential thing to remember is that, for the individual with dyslexia, this is normal. It doesn't go away after a good night's sleep. Even at home, getting though an ordinary multi-tasked day, which frequently involves skirmishes with the written word in shopping lists or TV guides, can demand that bit of extra concentration and build up levels of frustration when things that other people seem to do without thinking go embarrassingly wrong.

Many people with dyslexia will experience difficulty with any types of situation that involve:

- memory
- sequencing
- concepts of time
- orientation
- left–right confusion
- automaticity and managing simultaneous activities.

Memory difficulties

Research indicates (Gathercole & Baddeley, 1993) that it is an oversimplification to see memory processing as being a simple transposition of information, by way of a range of information-processing strategies, from a short-term processing 'box' into a long-term memory store. Chapter 6 presents a more in-depth description of memory processes. However, the storage-box metaphor is easily understood, and, initially, it is perhaps convenient to describe people with dyslexia as frequently having difficulties both with the processing and storage of information within the short-term working-memory box and with the subsequent retrieval of information from the long-term store. Memory processing, or working memory, involves four major components: the audio memory, the visual memory, movement or procedural memory and the semantic memory (storage of the meanings of words). An individual with dyslexia can suffer from a weakness in any of these channels, and this will put pressure on the others.

Any task involving short- or long-term memory can cause unexpected difficulty to a person with dyslexia. This can include remembering phone numbers, remembering what you have been asked to get from the shop or remembering what you need to put into your school bag for the day. Performing simultaneous activities or automaticity (Nicolson & Ayres, 1997) can cause problems, and these difficulties will be exacerbated if the individual is asked to follow several instructions in sequence or is expected to rely purely on listening. If, in addition, the instructions are given while attention is elsewhere or there is particular pressure to get things right, failure is frequently guaranteed. Unfortunately, many everyday tasks do indeed involve sequences of instructions or simultaneous activities. 'While you're in the kitchen making a cup of tea, please could you turn the oven off and put the cat out?' Obviously, failing in these seemingly simple tasks both causes inconvenience to others and makes people feel stupid. In future they may think twice about offering to help or even co-operating when asked, preferring to be seen as bolshy rather than as an idiot.

Sequencing

People with dyslexia frequently suffer from difficulties with sequencing. This does not simply involve problems with times-tables or the order of the alphabet. Children may well have little concept of the days of the week and live in a world where days are determined by the different activities that take place rather than any concept of Monday to Sunday. Their memory difficulties may erase the less interesting activities in their lives and remove even more points of reference. How can you possibly remember your cooking ingredients on Thursday if you aren't aware it's Wednesday today? Days of the week are hard. The months of the year are doubly difficult as there are twice as many and they recur less often. Some months contain nothing memorable, like Christmas or a birthday, to help children remember them. It is not unusual to find teenagers who will tell you that summer comes before spring and after autumn (Pollock et al., 2004).

In the face of such fundamental difficulties, it is not surprising that people with dyslexia have trouble with sequences of instructions or remembering phone numbers, let alone with following a more complex set of mathematical steps. To their embarrassment, sequences such as days of the week, months or seasons of the year and letters of the alphabet are considered easy by the majority of their family or classmates, who are frequently quick to point this out.

Concepts of time

By the age of 12 or 13, the average child can usually cope with telling the time and with planning the week to include the wide range of activities, from football training to sleep-overs, that have to be fitted in. Concepts of time, however, are an area where the child with dyslexia may experience difficulties. Telling the time involves sequencing, spatial and directional skills, memory and mastery of the linguistic expression of numbers (Pollock et al., 2004). With dyslexia, these may all be problem areas, but this is not the only difficulty. Some teenagers can struggle with temporal concepts such as ‘yesterday’, ‘today’ and ‘tomorrow’, be confused by the fact that ‘fifteen minutes’ is also ‘quarter of an hour’ and have little sense of how much time has passed or how long half an hour ‘feels like’.

This is particularly the case when they are absorbed in an activity and totally unable to keep any other considerations in mind. This obviously causes friction at home when dinner is spoiled or with friends when people are let down, but it can cause real distress in the world of school where so much is organised by timetables, so much specific equipment has to be brought on the right day and where teachers may be unable to understand how a seemingly able student can be so forgetful, seeing mistakes as the product of laziness or lack of co-operation.

Orientation and left-right confusion

Handedness seems to develop late in people with specific learning difficulties. In 1925, Samuel Taylor Orton, one of the earliest researchers into dyslexia, commented on the fact that significant numbers of dyslexic individuals seemed to be left-handers or to have mixed laterality. Individuals with dyslexia frequently also have difficulty with directionality and remembering ‘left’ and ‘right’. This may be due to memory, labeling difficulties or linked with the difficulties in visuo-spatial orientation experienced by those people who find following maps and plans hard. This difficulty may not cause inordinate problems at home but can be thrown into relief and exacerbated by the stress of the first day in a large secondary school where the dyslexic student spends the whole day anxious and lost trying to find out where their group is supposed to be.

Automaticity – managing simultaneous activities

Automaticity has an impact on all the other skills needed for successful learning or day-to-day survival. Many tasks, such as reading or driving, consist of a number of simultaneous sub skills. For example, to be able to drive a car, one must be able to focus on appropriate objects within the visual field, judge distance and speed, analyse events seen in at least two rear-view mirrors, co-ordinate feet on three separate pedals, judge appropriate pressure on the clutch and brake, manipulate a gear stick – and that's way before one might whip out a sandwich or an illegal mobile phone! This hierarchy of sub skills must be performed simultaneously; therefore most of them must become automatic rather than conscious, and use up very little processing capacity, to allow effortless performance. Hence automaticity refers to the ability to perform an action automatically without focusing on it.

Nicolson and Fawcett's (1994) research suggests that the root of any problems with automaticity lies in the part of the brain known as the 'cerebellum'. The links that they claim exist between cerebellar deficits and dyslexia indicate that individuals with dyslexia need to devote more energy to the conscious control of mental activities and even physical activities, such as balance, that would usually quickly become automatic for most people and their research showed that students with dyslexia found it significantly more difficult to perform tasks simultaneously than others. Students with dyslexia therefore have greater problems than others in coping with simultaneous mental processes. This is a far more deep-seated processing problem, which affects far wider areas of life than simply identifying and distinguishing between symbols and many individuals with dyslexia find it extremely hard to be asked to attend to more than one thing at a time. Hence the problems with multi-tasking.

Dyslexia at school

As suggested earlier, there is one group of parents of dyslexic children for whom the onset of their children's problems coincides with the start of formal schooling. Until then the child has been a happy, normal, bright pre-schooler, full of chat and busy fun, interested in the new world about them and all it has to offer – the sort of child, in short, who would be expected to take to school like the proverbial duck to water. For these parents, the first year in the reception class may be fine. Reading books brought home may well be likely to contain more pictures than print, with stories that are talked about rather than read. If writing seems to begin and end with the child's name, there are lots of others in the class at the same stage, and life tends to revolve around active learning through play, construction, paint and play dough.

It is only when this stage seems to be going on rather longer than would be expected for an able and articulate child, or when other people's children seem to be bringing home books containing three times as much writing, that parents may begin to question. Quite frequently, they will then be told that children all develop at different rates, that their child is happy, sociable and obviously absorbing lots of information and that they shouldn't worry. So they don't, with mixed results.

From the information discussed so far, it should be clear what is happening. The child with dyslexia is now having to do a number of things that they find hard. In reading and writing they are struggling with the sequence of the order of the letters of the alphabet, are having problems with distinguishing between the different letter sounds and remembering the letter patterns that can represent them, cannot retain the visual images of words in their long-term memory and, at best, are guessing from the first letter. In maths they are encountering difficulties with sequencing and remembering numbers, with dealing with the language of mathematics and with working out which way the numbers are facing.

For some children this may be the first time they have encountered failure and disapproval from peers or adults. Many of these children will have genuine difficulty following instructions and will be trying their hardest to remember what they have been asked to do. They will be bewildered by their failures and distressed by the fact that everyone else seems to be able to do everything so easily. Other children may well be beginning to taunt them or avoid them. Their teachers may be equally puzzled and frustrated and not always convinced that the difficulties this seemingly bright child is experiencing are caused by anything other than naughtiness or carelessness.

This may well be the moment when the teacher complains that the child is lazy or is beginning to behave inappropriately or is having trouble making friends. For the parents this may well be the very first indicator that their child has a learning difficulty and that this is beginning to affect the way that child feels about themselves and other children or adults. It can be really unexpected and distressing after such a trouble-free start.

There are a number of books that deal very effectively with the problems dyslexic children and their parents encounter at primary school. These include Pollock, Waller & Politt (2004) and Raymond (2001). Others are listed in the further reading list at the end of this book. These discuss some of the behaviour problems that can begin to emerge as children develop avoidance strategies, which can include anything from hitting the child in the next desk to playing the class clown. They also provide a range of suggestions as to how the parents, child and the teacher can minimise and cope with these difficulties.

One aspect of school that is likely to make huge demands on learners with dyslexia is mathematics. The demands of this subject place particular pressure on areas of processing which may well be undermined by dyslexia regardless of whether a learner might also experience dyscalculic difficulties (these are examined further in Chapter 6).

The learning of maths is dependent on sequencing and logical progression, what Weavers calls a 'tiered approach' (2003, p. 34) but you also have to be able to move forwards and backwards along sequences. You need efficient working and long-term memory. Learners with memory or processing difficulties need constant reinforcement. It helps to be able to process fairly quickly and mathematical understanding relies on previously learned work. For example, to understand percentages, you must understand fractions; to understand fractions, you must understand multiples and factors; to understand these, you must understand tables and tables are underpinned by the understanding of multiplication and division. If any of these building blocks are unstable, the concept disintegrates. Memory, sequencing and processing difficulties are all connected with dyslexia and should therefore indicate that a high proportion of learners with dyslexia will fail at maths – Chinn and Ashcroft (2006) state that mathematical difficulties and language difficulties are likely to occur concurrently. However, there are striking examples of highly talented students with dyslexia studying maths in Higher Education (Mortimore, 2006), some of whom report that they still experience difficulties with number processes but not with complex concepts.

Maths involves both the sequential skills implicated in dealing with numbers and conceptual understanding. It is not uncommon for one to function better than the other (Chinn & Ashcroft, 2006). Frequently, learners with dyslexia will struggle with the number aspect (Kay & Yeo, 2003). Writers on maths (Kay & Yeo, 2003; Weavers, 2003) emphasise that maths is best learnt by understanding concepts, appreciating why certain things happen or are done in a certain way, rather than by rote. This is particularly true of learners with dyslexia who struggle to remember isolated facts by rote or drill and need the glue of conceptual understanding. Unfortunately the development of this understanding is frequently undermined by the loss of components along the way and by a debilitating fear of maths, which is also reported by many perfectly capable adults. The language is confusing – almost a foreign language. What on earth is a trapezium? Maths language has multiple meanings – think of 'face' – is it a funny face? Should I face the front? What is face value? How many faces does a triangle have? – and a simple instruction such as 'add' can also be *total*, *sum*, *plus*, *and*, *altogether*, *addition*, *more than*, *positive*, *increase* (Weavers, 2003). As a result, the basic building blocks of maths fail to be established and the edifice becomes more and more shaky with time. The consensus (DFES, www.standardsdfes.gov.uk/primary) is also that conceptual work has to be underpinned by concrete examples such as table squares, or physical activities, or the use of fingers for calculating, or physical movement for walking through the months of the year. This will establish a multi-sensory reinforcement of abstract concepts. Frequently, however, the class is moving too fast for dyslexic mathematicians and they are left behind. Suggestions for supplementing this aspect of teaching will be found in Chapter 6 and further details are provided in the work of Chinn, Kay and Yeo or Clausen May listed in the recommended reading section of this book.

Learning difficulties sometimes related to dyslexia

For another group of parents, however, the news of difficulties does not come as such a surprise. All parents tend to dread the 'terrible twos' and often, however battle scarred they may be by the toddler stage, they hope that any difficulties they may have encountered are simply a manifestation of this phase. Earlier in this chapter, it is discussed how the typical difficulties with short-term memory and organisation experienced by many dyslexic children can complicate life at home. Increasingly, however, research is finding dyslexia co-existing with some other difficulties. These can include:

- problems in the development of language – either receptive, expressive or the social use of language (Snowling & Stackhouse, 2006)
- developmental dyspraxia (so-called 'clumsy' children) or developmental verbal dyspraxia (Portwood, 1999)
- attentional deficit hyperactivity disorder (ADHD) – the inability to concentrate.

Children suffering from any of these three difficulties may have caused parents some anxiety well before entering school.

Any or all of these conditions can exist alongside dyslexia, greatly increasing the difficulty a child has in coping with life both at home and at school. However, care must be taken with both diagnosis and the type of provision offered. Some seeming weaknesses in language, social skills or behaviours that might indicate ADHD may well be the result of the accumulation of negative experiences.

Dyslexia and speech and language difficulties

The popular conception of a dyslexic child is of an articulate talkative child whose difficulties with literacy, mathematics or organisation appear inconsistent with performance in other verbal and non-verbal areas. As mentioned in Chapter 3, one aspect of the discrepancy method of identifying dyslexia was to look for an uneven profile in standardised tests of intelligence, such as the Wechsler Intelligence Scale for Children (WISC-R) where, in contrast to low scores on sub tests that were linked with types of memory processing, children with dyslexia were expected to score average or above average on a range of verbal sub tests.

Although much emphasis has been placed on the key role played by phonological-processing weaknesses in reading disabilities (Snowling & Stackhouse, 2006), it was not immediately apparent that some students with dyslexia suffer from a range of speech and language difficulties. However, Stackhouse and Wells (1997) state that, although not all children with literacy problems have underlying speech and language difficulties, it is likely that the incidence of 'hidden' speech and language difficulties among individuals with dyslexia has been underestimated.

The investigative work of Stackhouse and Wells (1997) and Tallal and her associates (Tallal, 1988; Tallal, Allard, Miller & Curtiss, 1997) has thrown much light on the links between persistent speech difficulties and later literacy problems. In many cases a child's underlying language-processing problem only belatedly comes to light when subsequent failure with literacy leads to in-depth investigation of the causes. This growing awareness of language difficulty is matched by an increasing number of psychologists' reports or Statements of Special Educational Needs for students with dyslexia referring to speech and language difficulties and a need for specialist support in this field over and above the usual appropriate support given to students with dyslexia. There is growing co-operation between organisations, such as the British Dyslexia Association and Speech and Language Therapists, and an increase in collaborative work across professions such as teaching, speech and language therapy and psychology. Snowling and Stackhouse's *Dyslexia, Speech and Language* (2006) contains an excellent review of the literature with reference to case studies.

There is sometimes some confusion over exactly what a 'language' problem is. It is often imagined that the only children with language problems are either those who struggle with English as a second language or those whose articulation of spoken language is obviously hampered by some difficulty, such as a stutter, which makes them hard to understand. In fact, teaching English as a foreign language is not part of the speech and language therapist's brief, nor will the majority of cases consist purely of working with articulation. It has been estimated that one in a thousand children may suffer from severe and specific language impairments (Webster & McConnell, 1987).

The field of study linked with the development of speech and language is huge. A list of appropriate and practical texts for readers with a particular interest in this area is provided at the end of this book. It is hard to underestimate the extent and range of communication difficulties that can be experienced by these children and adults especially when combined with dyslexia. An understanding of the following aspects of speech and language theory may help to explain some of the misunderstandings and distress experienced by people with these difficulties.

- the nature of human communication
- the three main tools of communication.

Human communication involves three main overlapping components, which are clearly presented by Bloom and Lahey's Venn diagram (see Figure 4.1) (1978, cited in Martin & Miller, 1996).

The three overlapping circles represent the content, form and use of language. Content refers to semantics: topics, ideas, memory and meaning. Form refers to the method of communicating – spoken, written or signed (phonology, morphology and syntax in spoken language). Use refers to pragmatics or the goals and social use of language. The diagram shows how these three aspects of language interconnect, yet can be identified and examined separately

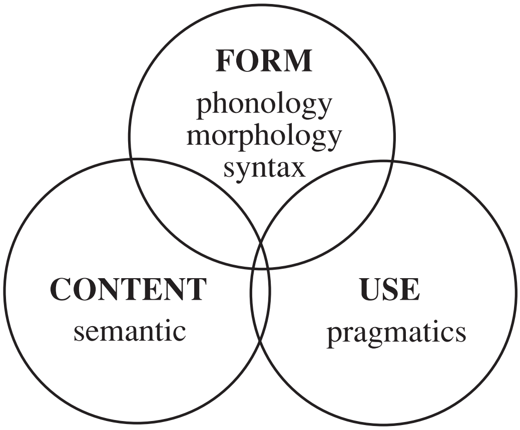


Figure 4.1 The intersection of content, form and use in language (based on Bloom & Lahey, 1978, cited in Martin & Miller, 1996).

to show how an individual's difficulties can, and often do, arise in any or all of these areas.

The *three main tools of successful communication* are:

1. *receptive* language or the processing of incoming verbal information
2. *expressive* language, including retrieval of the required vocabulary speech, voice and fluency
3. *non-verbal communication*, including production and interpretation of facial expressions, body posture, gestures, turn-taking and other frequently subtle social conventions that make communication meaningful. These are sometimes termed 'pragmatics'.

Disorders or delays can occur in any of these tools.

Difficulty with *receptive* language means that a child finds it hard to pick up on word meanings, particularly when words start to have technical implications as well as the previously understood day-to-day ones - 'I thought currants came in buns!' (Tom, 12, after a science lesson). It makes following instructions and processes hard. Understanding and remembering, using the spoken word alone, becomes a problem.

Difficulty with *expressive* language or word retrieval means that, even if you know the answer, you are frequently too slow to select the words you need to express it before somebody else jumps in. It makes writing up experiments a challenge and turns giving an oral account in front of a group into an ordeal.

Problems with the *social* or *pragmatic* forms of language can cause much distress as children frequently alienate their peers through their inability to know when they are boring them, how close they should stand or that the last remark was a joke. This is particularly true of students suffering from Asperger's Syndrome, which is a disorder within the autistic spectrum where normal cognitive skills and verbal intelligence co-exist with impaired social or pragmatic skills that can make the individual a challenging companion.

It only takes a little imagination to begin to understand the difficulties, misunderstandings and frustrations, both with adults and peers, that can arise. Even in technical subjects or maths, information is communicated through written and spoken language, particularly in the secondary school.

Like dyslexia, specific language difficulties are frequently a 'hidden impairment'. People suffering from them can be misjudged as selfish, taciturn or difficult. Martin and Miller (1996) suggest that many students seen as having behavioural problems may well be suffering from an undiagnosed language difficulty.

Dyslexia and dyspraxia

Dyspraxia is in some ways a controversial term. Williams (in Smythe, 2001a) defines it as 'difficulties in achieving purposeful, sequential movement in the absence of muscular paresis (weakness)' (p. 285), and the Dyspraxia Foundation states that: 'Dyspraxia is an impairment or immaturity of the organisation of movement. Associated with this, there may be problems of language, perception and thought.'

If a child seems exceptionally accident prone, seems to lack awareness of where peripheral parts of their body are in relation to the environment, is consistently clumsy and experiences difficulty with physical activities, such as dressing, ball games and balancing, or with the fine motor control needed to draw or write, they may be showing some of the signs of dyspraxia. These pupils may have difficulties with practical tasks across the curriculum, including in the science and DT areas and on the sports field. Some of these symptoms are considered to be typical of some dyslexic people and some individuals certainly appear to have some of the symptoms of both these conditions. Goedkoop (2001) considers that there is as much of an overlap as 40% between dyslexia and dyspraxia, but she presents a useful contrasting list of dyslexic and dyspraxic symptoms (see Table 4.1).

Verbal dyspraxia is a speech-production disorder, possibly related to damage to Brocas's area of the brain, characterised by difficulty processing sound sequences and an inability to organise and produce longer words or utterances. It is neurologically based and is presumed to be due to defective programming of verbal motor output, of the translation of verbal 'images' into the motor commands for their execution by the muscles of the mouth and face (Rapin, 1996). Some individuals with dyslexia can also be dyspraxic and, as with speech and language difficulties, an increasing number of Statements of Special Educational Needs refer to the co-existence of the two conditions and the need for additional special support for those children with the co-ordination and motor-programming

Table 4.1 Symptoms of dyslexia and dyspraxia.

Dyspraxia	Dyslexia
Late motor development	Early or normal development
Weak posture and muscle tone	Normal
Verbal IQ greater than performance IQ (often)	Performance IQ greater than Verbal (often)
Poor gross motor skills and PE	Often good at sports
Poor fine motor skills, craft and art	Strengths in art and craft (often)
Difficulty with social skills	Often strong social skills
Usually no reading difficulty	Usually reading problems; problems with word finding, rhymes, phonological awareness
More writing than spelling difficulty	Always spelling problems

problems associated with dyspraxia. Some teenagers with dyslexia who no longer suffer from articulatory difficulties continue to have to cope with slower processing speeds and response times.

A child who is dyspraxic may well have caused concern well before school due to their excessive clumsiness in play and everyday life, often combined with a delay in producing intelligible speech.

Dyslexia and ADD/ADHD

ADD (attentional deficit disorder) of ADHD (attentional deficit hyperactivity disorder) is a psychiatric diagnosis that has recently begun to be applied to children who are experiencing significant difficulty, both at home and at school and in their personal relationships, due to problems of impulse control and attentional deficits (ADD) accompanied sometimes with hyperactivity (ADHD). There is some controversy surrounding the question of whether this collection of difficulties is part of a specific syndrome and some criticism of the ways in which these types of behaviours have been medicalised and seen to be the product of a 'within the person deficit' rather than an individual's response to inappropriate contexts or interactions. There is also controversy over the tendency to look to medication for solutions and, in particular, the use of drugs, such as Ritalin in the treatment of the disorder (Volkow 2001).

ADHD often occurs alongside both behavioural and emotional disorders and low academic achievement in relation to intellectual ability (Barkley, 1990). Interestingly, there is some suggestion of a link between high levels of creativity and ADHD (Gramond, 1994, cited in Robertson, 2003). There is clearly an overlap between the profiles of some children with ADHD and some with dyslexia in that both may have trouble with working memory, maintaining concentration and may be behaving inappropriately, but the reasons for this may be different, and many children with ADHD do not exhibit the same literacy difficulties as those with dyslexia. Thus, despite the fact again that some Statements of Special Educational Needs do mention ADHD as well as dyslexia, great care must be taken with diagnosis and provision of the right kind of support. Many of the disruptive behaviours or lack of attention exhibited by some learners with dyslexia may be secondary behaviours developed as a response to their feelings of frustration and failure in classrooms.

Self-esteem and dyslexia – the effects of early negative experiences

Many teenagers with dyslexia may have endured a lifetime of being told – or simply telling themselves – that they are hopeless. Teachers at school have been driven mad by exploding briefcases and lost assignments. At home the best intentioned of families can lose patience with misplaced belongings and forgotten arrangements. Frequently, the child will find themselves the odd one out in a high-achieving family where neither the student nor the parents can understand why little sister is reading far more difficult books than they can cope with. Sadly, parents can sometimes be the worst people to help their child with reading or homework. Instead of the home being a refuge from the pressures of school, Mum becomes ‘teacher’ and all the school-related problems and tensions reappear at home, exacerbated by the parent’s own anxieties and insecurities. Edwards (1994) and Scott (2003) document many examples of these types of experience.

Alternatively, other members of the family may also be struggling with dyslexia-related problems; so home may be chaotic. Some dyslexic children have younger or older brothers and sisters, or even parents, who tease them when they make mistakes. Accumulations of small failures and humiliations both at home and at school can damage self-esteem almost beyond repair. It’s easy to laugh at oneself for the odd lapse if it happens within the context of a normally efficient and successful lifestyle. If it becomes the rule rather than the exception, one’s sense of humour begins to vanish, particularly if friends and family start to lose patience or, worse, ridicule one’s best efforts. Good humour is replaced by outbursts of frustration. What’s the point of trying? I’ll only make a mess of it!

Edwards (1994, p. 142) describes the sense of alienation, lack of confidence and self-doubt experienced by many dyslexic adolescents. She gives a vivid picture of eight ‘outwardly secure, confident young men’ who had ‘all except one been pushed to extremes of misery during primary school … had been teased, humiliated and insulted, by staff, children or both … with evidence of truancy, total demoralisation, psychosomatic pain and isolation’. A number of studies (see Hales, 2004; Mortimore & Crozier, 2006b; Riddick et al., 1997) also examine the emotional reactions to dyslexia. These include lack of confidence, self-doubt, sensitivity to criticism, behavioural problems, truancy, competitiveness disorders, withdrawal, isolation and psychosomatic pain. These childhood experiences last a lifetime, as this adult artist explains:

> *It's [dyslexia] been the bane of my whole life. From the day I started school to the day I finished, I hated every minute except at art or PE. Teachers can be the most evil of people ... I'm not so ashamed now. It's been a hell of a journey going through finding out I was dyslexic. I felt at liberty to be myself – I didn't feel stupid any more. It's horrible from a child onwards being told you're stupid. Some of the teachers were awful – they'd read out spellings in front of the class and humiliate me ... I've got butterflies in the stomach now just talking about this ... (Mortimore, 2006)*

Psychologists frequently refer to low self-esteem when writing up statements of special educational needs for dyslexic students. 'Self-esteem' has been defined as 'the extent to which we like or approve of ourselves or how worthwhile we think we are' (Gross & Mcllveen 1998, p. 402). It is bound up with the 'self-concept', or the picture an individual builds up of themselves (a picture that is created by experiences at school, at home, with teachers, family and peer group).

During adolescence, which can be a shaky time for the most successful of individuals, having a positive self-concept or high self-esteem can be crucial to the teenager's wellbeing. Repeated failures at school or at home, however seemingly minor, can devastate self-esteem and lead to problems in all areas of life. Many studies have linked poor self-esteem with juvenile crime or experimentation with drugs (Coopersmith, 1967). For many students it will destroy their willingness to try any new task for fear of failure. In fact some research has suggested that, unlike others who tend to attribute success to their own ability and failure to outside causes, dyslexic students get into the habit of identifying any success as due to extreme hard work on their part and any failure to their lack of ability (Osmond, 1994).

Other research linked with the Pentonville Prison Dyslexia Project suggests that a high proportion of illiterate prisoners are in effect dyslexic, possibly as many as 30% of the prison population. This is not to suggest that people with dyslexia are any more prone to crime than anyone else in the population at large, but merely to focus on the damage that can be done to their lives if their needs are not met. There is certainly room for more investigation into the true nature of the difficulties of many of the children who formerly ended up in special schools for students with disordered behaviour.

Dyslexia in adults

Is there any difference between the difficulties experienced by school-aged learners with dyslexia and their adult counterparts? Until comparatively recently in the United Kingdom, most of the research into dyslexia involved children under the age of 16. Research into dyslexia in adults or higher-education students was rarer (see Miles, 1993; Miles & Gilroy, 1986; Riddick, Farmer & Sterling, 1997). However, studies of students in Higher Education indicate clearly that children with dyslexia grow up into adults and many move on into higher education. Frith emphasises the fact that, even though dyslexic children usually master reading, they become dyslexic adults: 'dyslexia is not a disease which comes with school and goes away with adulthood' (1997, p. 8).

A further development was the research of Galaburda (1993) among others, into laterality and hemispheric asymmetry. These findings support the contention that dyslexia is not simply a difficulty with symbolic material but a much wider approach to the processing of experience involving a range of basic executive function or organisational difficulties, including organisation in time and space (Vail, 1997), which do not simply disappear once a student masters the written word. They also lend credence to the contention that the effect of dyslexia goes way beyond working with symbols or phonological processing and that many people with dyslexia may possess considerable strengths.

The National Working Party on Dyslexia in Higher Education (Singleton & HEFG 2001) surveyed 80% of higher-education institutes and stated that 1–2% of students in higher education present as dyslexic, although there must be more dyslexic students who have not been identified. These students are scattered throughout the range of subjects. University based studies, such those of Farmer and her colleagues (2002) and Mortimore and Crozier (2006b), make it clear that, although these students had compensated for earlier literacy difficulties to enable them to meet the entry criteria for university, they reported that they remained disadvantaged by dyslexic differences such as effortful reading, poor note taking skills and difficulties with expressing ideas in writing. In terms of the findings from research into reading and brain processes, longitudinal studies cited by Frith (1997) and work by Pennington et al. (1992), Paulesu and colleagues (1996) and Bruck (1992) show the persistence into adulthood of underlying problems with reading, linked mainly with phonological processing, also subtle impairments in visual ability and a wide range of abilities involving motor control (Nicolson & Fawcett, 1995). These studies suggest that, although many adults with dyslexia master literacy, the brain activity involved remains different from those without dyslexia.

Klein (1995) lists the most persistent difficulties she commonly encountered in students with dyslexia as being:

- memorising names and facts
- remembering sequences (e.g. alphabet, instructions, procedures), rote memory tasks in maths, including times-tables and basic number facts
- right-left discrimination

- problems with telling the time, time-keeping and estimating time scales
- concentration difficulties and being easily distracted
- severe expressive writing problems, even when orally competent, copying difficulties
- word retrieval – getting ideas down on paper, either as notes from lectures or in assignments.

To these should be added a range of problems linked both to study and day-to-day organisation.

In the academic sphere, students will frequently still find the volume of reading required for many subjects more time consuming and exhausting than their peers. They will also frequently find it hard both to decode new technical terms and then to assimilate them quickly into their working written vocabulary. Problems with automaticity lead to major difficulties with note-taking as the majority of students with dyslexia find it very difficult to attend to the logic of an argument while simultaneously attempting to store it on paper even if they are not handicapped by slow handwriting and doubts over spelling. If they record lectures on tape, they then have to face the time-consuming process of listening and scribing later.

Inadequate notes obviously add to the pressure placed on students with dyslexia by written examinations, particularly in subjects where ability at the subject is not directly linked to the ability to write about it. Revision is made more difficult by slow reading and problems with time and planning revision schedules. Timed examinations are a nightmare to students whose handwriting speed may still be half that of the average student and who are aware that their spelling, even if readable, will give the impression to unsympathetic examiners that they are really too illiterate to be at university.

Essays and assignments also pose considerable difficulties as many of the essay-writing skills that seem second nature to a many students were never absorbed by the student with dyslexia at school where they were too busy concentrating on basic writing and spelling to absorb concepts of punctuation or planning. Planning itself is frequently hard, as sequential memory may be weak, as is the ability to sort out and organise main ideas from the mass of detail accumulated about a subject that may be of consuming interest (Miles & Gilroy, 1986).

Planning in general is often very difficult for students with dyslexia, whether it be assignments or simple day-to-day living. Problems with organisation, with concepts to do with time or with short-term memory can lead to a range of difficulties from forgotten appointments, lost phone numbers, lost library tickets or missed assignments. The student with dyslexia may need far more support with organising life away from home for the first time than the majority, yet is frequently reluctant to seek it out.

To general difficulties with day-to-day organisation is frequently added the emotional pressure of deciding whether to admit either to friends or tutors that one has a problem or might be dyslexic. For some students who managed to cope well at school within the structured home-school environment, there is the shock of discovering within the first year of higher education that they are not coping, and they do not know why. The dyslexia of over 40% of students is not identified until they reach higher education (Singleton, 1999).

> *Dyslexia, annoying, yes, inconvenient – only if we fail to change society's and the education system's attitude to dyslexia. Remember it is only the under-diagnosing and treating of it that causes dyslexia to be an inconvenience. If this was done properly, many dyslexics would have a head start over those peers who lack the problem-solving abilities that many dyslexics have. (David, dyslexic graduate)*

Chapter summary

Chapter 4 looks at the pattern of difficulties experienced by children and adults with dyslexia at home and at school. Dyslexia is not simply a weakness with literacy or numeracy in an otherwise able child. It affects memory and organisation and frequently language use and behaviour. These effects are felt both at home and at school and frequently result in the kind of damage to self-esteem that leads to a cycle of repeated failure, poor behaviour and emotional damage.

It outlines the other main learning difficulties that sometimes co-exist with dyslexia:

- speech and language difficulties
- dyspraxia
- ADHD.

It examines the prevalence of dyslexia among higher education students and describes some of the difficulties these students may encounter at university level. Dyslexia does not go away once a student with dyslexia learns to read. Children with dyslexia become dyslexic adults and carry the effects of these differences throughout their adult lives.

Chapter 5 looks at some of the strengths and talents displayed by many people with dyslexia.

Chapter 5
STRENGTHS AND TALENTS

Introduction: Does dyslexia bring special talents?

I am a very LOUD PROUD DYSLEXIC THAT LEARNS IN A DIFFERENT WAY. I don't have a disability. I am different and wouldn't the world be BORING if we were all the same. (Nicky Woodward, adult dyslexia co-ordinator)

I'm dyslexic. That means that my brain works faster than I can write. (Jamie, A level college student)

I am currently a TV and video student. The more I see others struggle, the more I realise that I am gifted. What I lack in auditory memory I more than make up for in visual. All the other students plan their projects, storyboard them, etc. I can see the whole thing in my head and know how to edit and put it together. They all wonder how I can do that. I wonder how they cannot. (Lawrence Arnold, dyslexic student)

The previous chapter painted a gloomy picture of the many ways in which people with dyslexia can struggle to cope with everyday life. This is, however, only part of the picture. Question? What do Albert Einstein, the scientist, Gustav Flaubert, the writer, Richard Rogers, the architect, and Tom Cruise, the actor, have in common? Answer: they are all (arguably) dyslexic. To this list could be added businessman Richard Branson, politician Winston Churchill, scientist Isaac Newton, poet W B. Yeats, scientist Michael Faraday, sculptor Auguste Rodin (Thompson, 1969), comedian Eddie Izzard, racing-car driver Jackie Stewart, five-times Olympic gold-medallist oarsman Steve Redgrave, photographer David Bailey, actress and singer Cher and still omit many other talented and successful individuals with dyslexic differences.

These people epitomise the other approach to dyslexia that has been developed and examined by those such as West (1997), himself dyslexic, Davis and Braun (1997), and organisations such as the Arts Dyslexia Trust in England and the Newgrange Trust in America. This is to see the range of difficulties with memory, language and organisation endured by many people with dyslexia as a 'price' that may have to be paid for being talented in creativity and visual thinking. The difficulties experienced by people with dyslexia have been compounded by the tendency throughout most of the twentieth century to transmit information in a verbal, linear way, thus condemning many dyslexic learners to early and lasting academic failure. The first edition of West's book (1991) had coincided with, and encouraged, the development of a timely shift in the attitude towards dyslexia that had for so long tended to focus research on deficits in phonological processing and emphasise the deficits and difficulties associated with the condition. West celebrates the creativity and visual talents that so many individuals with dyslexic type differences possess. He suggests that individuals such as Einstein and Michael Faraday seem often to recognise that they have achieved extraordinary accomplishments 'as much because of, as in spite of, distinctive combinations of difficulties and disabilities, disabilities that are themselves sometimes the obverse of special talents' (p. 102). He emphasises the role this type of 'visual-spatial' thinking has to play in the technology of a new century in which he argues that the visual image may well become the primary focus of analysis in detecting relationships rather than the verbal, logical or mathematical modes of thought. Thus individuals with the ability to visualise scientific concepts and manipulate complex three-dimensional information in a range of graphic displays may well become more useful than those skilled in words or numbers. This may be debatable but this new approach epitomises a type of 'dyslexia-pride' and fits well with the criticism of the medical model of dyslexia as a defect within the individual. It has been invaluable in the way that it has inspired many people with dyslexia and their families to take pride in strengths rather than focusing on weaknesses, and provided them both with successful role models and with the power to see themselves as making an original and significant contribution in a range of areas of work and study. It does, however, remain controversial in a number of ways.

The research background

The all-important question must be: Is there reliable, empirical research to support the contention that dyslexia may frequently carry with it high talents in spatial, mechanical or visual skills? West (1997) cited five types of evidence to support this:

1. anecdotal evidence and neuroscience
2. evidence arising from hemispheric specialisation theory
3. evidence arising from research into the structure and function of the brains of people with dyslexia
4. evidence from psychometric testing
5. evidence from comparison studies

Anecdotal evidence

West provided much fascinating information about a range of highly talented individuals in the fields of science and the arts, emphasising evidence of the presence of many of the classic signs of dyslexia, such as difficulty with processing written and sometimes spoken language, disorganisation and forgetfulness, along with a gift for using visual imagination. He cited a range of anecdotal evidence including comments from friends and historians such as Tricker's (1966, cited in West, 1997) reference to Faraday and Maxwell's habit of 'thinking in terms of physical pictures' (p. 32). He also quotes extensively from letters, diaries and lectures including Einstein's own comments about his 'poor memory for words' and the 'ghastly disorder that reigns among my worldly goods' (p. 12). Einstein, who did not talk until he was four or learn to read until nine, has also been quoted elsewhere (Richardson & Stein, 1993; Robertson, 2002) as stating that, for him, the essential features and tools in his thought processes were signs and images that could be voluntarily reproduced and combined – words being used laboriously only when ideas needed to be communicated to others. It must not, however, be overlooked that Einstein attended an unusual school in Switzerland run by followers of an educational pioneer Johan Pestalozzi. Pestalozzi believed that the foundations of all knowledge and learning were rooted in imagery and students were therefore encouraged and taught how to develop this aspect of their minds rather than others. Thus, from an early age, Einstein was encouraged to utilise imagery and this reflected the prevailing approach of German scientific thought at the time (Robertson, 2002). There is therefore no conclusive evidence that his evident preference for the visual rather than the verbal was a direct product of difficulty with verbal skills or for suggestions that he may have had dyslexia.

There is, however, evidence of a high proportion of students with dyslexia enrolled on arts based courses in higher education and of a high incidence of creative artists among those public figures who have acknowledged their dyslexia. The work of the Arts Dyslexia Trust has also publicised and championed the work of artists with dyslexia across eight professional art and design disciplines. In itself, however, anecdote does not constitute hard, quantitative evidence for a strong and consistent link between dyslexia and creative visual thinking.

There is, however, evidence from the realm of neuroscience indicating the existence of competition between the verbal and visual pathways in the brain. For a detailed and fascinating account of this area, readers are referred to Robertson (2002) some of whose main suggestions are summarised here. Robertson states that studies in neuroscience of both normal individuals and stroke victims have established that imagery and verbalisation tend to take part in separate areas of the brain. Language is usually mediated in the left hemisphere while the right hemisphere has a more limited access to language

– can 'know things but be unable to say them' (Robertson, 2002, p. 14). Much visualisation takes place in the parietal and occipital lobes of the right hemisphere of the brain. Spatial imagery, such as locating oneself in space and building mental maps, is mediated by the patietal lobe while detail, mental pictures of objects and faces, is mediated by the temporal lobes. Robertson suggests that, as we get older, we lose our infant powers of imagery as we increasingly begin to become word and sound focused and to categorise and classify. It is as though words damage images and the language system interferes with the visual processing systems. Does this, however, mean that a damaged language system will necessarily contribute to heightened powers of visualisation? If dyslexia is seen as rooted in an impaired language system (Snowling & Stackhouse, 2006), can we really argue that this will lead to increased visuo-spatial powers? Robertson (2007, personal communication) is not convinced and the evidence for any link does not seem clear. However, the only clear evidence of a spontaneous link between an impaired language system and enhanced visuo-spatial skills is that provided by the study carried out by Miller and his colleagues (2000, cited by Robertson, 2002), which established the existence of the development of new visual artistic talents in some Alzheimer patients with left hemisphere language degeneration as their language diminished. Miller and his colleagues suggested that there may be areas in the language parts of the brain that inhibit the parts of the right hemisphere that are involved in visual and musical creativity. As these are damaged by the Alzheimer's, so creative powers are released. It must, however, be remembered that this was a small study. It was also based on damage to the brain so should be related to dyslexia with extreme caution.

Evidence based on hemispheric specialisation theories

The field of research into brain structure and function has further been invoked to support this link. One theory used is that of hemispheric specialisation. This is also sometimes referred to as the 'Two Mind Theory' and it arose from the work of Ornstein (1972). He suggested that the two halves of the brain deal with information in diametrically opposite ways. The right hemisphere is more attuned to visual processing and will process any incoming stimulus as an integrated whole while the left hemisphere will analyse it in a sequential manner. Freeley (1987) provides a typical description of how the different types of processing are attributed to the different hemispheres (see Table 5.1).

This was supported by others, among them Cane and Cane (1979) and Torrance and Rockenstein (1988), who suggest that the right hemisphere is linked with non-verbal, wholistic, concrete, spatial, creative, intuitive processing while, the left-hemisphere is linked with verbal, analytical, abstract, temporal and digital processing. Robertson suggests (2002) that the left hemisphere has a much tighter system of semantics, meanings and

Table 5.1 Types of processing undertaken by each hemisphere (Freeley 1987, p. 68).

Left hemisphere	**Right hemisphere**
Respond to verbal instruction	Respond to visual, kinesthetic and demonstrative instruction
Depend on words and language for meaning	Depend on images and pictures for meaning
Prefer a step-by-step process where details and facts build one upon the other in a logical order	Prefer a wholistic overview so they know where they are going and then can learn by exploration and discovery

concepts which become hardwired. In contrast, the right hemisphere is less precise, heavily image laden and perhaps more open to creativity.

West (1997) used hemispheric specialisation theory. He suggested that the two modes or processing outlined in Freeley's table are fundamentally incompatible and that it is therefore not surprising that an individual with highly developed abilities in one mode would find the alternative mode difficult, to the extent that somebody who has a propensity to think in images rather than words would experience actual difficulties with verbal communication.

This is an elegant theory, since it helps both to explain the often puzzling contrasts of ability and disability co-existing in many individuals with dyslexia and to present the condition in a very positive light, almost as a gift. However, it has flaws. As shown earlier, there is little evidence that weakness in one type of processing will automatically produce strength in the other. This assumption can also undermine still further the confidence of that large group of people with dyslexia who do not seem to possess superior visuo-spatial talents. Furthermore, the validity of the scientific basis to Two Mind Theory, as popularised by Ornstein (1972), has come under attack from a range of researchers (Coren, 1993; Goswami, 2004; Zenhausern, 1982). Coren (1993) provides a particularly strong critique. He explains that what is sometimes termed the 'two mind' theory arose out of Sperry and Gazzaniga's neurophysiological research (1970, cited in Coren, 1993) on split-brained patients. These were people whose corpus callosum, which connects the two hemispheres of the brain, had been severed. This allowed Sperry, Gazzaniga and their associates to examine responses mediated by each hemisphere of the brain separately in the hope of coming up with some definitive answers as to whether there was any difference in the functions and abilities of the two hemispheres. Initially, results seemed to indicate that there was.

In short, the suggestion was that the left hemisphere handles language functions and several other functions that have features in common with language, while the right hemisphere handles functions that are not easily translated into language, including spatial abilities, music and, perhaps, emotion. So far so good, and as we have seen from Robertson's evidence from the field of neuroscience, there is a strong element of truth in this. However, it was at this point that Ornstein (1972) seized and popularised the idea that differences in the function of the two hemispheres are responsible for clearly identifiable and characteristic differences in abilities and thinking styles that affect all aspects of everyday behaviour.

This theory was immediately taken up by educators and counsellors as a basis for direct action and therapy. Phrases such as 'right brained' learning (for example, Goodwin & Thomson, 2004) and suggestions as to how educators might cater for this began to appear in the practical education literature including suggestions (Cane & Cane 1979) that one of the goals of education might be to develop equal cerebral functioning through activities specifically designed to target and stimulate whichever hemisphere seems to be less dominant in any student.

Almost immediately, however, Gazzaniga and Ledoux (1978) qualified Sperry and Gazzaniga's original work and pointed out that there is, in fact, little evidence to indicate that tremendous differences in thinking styles are really characteristic of left and right hemispheres. There has since been a series of research papers querying the extent to which the hemispheres specialise in particular activities. Levy's review (1992, cited by Riding & Rayner, 1998) of the role of the two hemispheres in various aspects of language function seemed to show that, in the normal child or adult, both hemispheres contribute important processing operations. Robertson and Bakker (2002) suggest that, different aspects of language are processed in the right and the left cerebral hemispheres and that the age at which language is acquired affects which side is used in language mediation. This makes it impossible to allocate the final level of language understanding or output to one hemisphere or the other. Coren (1993, p. 125) provides a particularly strong critique:

> *In other words, the Two Mind Theory. .. is wrong, according to the conclusions of one of the very researchers whose data served as the starting point for the development of this new scientific myth.*

As early as 1972, Dimond had suggested that it is an oversimplification to attribute particular functions to particular hemispheres. Goswami (2004) added that this type of rigid attribution could be termed a neuro-myth. Findings indicating the plasticity and adaptability of the human brain (see Blakemore and Frith, 2006 for a clear discussion) further complicate the picture. Although many advocates of hemispheric specialisation seem unwilling to acknowledge this, to state that each hemisphere can only deal with specific functions and that strengths in one set of functions will necessarily lead to weaknesses in the other seems to be an oversimplification. The picture is of a far more complex and adaptable system. Hemispheric specialisation theory cannot be used to justify West's assertions that visuo-spatial strengths accompany dyslexia.

Research into the structure and brain function of people with dyslexia

Research into the structure and function of the brain showing possible anomalies in structure and brain function in people with dyslexia has been used to justify the application of the 'two mind theory' to dyslexia. Until comparatively recently, our knowledge of the workings of the brain was gained either from extrapolating from observed behaviour or from autopsies. Much of this research also focused on brains that had been damaged by accidents or strokes, which may not be a reliable guide to what might be occurring in a developmental disorder. Galaburda's (1993) work, however, established the existence of some differences both in structure and function. Galaburda noted (pre-natal) malformations in the cellular architecture of the left hemisphere in these 'dyslexic' brains. His post-mortem studies indicated that two-thirds of normal brains are asymmetric, larger to the left in the planum temporale, an area vitally important to language processing and comprehension. The 'dyslexic' brains that he observed, however, showed an abnormal symmetry, perhaps suggesting a preference for right hemisphere function. This has been associated with mixed handedness or a tendency towards left-handedness (Rae et al., 2002). Left-handedness has been linked with dyslexia although Bishop's (1990) review of the literature did not provide any clear conclusions apart from the 20 studies that suggested twice as many children with dyslexia were left handed (11%) compared with 5% of controls and that there might be an expectation of poorer motor performance overall in individuals with dyslexia.

There is some evidence of a link between left-handedness and visuo-spatial skills. Coren (1993) examines some characteristics of left-handers. At university level, left-handers perform better in tasks that involve the visualisation of objects and mental manipulation of images, an important part of certain scientific applications of mathematics, such as physics, chemistry, engineering and architecture. They do not perform quite as well as the right-handers in tests of vocabulary, arithmetic ability and certain types of problem-solving tasks. However, these results are not consistent and seem to be influenced also by the gender and the age of the individual as some differences do not make themselves reliably visible until after the age of 13 (puberty).

Coren (1993) also cites Peterson and Lansky's (1974) research, which discovered that an unusually high percentage of architecture students are left-handed and that left-handed students appeared to do better in this area. Other data relating to chess and the Chinese game of go, where good spatial skills are required, found evidence of an over-abundance of left-handers among masters. This must, however, not be taken as clear confirmation of other so-called right-brained strengths, as a range of research cited by Coren (1993) has found no link between left-handedness and creativity, musical ability or artistic success. Coren admits to some differences between right- and left-handed people, but he does conclude by stating that these are usually small and that they tend not to hold up in systematic laboratory testing. Many left-handers do well at supposedly left-brained tasks and many left-handers also turn out to be left-brained for language. Handedness studies do not seem to provide any real support for the linking of visuo-spatial skills with dyslexia.

Since the mid-1980s, a number of brain imaging or 'scanning' techniques have been developed which has allowed the location of brain activity underpinning certain functions to be observed. There are unquestionable biological differences between the structures of the brains of people with and without dyslexia, and imaging studies show that the activation during reading differs between participants with and without dyslexia. Rice and Brooks (2004) provide a clear discussion of the findings and counsel caution in the way that these are interpreted. These differences in brain function may not be causes of dyslexia; they may not be biological in their origins but simply an adaptation in response to reading and writing experience (Castro-Caldas & Reis, 2003); they may reflect not dyslexia but compensatory processing or some other general difference; they may simply represent variation within the normal range. In any case, it does not seem that they can be used to support the contention that people with dyslexia operate in a right-brained way, that they will have superior visuo-spatial skills or that they will thus necessarily have weaknesses in verbal or sequential processing.

Evidence from psychometric testing

There are, possibly, some more supportive pointers from studies that compare IQ scores in tasks that measure visuo-spatial skills. It is not uncommon for the educational psychologists' reports for children with dyslexia to reveal sometimes dramatically superior scores in the visual/spatial non-verbal subtests of IQ assessment instruments (Chasty, 1985). Research collected by Whyte (1989) suggested a link between an above-average visuo-spatial ability and dyslexia or reading difficulties. He also cites research suggesting that strengths in visuo-spatial cognitive functions are genetically more common in boys, which Robertson (2002) endorses; however, he suggests that women report that they can create more vivid mental images than men.

This is not, however, strong evidence in support of the visuo-spatial strength hypothesis. Although there remain many more boys diagnosed as dyslexic than girls (Miles, Wheeler & Haslum, 1998), a number of researchers have now questioned this gender disparity. Vogel and Holt (2003) suggest that the 60% boy: 30% girl distribution of dyslexia reported amongst learners identified in school may well be due to referral bias among teachers. Boys with dyslexia tend to exhibit delayed language and reading readiness, poor letter recognition, poor phonological processing skills and poor handwriting and spelling. However, the picture is complicated by the more frequent co-occurrence in boys of Attention Deficit (Hyperactivity) Disorder with dyslexia, which exacerbates behavioural issues in the boys (Vogel & Holt, 2003). As a result, it has also been suggested (Phillips, 1996, cited by Richardson & Wydell, 2003) that the displacement strategies employed by failing boys are more disruptive and gain them more attention and specialist provision than those of girls who either use their social skills to disguise learning difficulties or alternatively become withdrawn and avoid activities that might focus attention on them or their difficulties. Schools may tend to link learning difficulties with behaviour difficulties and not use the same criteria to identify learning difficulties in boys and girls. Thus disruptive boys are picked up while girls quietly disappear to the edges of the classroom (Shaywitz et al., 1990). The picture as to gender distribution is still unclear but gender should be taken into account when evaluating research into dyslexia.

In any case, Gordon (1989, cited in Whyte, 1989) does not see these visuo-spatial strengths as necessarily a blessing and suggests that this preference for visuo-spatial skills can often be a factor in learning difficulties. He suggests that verbo-sequential phonological deficits may well be the consequence of a locking onto a visuo-spatial model of cognitive processing with insufficient flexibility to adapt to the requirements of different learning tasks. He does not address the causes of this rigidity. It may, of course, be due to difficulties with verbo-sequential processing, rather than a real talent for the visual. To date there is insufficient collected data to come to any firm conclusions about the predominance of high visuo-spatial scores among dyslexic individuals, but psychometric profiles would certainly be an interesting source of information.

Evidence from comparison studies

Another way of investigating the possibility of talents in visuo-spatial skills is to compare the performance of individuals with dyslexia with a matched control group without dyslexia across tasks that measure these types of skill. There are a couple of small scale studies that do this. Winner, Von Karolyi and Malinsky (2000) compare the performance of dyslexic and non-dyslexic students on a number of visual-spatial tasks and found no evidence of superior talents in the dyslexic group. These were, however, very artificial two-dimensional tasks, and there was no apparent attempt either to ensure that the dyslexic and non-dyslexic groups came from comparable skills and backgrounds (for example all scientists or all arts students) or to discount gender as a factor. Another small-scale study (Brunswick et al., 2006) compared the performance of 20 students with and without dyslexia across a variety of cognitive and visuo-spatial ability tests and found that men with dyslexia demonstrated some superiority over both women with dyslexia and over controls. However, the confounding effect of gender undermines any conclusions. A further study by Mortimore (2006) used Riding's CSA (1991a) to compare the cognitive style profiles of 60 carefully matched male higher education students with dyslexia with 58 students without and found no significant differences in style between the two groups. Students with dyslexia did not tend towards a more visual-spatial style of processing. There is, therefore, currently little evidence of any link between dyslexia and any specific style.

Conclusions

Is there reliable evidence of a link between dyslexia and enhanced visuo-spatial skills? The answer to this seems to be: 'Evidence? Maybe. Reliable? Currently not.' West's evidence tends to be either anecdotal or based on a theory of mutually exclusive modes of processing derived from the questionable (Goswami, 2004) scientific model of hemispheric specialisation.

As explained above, there may be evidence for underdevelopment in the area of the brain usually associated with language processing in normal individuals and for differences in brain activation between readers with and without dyslexia. However, this does not necessarily mean visuo-spatial skills must be superior in people with dyslexia. There is little research evidence so far to suggest this.

Many support facilitators, particularly in the field of further and higher education where discussion of style with students is more common, do suggest that learners with dyslexia do bring increased visualisation and creativity to their learning strategies (see Pollak, 2005) and it is obviously important to be sensitive to these possibilities. However, it will not be helpful to present these strategies to vulnerable students in a way that makes them feel inadequate if they do not think in this way. For the teacher's purposes it might, however, possibly indicate an anticipated preference within the dyslexic population for a visually based cognitive style, even if the student is not necessarily particularly talented in this area. Similarly, there does seem to be a disproportionate number of dyslexic people allegedly found in visual or spatial professions, such as art, engineering or architecture (Geschwind & Galaburda, 1987). It may, however, be that these creative and determined people enter these professions by default since individuals with difficulties in the verbal field might be likely to avoid professions that require facility with language or extensive reading. Not being good at art does not make you a 'bad' dyslexic!

The great value of the approach of West (1991), Vail (1997) and many other champions of the cause of people with dyslexia has been to highlight and encourage the talents many undoubtedly possess.

Edwards (1994) cites Vail's list of nine special traits and adds three more of her own. Professionals and parents who have lived and worked with dyslexic students will undoubtedly find many of them familiar:

1. rapid grasp of concepts
2. awareness of patterns
3. energy
4. curiosity
5. concentration
6. empathy
7. vulnerability
8. heightened perception
9. divergent thinking (Vail 1990)
10. talent in art and design
11. multi-dimensional thinking
12. originality and problem-solving

However, it is dangerous and potentially destructive to assume that all or even a high proportion of individuals with dyslexia will exhibit these traits. Many do not and feel doubly disadvantaged if expectations are raised. Many people without dyslexia also possess them, and it is obviously rash to attribute many of them to the dyslexic condition rather than to life experiences. However, if we are to teach to and reward strengths rather than focus on weaknesses, a good starting point is to recognise that every person with dyslexia is a learner with a particular style and that the added vulnerability of the person in the learning situation makes it even more important that this should be recognised and supported.

> *No two dyslexics are the same, and the gifts will be different, but it is our ability to use other methods to come to the same ends. For example, my organisational skills are not that great; so I have strategies to make sure I don't miss appointments or double-up meetings. People who come and see me say how organised I am. It is my gift to work out a system that makes this possible. A lot of people with dyslexia have skills they don't know about because it's what worked for them and they assume that everybody else does it the same. To explain this is difficult because of the different kinds of gifts. The simplest way would be to say we have creative ways of doing things. (Nicky Woodward, adult dyslexia co-ordinator)*

Chapter summary

This chapter reviews the suggestion that, for many individuals with dyslexia, considerable talents, particularly in the visuo-spatial field, accompany the pattern of difficulties (West, 1991). This acknowledgment of the creativity and talent of many dyslexic adults was long overdue. After considering the evidence from hemispheric specialisation theory, from research into the structure and function of the brain, from psychometric testing and from comparison studies it concludes that empirical evidence is currently less than conclusive, despite anecdotal evidence and the existence of many talented people with dyslexia.

However, it is suggested that the effect of dyslexia on some people may be to make them tend towards visuo-spatial learning styles and professions in which they can then become very proficient. Educators should therefore be aware of this in the classroom or lecture hall, especially when working with students with dyslexia.

Chapter 6 looks at how the theories of different learning styles can be put into practice.

Part Three

‘IT’S NO USE IF YOU CAN’T USE IT’

Chapter 6

APPLYING LEARNING STYLE THEORY TO LEARNING

I hear and I forget;
I see and I remember;
I do and I understand.

(Chinese proverb)

Introduction: Recap – learning style and dyslexia

The first five chapters of this book attempt to provide answers to the following questions:

What is cognitive or learning style?

Cognitive style is our characteristic and relatively consistent way of processing incoming information of all types from the environment. Learning style is this cognitive style applied to a learning task. It is likely that individuals develop learning strategies to cope with both task and situation and that these strategies are closely linked with the predominant cognitive style.

What are the different cognitive styles?

There are a number of models. However, for our practical purposes, the clearest and most all-embracing construct seems to be Richard Riding's pair of continua:

Wholistic-Analytic/Verbaliser-Imager

An individual can have a wholistic-imager, an analytic-imager, a wholistic-verbaliser or an analytic-verbaliser style preference. There is no particular virtue attached to any of these ways of dealing with the world except that some approaches will be better suited than others to specific types of tasks. There is also, as yet, no reliable evidence that any particular learning style preference is more conducive to academic success than any other. Riding (1998) also suggests that the analytic-imager and wholistic-verbaliser learning styles are more flexible in that the two styles complement each other rather than being similar or unitary; for example, an analytic imager style might not lend itself to seeing an overview of a situation but might use the whole-view aspect of imagery to supplement it. The analytic-verbaliser style offers more limited access to an overview since only the analytic style is available. In the same way, the wholist-verbaliser style offers both a wholistic and a more analytic mode, whereas the wholist-imager style only has access to the wholistic approach. The more flexible the style preference, the more an individual is able to use strategies to maximise learning success in a range of situations.

Why is knowledge of learning style important?

Much evidence seems to indicate that most people learn best when the style of presentation harmonises with their preferred learning style. It is therefore useful for teachers to ensure that they do not persistently use one style of teaching or demand the same style of response from their students, as any mismatch is likely to disadvantage any student who finds it hard to adapt learning style to situation.

If students can be made aware of their learning style preferences, they will then be more able to recognise their strengths and become sensitive to their weaknesses. They will also become more aware of the demands of a particular context. They can then take responsibility for ensuring that they either use their preferred style, or, if this seems impossible, they find strategies to compensate for the mismatch.

Why might this knowledge be particularly significant for people with dyslexia?

There is a range of reasons. Although there is little empirical evidence, it is possible that students with dyslexia may tend towards:

- a wholistic or imaging style either because memory difficulties and weakness in processing verbal information force them to rely on the visuo-spatial channels or through innate strengths in these areas.
- a less flexible unitary style, which leaves them with difficulties responding to verbal detail. It may be because of problems with concentration, attention span, working memory or automaticity. It may be due to fear of failure and increased anxiety in academic situations. Whatever the reasons, without explicit help, this will make it more difficult for them to develop coping strategies when teaching presentation does not match their preferred styles.

Both research and experience suggests that students with dyslexia succeed when teaching is multi-sensory and uses all channels to reinforce learning.

For many highly intelligent dyslexic people, education is already fraught with difficulties. If matching style of delivery with learning style and helping students to develop compensatory strategies can enhance success, it seems less than sensible not to give it a try.

Learning styles and learning strategies

What is a learning strategy? A learning strategy is not the same as a learning style. Learning style is the application of a particular cognitive style to a learning activity. It is seen as less fixed than the underlying cognitive style. The difference between a learning activity and a strategy is that the activity becomes a strategy when it is selected as particularly helpful to the individual. Therefore, a learning strategy is one of a repertoire of ways of dealing with learning tasks that an individual develops to facilitate performance.

Riding and Rayner (1998, p. 79) term this 'the cognitive tool-kit'. They feel that individuals cannot change their styles, but can develop strategies to compensate for weaknesses by using their positive skills to enable them to deal effectively with a range of situations. They suggest that the processing load on the brain is heavier if the information is presented in a mode that is not preferred. As discussed previously, other researchers feel that style is less fixed. However, the consensus tends to be towards the need to develop flexibility. We have already discussed the difficulties that many students with dyslexia have with overload in the processing of information. This could well be one explanation for the problems many seem to have in generating a more flexible approach to learning.

How are these strategies generated and developed? A number of researchers have suggested that there is a hierarchy of cognitive processes involved in learning This goes from lower-order or primary processes, such as reflex or intuitive actions, through conscious and deliberate actions to higher-order actions or strategies, such as monitoring and metacognition – 'knowing about knowing'.

Developing knowledge of one's own mental processes, or metacognition, is seen as a major part of personal development and essential to the acquisition of learning strategies. Flavell (1987) calls the ability to take responsibility for generating learning strategies 'planfulness'. These strategies emerge over time through the cycle of action, reaction and the conscious selection of the activities and approaches that lead to a successful learning outcome.

There is a consensus among researchers that those students who have developed this repertoire of strategies will be more successful learners than others. Weinstein and Van Mater Stone (1996) emphasise that knowledge and the use of the following four items is vital for students if they are to achieve their goals:

1. the range of available strategies
2. their own learning styles
3. when and where their knowledge could be useful
4. the ability to evaluate their own performance and know when they are not coping.

It is important to remember that the development of a learning strategy involves three phases:

1. being aware of preferences or styles
2. selecting the mode of learning that is most comfortable
3. extending the strategy to apply to a range of tasks.

This third phase should involve a range of strategies, most of which are designed to reduce the amount of processing to be done. They all tend to involve adapting or translating information from an uncomfortable mode into one the student finds easier to handle, for example a student who favours the imager style may represent spoken information from a lecture as a diagram, a mind map. A student with analytical preferences, who finds it hard to make links, may well choose to create a flow-chart type diagram that gives an image of the whole of a topic.

RECAP

Successful students will develop learning strategies that complement their learning style preferences.

To do this they must be aware of their preferences and be given the opportunity to use them to their advantage. They will also need to be shown ways of adapting information to suit themselves.

The remainder of this chapter is split into two sections: the first explains the theories that underpin the suggested strategies; and the second explores some of the ways in which these might be applied to practice within educational situations.

What theories underpin these strategies?

The main aim in the teaching of strategies is to reduce the amount of processing needed to absorb and retain information. The most commonly used techniques are based on research from two main areas of education theory:

1. schema theory
2. memory function.

Books giving a more academic and detailed analysis of memory function, schema theory, scaffolding and the role of metacognition in reading and other types of comprehension will be found in the further reading section at the end of this book.

Schema theory – its role in learning

A schema is a general representation of the typical structure of a familiar experience. It involves knowledge of both the typical elements of some familiar aspect of the environment and of the relationships or sequence of these elements. Very young children develop schema for all sorts of events, such as going to bed at night, the events of a birthday party and simple stories. They are like recipes or sets of general rules for particular experiences. They affect both how we take in information and how we direct our own behaviour. They are closely connected to memory in that they are both the product of memory and help in the process of memorising – we can predict from our schema what ought to occur in any general situation and match that with the reality of the specific experience.

What relevance do schema have to learning? Researchers, such as Nist and Mealey (1991), consider schema to be vital to such basic learning processes as reading comprehension and for the building of mental models of information gleaned from oral or written information for the following reasons:

- They provide ideal scaffolding (see below).
- They help in the selection of important information.
- They aid inference by allowing a learner to fill in gaps with their own pre-existing knowledge.
- They help to edit, summarise and select key ideas.
- They help to fill gaps in memory through inference.

A range of studies seem to indicate that learning new information is easier if one already has a mental model of the topic and if the knowledge contained in this can be activated, expanded and organised to include any new information – almost like hanging decorations on an existing tree. Helping students to construct and use schema effectively to develop new models incorporating previous knowledge seems to lead to success.

The other contribution that schema research can make to teaching and learning strategies stems from the fact that schema do not simply apply to everyday experiences and knowledge. There is increasing emphasis in today's curriculum in the United Kingdom (UK) on the need to analyse and write texts of different types or genres, covering a range of fiction and non-fiction writing. Genre analysis research cited by Lewis and Wray (1995) suggests that there are six main genres of non-fiction writing: recount, report, procedure, explanation, persuasion and discussion. These types are reflected in the range of writing types tested in the UK English Language examinations at 16 – GCSE level. Each type has a typical specific structure and uses particular vocabulary or connectives. Giving students an explicit schema to match each type will provide them with a framework. This will often give those for whom writing is a real challenge the confidence to start.

Ausubel (1981) coins the term ‘advanced organiser’ for what has also grown to be a family of pre-organising techniques rooted in the principal that learners will benefit from a general introduction to a topic. The theory suggests that providing a student with a brief generalised passage prior to reading a longer more detailed piece provides a bridge between the student’s existing schema and the new information.

This is particularly helpful for a learner who prefers a wholistic approach. The learner who likes this kind of approach tends to gravitate towards frames and models. This is a strength which can be encouraged. When they ask in advance what they will be doing next lesson, they are already preparing to activate existing schema in the hope that they will be helped to absorb and retain detail by having a previously organised mental model onto which they can then add. Giving them what are sometimes also termed advanced organisers makes them feel safer. It reduces anxiety and therefore allows them to focus on new facts or details that they might otherwise overlook, secure in the knowledge that the schema is reliably available for them to refer to when they want to slot the new information into an appropriate section for future use.

Students with dyslexia are often used to feeling anxious at the start of a lesson, confused after a few minutes and totally lost by half-time. Giving them the security of a reliable framework reduces this anxiety and allows them to focus on the more detailed aspects of the task, an aspect they know they may find difficult, without losing the thread of the whole.

Schema theory – or the way in which we create stored mental models from experience – obviously has relevance for helping learners with both dyslexia and a preference for wholistic approaches. It also has strong links with the theories that underlie our understanding of the functions of memory and memory strategies in ways that are particularly important for people with dyslexia.

Memory function – its role in learning

Chapter 4 contains a brief discussion of some of the difficulties with memory that dyslexic learners may experience. The study of memory is a huge and fascinating area. What do we mean by the term ‘memory’? Memory has been defined as ‘a change in the brain that outlasts the stimuli that trigger it’ (Morris, Hitch, Graham & Bussey, 2003), but this is to underestimate the complexity both of the experience and of the wide-ranging and fascinating studies that have been carried out since the mid-1950s. Anyone with a particular interest in this aspect of cognitive processing is referred either to Vasta, Haith and Miller’s (1992) chapters on the development of research theories, or to Rose (1993), Pickering (2004) or Baddeley (1996).

It is accepted that difficulties with verbal memory have been identified as a factor both in the poor development of literacy skills and in the dyslexic profile (Pickering, 2004). Both dyslexic learners and those whose preferences are wholistic frequently have trouble with remembering facts and details; it is therefore necessary to have a basic understanding of current thinking about memory processes so that a teacher can select the most useful strategies to help them.

It is an oversimplification to see memory processing in terms of the simple two-stage 'storage box' metaphor where information is shunted by a process of rehearsal from a short-term memory store to a long-term memory store (see Atkinson & Shiffrin, 1968). Until the 1970s, however, this was the model; a distinction was made between short-term and long-term memory and the process was seen as a fixed sequence with information flowing from short-term to long-term. Research tended to focus on verbal coding. No account was taken of the nature of the material being remembered – what about familiar material or material related to information already known? Neurological evidence and one's own experience suggest that there is much more going on. This model also does not attempt to explain such questions as to why people forget or have problems retrieving information – does information decay, does it get overwritten by new data or is it simply in store and inaccessible?

In the 1970s, it was discovered that short-term memory was composed of more than one component and more attention was paid to identifying the different types of activity that might be going on during various stages of the memory process (Baddeley 1986; Baddeley & Hitch 1974). The activity during the first or 'experiencing' stage was described as registration, trace formation or encoding. The moment of 'remembering' something was termed retrieval, recall, recollection, reactivation or utilisation. A variety of interesting questions and areas of study arose from this research.

- Are there different types of memory?
- Do different types of memory involve different brain functions?
- Does learning or remembering change the structure of the brain?
- Does memory change developmentally as a child becomes an adult?

Are there different types of memory?

Memory processing involves four major components or codes:

1. The audio memory: this includes both environmental sounds and word-based knowledge of sounds (phonology).
2. The visual memory: this includes both visual experience, images and the orthography or forms of words.
3. The semantic memory: this is the aspect of memory that deals with meaning rather than sound, shape or touch. It is sometimes termed 'declarative memory', and it can be subdivided into two categories – episodic and semantic memory (Tulving 1983, cited by Rose, 1993). By episodic memory, Tulving

meant the memory of the events in one's own life; by semantic memory, he meant knowledge that is independent of one's own experience. He suggested that the development of a sense of self is a prerequisite for episodic memory which, therefore, does not develop until the end of early infancy (Robertson, 2002).

4. Movement, procedural or skill memory. Sometimes termed habit memory, this is the hardest form of memory to lose, for example an amnesiac may lose the knowledge of the name of a bicycle while being able to operate one perfectly.

Do different types of memory involve different brain functions?

In 1993 Rose discussed whether different biochemical changes located in different areas of the brain can be associated with particular memory functions and suggested that new technical developments in analysis of brain patterns such as Magnetic Resonance Imaging (MRI) or Positron Emission Tomography (PET) seemed to offer the possibility of answering all these questions about brain function and its relationship with mental processes. However, Rose was aware 20 years ago that the fact that a particular brain region might be active when a person is learning or remembering will show us little more than the location of the cortical activity for that specific task. Most tasks also involve a sufficiently complex range of processes to make it hard to be certain exactly what type of memory is being used. If a task could be made simple enough to be clearly attributable to a particular type of memory processing, it would not be typical of most everyday activities or tell us anything much about meaning or about the motives involved in transfers between different types of mental activity.

Reliable forms of measurement are still in their infancy. A state of the art review of recent progress in research into cognitive systems aiming to bring together experts within the field of psychology, neuroscience, biology, mathematics and computer modelling (Morris et al., 2003) finished with more questions than answers. They agree that the brain has a variety of storage systems which serve different purposes and do different things, but state that different experts describe these systems in different ways and 'whether they are really tapping into theoretically fundamental distinctions is a matter of debate' (2003, p. 8). They suggest that the focus is now less on individual brain centres but on how small networks could be connected together into a working system. This emphasises, yet again, how complex the brain is and how far research still has to go.

Does learning or remembering change the structure of the brain?

Biochemists have established the general principles of the cellular mechanisms involved in animal learning (Blakemore & Frith, 2005; Rose, 1993). When an animal learns, specific cells in its central nervous system change their properties. These changes in the structure of the neurons and their synaptic connections can be measured in terms of localised change in blood flow or oxygen uptake or through other physiological changes. This means that brain cells change their properties adaptively in response to events in the environment and some types of electrical activity (sometimes termed Long Term Potentiations or LTPs) increase the effectiveness of the receptors at the synapses, improving processing capabilities. It is as though experience reprogrammes the brain and can affect critical parts of the brain, having a knock-on effect on other functions and conditions.

Thus, in learning, it is likely that patterns of responses are set up leading to the tendency to utilise specific styles of processing and memorising. Hence, if we have a particular weakness in, for example, auditory processing, our tendency towards a compensatory visual style of processing may well set up a type of brain structure that is particularly suited to this style and is therefore less flexible.

Does memory change developmentally as a child becomes an adult?

The answer seems to be ‘yes’ (Rose, 1993; Vasta, Haith, & Miller, 1992). However, before we can investigate this, we need to understand the current accepted models of working memory. To start with some definitions: short-term memory and working memory are sometimes confused but they are not exactly the same (Vance, 2007). Short-term memory is a temporary store for ‘untransformed’ recall – it is measured in seconds. Working memory is also a temporary store but it has the capacity to process and store simultaneously (such as the effort needed to remember three numbers backwards) and it can deal with complex tasks demanding reasoning and comprehension. Its span is measured in minutes and it both supports the transfer to long-term memory and retrieves information from long-term memory when needed. Gathercole and Baddeley carried out a range of studies and developed what has become the respected model of working memory supported by evidence from a vast range of varied types of study (Pickering, 2004) – that of Gathercole and Baddeley (1993). Figure 6.1 shows a model of working memory.

Gathercole and Baddeley are particularly interested in a functional approach. How is information held while it is being worked on? How do we combine information from the senses with knowledge held in long-term memory? They present a three-part model of ‘working’, memory. This involves:

1. a *central executive*, a supervisory attention system which is increasingly emerging as a crucial influence in everyday activities and implicated in children’s underperformance at school. It is involved in carrying out tasks that combine the maintenance and manipulation of information in memory, such as mental arithmetic and makes a significant contribution to reading recognition, predicting reading difficulties (Pickering, 2004). It

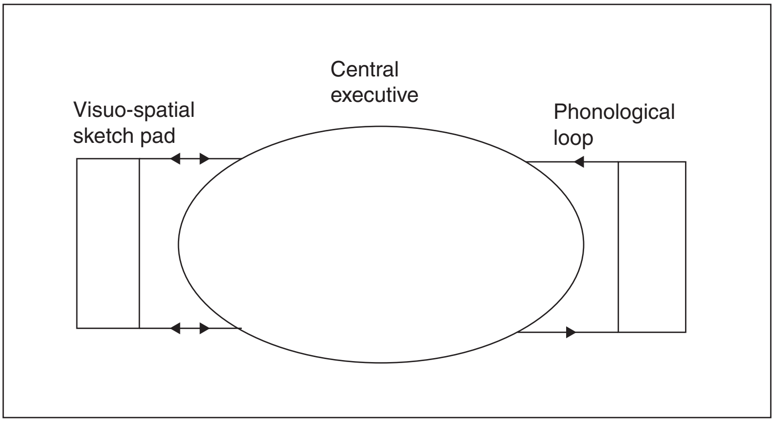


Figure 6.1 A simplified representation of the Baddeley and Hitch (1974) working memory model.

deals with selectivity and processes and co-ordinates the switch between different retrieval strategies arising from:

2. *two slave systems:*

- first, the ‘phonological loop’, which includes a phonological short-term store that decays over time, an acoustic store and the articulatory (sub-vocal) rehearsal system that both renews phonological material stored in the loop and converts non-speech for storage. They term this slave system the ‘phonological working memory’. This system has been extensively researched during since the mid-1990s and the suggestion has been made that a person’s memory span represents the number of memory items that can be spoken in about two seconds (see Pickering, 2004). Hence speed of articulation and processing has a significant part to play in memory capacity although articulation speed was not found to play so large a part in predicting reading skills than short-term memory or central executive performance (Swanson & Ashbaker, 2000).
- secondly, the ‘visuo-spatial sketchpad’. It encodes verbal material as imagery, generates and maintains images and spatial awareness. This system has been far less extensively studied as it has, until recently, been hard to devise tasks which measure ‘pure’ visuo-spatial memory as it is suggested that we are likely to use words to name images while storing them thus utilising the phonological loop as well as the visuo-spatial sketchpad. However, recent research (Della et al., 1999; Logie, 1995) cited by Pickering (2004) suggests that visuo-spatial working memory also involves more than one element, a store and a rehearsal system – the ‘visual cache’ and the ‘inner scribe.

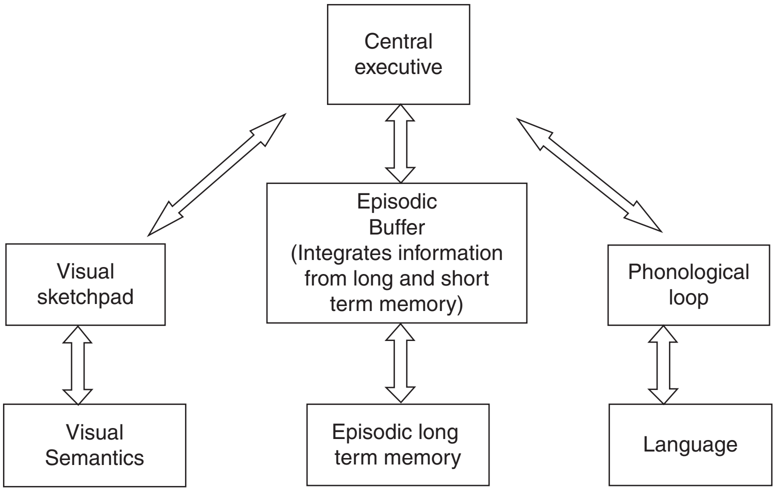


Figure 6.2 Baddeley's revised model of working memory (from Vance, 2007).

Recently, Baddeley (2000) has added an extra component to this working memory model: the episodic buffer. He suggests that the episodic buffer is a temporary multi-modal storage device which integrates the information from the two working memory slave systems – the visuo-spatial sketch pad and phonological loop – and the long-term memory system. The long-term memory system contains both semantic, episodic and procedural memory, thus Baddeley's latest refinement suggests integrated working between all these aspects of memory. Vance (2007) suggests that this could be a key to how learning takes place and suggests that some language impairments may be due to difficulties in simultaneous processing arising from the central executive and episodic buffer. Research is ongoing into this new area. (Archibald & Gathercole, 2005; Baddeley, 2002, 2006). Figure 6.2 shows how Baddeley revised his model of working memory.

Stages of memory development

Memory seems to go through several stages. In *early infancy* it is visually based, non-selective and timeless. The focus must be on the visuo-spatial slave system. Robertson (2002) provides a fascinating discussion of how the child's memory develops from a state where they have not yet learnt to 'spell out the world' (p. 33) and think in clear mental images rather than abstract language. He suggests that the two systems, or codes, of imagery and language, operate in competition with each other and as the language system develops, so the ability to access images decreases. Thus, in later life, we are less able to access the images and memories of early childhood because, as he puts it, 'the mind's eye ... succumbs to the clutches of language' (p. 35). Around the *end of infancy*, recognition is enhanced by some form of recall memory (Mandler, 1988, cited by Vasta et al., 1992). At this stage the average auditory digit span – or number of sounds that can be recalled – is around two or three units, compared with the adult span of seven items, plus or minus two. By *4 years*, all three components of working memory are present. Scaffolded by the development of language and, therefore narrative or story telling, phonological processes develop and auditory speech is retained through the second slave system, the phonological loop. During the *early school years* rapid development takes place, owing to a range of both environmental and internal factors. Pickering (2004) suggests that, from the *age of 8*, children tend to use phonological strategies to enhance their memory of visually presented information.

The environmental factors include the increased opportunity for problem-solving and exploration and the variety of people around to provide models for imitation. Emerging literacy also has an enormous impact on memory function. Studies suggest that a skilled silent reader begins to use sub-vocal rehearsal rather than visuo-spatial processes for memorising even visual material and that this is a far more efficient way of recalling information. Hitch and his colleagues (1988) demonstrated that, whereas, five year olds used mental images to help in memory tasks, the 10 year olds in their studies were relying more consistently on language The relationship between reading and memory skills is also so interactive that there seems to be a vicious circle operating between memory skills and poor reading development in that poor memory skills lead to reading difficulty and that below-average reading skills can impede the development of memory skills (Hatcher & Snowling, 2002).

Many of the internal cognitive developments are closely linked to the functions of that supervisory attentional system, the central executive:

- A range of rehearsal skills come into action. These include articulation, or the use of internal speech.
- Children start to develop landmarks, schema and rules, which start very simply and then incorporate more information (Case, Hayward, Lewis & Hurst, 1988).
- Children start to construct memory – to use inference to build bridges between new information and what they already know (Paris & Lindauer, 1976).
- Memory processes begin to involve metacognition or the use of strategies (Flavell, 1987).
- The increasing efficiency of all three memory systems (Gathercole & Baddeley, 1993) and of automatisation frees up operating space for new encoding or memorising, thus creating a loop of new automatisation, new strategies and so on.

After puberty, the adult memory develops ways of selection and filtering and becomes (particularly through the influence of literacy) linear, time-bound and more verbal. The processing therefore becomes more structural and relies more on phonemes and semantics (the sounds and meaning of language).

To sum up, the basic progression seems to be from the infant's timeless, non-selective, visuo-spatial system, through increasing development and reliance on the phonological slave system for the rehearsal and construction of memory during early school years to the adult system, where the central executive plays a strong role in planning, focusing attention and developing strategies.

Dyslexia and memory

It has already been stated that memory problems are one of the most commonly quoted aspects of dyslexia, and there is a range of research into memory deficits and dyslexia. It is, however, essential to establish whether people with dyslexia really do show problems on memory tasks compared with others for there is, of course, as much variation in performance among the dyslexic population as there is amongst people without dyslexia.

To study this, researchers always use a matched non-dyslexic group of people as 'controls'. They can match these controls in a range of ways – chronological age, gender or reading age are frequently used. Thus, a dyslexic participant aged 12 with a reading age of 9 can either be matched with a non-dyslexic of 12 with a reading age of 12 (chronological match) or with a non-dyslexic of 12 with a reading age of 9 (reading-age match). Bearing in mind the link between poor reading and memory skills, comparing a dyslexic person with a same-age non-dyslexic will usually mean that the dyslexic has a lower reading age. Therefore, any poorer memory performance by the person with dyslexia may be due to the lower reading age rather than the dyslexia. It is therefore common to eliminate this possibility by using the reading-age match. Obviously, with this pairing, researchers are still not comparing like with like as factors linked with the age difference are ignored; therefore one must always exercise caution.

Currently, research into dyslexia and memory has established some interesting links. The most significant must be between dyslexia and phonological impairment.

Dyslexia and phonological processing

A number of researchers, including Stanovich (1988), Pickering (2000, personal communication), Snowling (2000) and Hatcher and Snowling (2002) emphasise the links between phonological or sound-based processing skills, vocabulary development and the acquisition of reading skills. A range of studies into the dyslexic experience have come to the following conclusions:

- The storage and maintenance of verbal information in memory over short periods of time is dependent on speech based codes (Blakemore & Frith, 2005; Hulme & Roodenrys, 1995).
- Evidence from brain-imaging studies of activity in the brain regions activated by short-term memory processing suggests that, compared with normal readers, even highly literate readers with dyslexia show lower levels of activity during short-term memory tasks (Paulesu et al., 1996).
- People with dyslexia have particular problems with the phonological code in working memory. They appear to use it less efficiently.
- The phonological representations in working memory have sometimes been described as 'fuzzy' compared with normally developing children. This gives rise to a difficulty in representing the 'fine-grained' aspects of phonology such as individual phonemes or sounds and a tendency to depend on 'coarse-grained' representations such as rhyme-sized units (Hatcher & Snowling, 2002)
- They have problems translating visual information into phonological form. In terms of reading development, they are less able to store new words in the phonological loop before moving them into a permanent position in the lexical/semantic system – thus their ability to learn new words is limited. Their processing is also slower.
- Individuals with dyslexia have difficulty with phonological repetition, for example repeating multi-syllabic or nonsense words.
- The phonological loop is implicated in the memorising of vocabulary and second language (Baddeley, 2004). This might suggest that students would have difficulty with technical or subject specific vocabulary (Desmet, 2007)
- They do not seem to use phonological mnemonics (memory strategies) as readily as others. They have difficulty maintaining phonological information using rehearsal or repetition. They do not spontaneously attach verbal labels to pictures, and they have difficulties with lists.
- Children with specific language impairments may also have difficulties in simultaneous processing arising from weaknesses within the integration of the central executive and episodic buffer (Vance, 2007)

There is some evidence (Stanovich & Stanovich, 1995) that, given these phonological-processing weaknesses, individuals with dyslexia develop strong compensatory processes. Many may come to rely more on visual codes for memory processing. This is an idea that has been mentioned before in the context of the alleged link between dyslexia and superior visuo-spatial skills. However, is there any evidence from the memory research that might support this?

According to Baddelely (1996, Baddelely & Webster, 1998, both cited by Desmet, 2007), the articulatory mechanism of the phonological loop is one of the most efficient ways of transferring material into long -term memory, particularly when spoken out loud, because of the echoic effect. It holds a trace for four seconds, four times longer than the time a visual trace is sustained by the visuo-spatial sketch pad. It is also better designed for serial recall than the visuo-spatial sketch pad, which has no output process to compare with the articulatory rehearsal component in the verbal memory. The research described does suggest that a learner with weakness in the phonological loop might turn to visual memory techniques. However, this is not such an efficient mechanism for serial recall and may involve more processing effort. If a student is likely to need to resort to these strategies, they are likely to need practice and support in visualisation techniques. These will be explored in Chapter 9.

Other students with dyslexia may develop the kind of skills mediated by the central executive. These would include context skills or the use of meaning (semantic codes) to support recall. However, there is some suggestion that there may also be some impairment of the central executive function in at least some individuals with dyslexia (Pickering 2000, 2004; Vance, 2007). This gives rise to the question of whether teaching strategies might be able to provide support for the central executive.

All indications are that the difficulties lie in the phonological area of memory processing. However, it must be emphasised that, until comparatively recently, research has focused on the phonological slave system of memory, and work is only just starting on the relationship between the visuo-spatial sketchpad or the central executive and dyslexia. For a detailed review of the current research, see Pickering (2004).

Dyslexia and automaticity

As discussed previously in the chapter dealing with the difficulties encountered by individuals with dyslexia, many have problems in any situation that involves the combination of a number of sub-skills. The work of Nicolson and Fawcett (1994) investigates the possibility that, owing to some deficit in the cerebellum area of the brain, people with dyslexia have difficulty in making a range of basic skills automatic, whether motor or cognitive. Therefore, continual concentration and effort is required to maintain basic sub-skills reducing the efficiency of other simultaneous ongoing processes. In terms of memory, children will have difficulty maintaining material in temporary memory storage while carrying out another skill. For example, a dyslexic person may need to focus upon decoding or working out letter-sound links while reading, thus reducing the potential attention available for the processes of understanding the material. Most problem-solving involves several elements, Ghasty (1991), cited in Pumfrey and Elliot (1990), identified 10 sub-skills for reading. An inability to automaticise sub-skills and to weld them together into a complex automatic schema is a true disability that will have implications for the simultaneous processing involved in memorising.

To sum up, students with dyslexia may well have difficulties in two major areas of memory function: phonological processing and automatisation. There is some further suggestion that there may be difficulties in the 'organising' department – the central executive or episodic buffer. They are likely therefore, to need support in three fundamental areas:

- compensation for poor auditory or phonological skills
- the kind of support that will reduce the possibility of overload
- encouragement in the use of thinking strategies.

What are the most effective ways of providing this support for a vulnerable student?

It seems likely that the use (whether consciously or automatically) of thinking strategies or metacognitive skills enhances study, whatever the learning style of the student. Much research has been carried out into the nature (Weinert & Kluwe, 1987) and developmental aspects of metacognition (Nelson, 1992). The inter-related activities of this monitoring system include:

- prediction
- planning
- monitoring
- testing
- revising
- evaluating.

The consensus is that the most successful learners are those people who develop a sense of themselves as active thinkers, those who are able to ask themselves how they arrived at a particular outcome, those who evaluate the strategies chosen in ways that influence the course of their learning. These learners are also likely to take control of their learning, to set constructive and realistic goals (Ridsdale, 2004) and to avoid falling into the trap of helplessness. Research into success and failure in reading comprehension suggests that the main differences between skilled and unskilled comprehenders are the extent to which they are able to use:

- inference to create efficient mental models
- schema to aid the creation of mental models
- working memory to store ongoing information
- automatic decoding skills
- metacognitive strategies.

Dyslexia and metacognition

Research (Palladino, Poli, Masi & Marscheschi, 2000; Tunmer & Chapman, 1996) suggests that children with dyslexia do not tend to develop metacogntive skills spontaneously. This could be due to repeated failure undermining their motivation to take strategic control of tasks (Ridsdale, 2004) or else be an added effect of their difficulties with automaticity. Many researchers and practitioners (see, for example, Reid, 2003) have therefore argued that it is essential to help dyslexic learners to develop these metacognitive strategies. There is, however, less consensus over whether it is possible to teach these strategies. Some programmes, such as Feuerstein's (1979) Instrumental Enrichment programme, have attempted to teach students to use cognitive strategies in isolation and have claimed that these skills can transfer to other learning situations, but there is a lack of empirical evidence to back these claims, and many researchers have strong reservations as to the effectiveness of teaching general skills in isolation (Quicke, 1992). There is, however, more research evidence to back the efficacy of teaching metacognitive skills in context (Wray, 2002) or within the processes of paired reading or thinking described by Topping (2002).

The most effective programmes seem to be those that involve two approaches: (1) they are firmly grounded within 'real' tasks that need to be accomplished; and (2) they follow the social-learning apprenticeship model advocated originally by Vygotsky (1978), sometimes termed the scaffolding, modelling or apprenticeship approach. He observes that children learn in collaboration with 'experts', parents, teachers or older children. Initially, they watch, then they begin to imitate and take increasing responsibility, relying on the expert only when problems arise. Finally, they take full responsibility for the activity. Nist and Mealey (1991) express this as an eight-step process:

1. focus attention
2. give a general overview
3. introduce new terms
4. go through the procedure step by step
5. model the process – think aloud – introduce new frameworks of thought, the students also discuss the processes and teach each other
6. guide the practice – students repeat the instructor's strategy with support
7. independent practice
8. re-demonstrate the practice, if necessary, to reinforce

This is a three-stage process moving from the first stage, where the responsibility falls on the teacher, to the second, where it is shared and, finally, to the third, where students become responsible for their own learning, and at this stage transfer occurs. The external scaffold modelled by the teacher must be internalised by the student's own spontaneous use of the techniques.

For any student, dyslexic or otherwise, whose confidence is shaky, an apprenticeship or scaffolding model of this type offers fewer opportunities for failure. It also gives the opportunity to learn by doing, rather than purely listening, in an atmosphere where everybody is a novice and the expert is on hand to offer support where needed. There is scope for reinforcement through repetition and also the possibility for the student to become an expert and support others. This approach can be used and adapted to a range of strategies suited to all learning styles.

Many of the strategies discussed in Chapters 7–11 of this book focus a learner's attention on *how* they learn, with the explicit intention of developing metacognition, self-awareness and independent strategies. However much criticism there has been of style theory (see Coffield et al., 2004), there is consensus as to the role a style approach can play in the provision of a language and opportunities in which to discuss an individual student's learning strategies and preferences. This must surely be one of the ways in which metacognitive skills might indeed be fostered.

Learning style and mathematics

Maths may not be your specialism: it is not mine, nor is it a particular strength. However, this is unlikely to prevent students or colleagues from seeking our support. There is insufficient space in a general book on dyslexia and style to provide in-depth guidance, however, in the intervening years since the first edition, an increasing number of books offering support with maths for learners with dyslexia have been published and, amongst these, three new books offer particularly clear help, comprehensible to the non-mathematician. These are *Dyslexia and Maths* (Kay & Yeo, 2003), *The Trouble with Maths* (Chinn, 2004) and *Teaching Maths to Pupils with Different Learning Styles* (Clausen-May, 2005). All three of these books discuss the impact of mathematical style and provide suggestions as to different approaches that can be used to complement style. Chapter 2 discussed the attributes and identification of the predominant style constructs within the field of mathematics – the quantitative versus qualitative model and the inchworm versus grasshopper approaches – and it is clear to see how these might map on to the wholistic/analytic approaches adopted in this book.

How, then can style be used to support the learning of maths? Chinn and Ashcroft (2006) make some clear observations from their work with dyslexic mathematicians. Overall they suggest that learners can and should be encouraged to use both wholistic and analytic – grasshopper/inchworm – types of strategy, depending upon the type of task. It could be suggested that those with wholistic preferences are more likely to go for the grasshopper approach while the analytics may well be the inchworms. However, they suggest that individual learners will utilise both types of strategy; insecure learners are likely to utilise inchworm strategies that make them feel safer yet these sequential strategies are more difficult for those with memory weaknesses. They emphasise that inaccurate grasshoppers need to be taught to document the stages of their work. Inchworms need to be both encouraged to ask ‘why?’ as well as ‘how?’ and to understand and retain the answer to both those questions. These experts in mathematics and dyslexia seem to be suggesting that although it might be in a learner’s nature to go for a particular way of achieving a solution, it is not a simple matter of selecting specific types of strategy that might be effective for one type of learner as opposed to another and that it is more to the point to provide a range of strategies and to embed these strategies through the means of concrete experience and multi-sensory activities for all (Clausen-May, 2005).

Little research has been undertaken to explore the effect of applying style theory to maths. However, Pearson (2007) carried out a small-scale study with learners in a mainstream primary classroom which found that the use of Riding’s Cognitive Styles Analysis to structure and differentiate teaching approaches was positively received by both the pupils and teachers involved. Figure 6.3 shows how Pearson allocated different types of maths approach materials to the nine different style profiles indicated from the Riding Cognitive Styles Analysis. For simplicity, in practice the students could be grouped according to whether they are wholist (prefaced by W) analytic (prefaced by A) or intermediate (no strong preference) or by their scores on the verbaliser–imager dimension. These style groupings could also be used for differentiated tasks.

Pupil(S)		Teaching/Learning Approach	Modality Materials
No.	WV	Wholes	Words / text
	WB	Wholes	Mixture of words / text and pictures / diagrams
	WI(m)	Wholes	Pictures / diagrams
	I(n)V	Mixture of wholes and parts	Words / text
	I(n)B	Mixture of wholes and parts	Mixture of words / text and pictures / diagrams.
	I(n)I(m)	Mixture of whole and parts	pictures / diagrams
	AV	Parts	Words / text
	AB	Parts	Mixture of words / text and pictures / diagrams
	AI(m)	Parts	Pictures / diagrams

W = Wholist; A = Analytic; V = Verbaliser; I(m) = Imager; I(n) = Intermediate; B = Bimodal

Figure 6.3 Allocation of types of materials according to style profile. Reproduced from Pearson (2007) with the permission of the author.

Examples of What was Done in Numeracy Lessons

Task (Activity)	Teaching / Learning Approach	Modality (Materials)
• Count in 1's and 10's up to 20 • Groups of 10's up to 20	• Counting fingers and toes (A) • Looking for 1's and 10's around the classroom(W)	• Large no. of cubes (towers of 10's (I) • Large no. of small coloured flags (rows or columns of 10's (I) • Number Grid • Across –1 's • Down – 10 's
• Counting 2's • Introduce 'X' notation	• Counting feet and hands of group (W) • Count in 2's (W) • Relate to 2 x table on flipchart or whiteboard (A)	• Pictures if items grouped in 2' s –Identify (I) • Multiplication Sentence – cross shape – fill in gaps – horizontal and vertical
• Recognise halves and quarters of shapes • Introduce fractional notation	• A piece of square paper – folded and cut into halves and quarters (W) • Relating above to fractional notation (A)	• Arranging / re-arranging the halves and quarters (I) • Stick halves and quarters together into workbooks and write fraction on them.
• Count in 5's forwards and backwards • Tell time to hour / half hour (analogue and digital)	• Maths Mountain Game • ICT – Whiteboard (W/A) • Use of large analogue and digital clock (W/A)	• Counting Forwards (up the mountain) (I) • Counting Backwards (down the mountain) (I) • Set each clock to hours and half hours • Worksheets (I) ◦ Examples given and questions to be completed
Verbal – across each column in terms of • Teacher explanation • Pupil's response to teacher questions • Pupil's talking to each other about the task(s) • Write a phrase or sentence to explain (reinforce) a diagram or simple equation.		

The W, A and I by the side of each of the different tasks above, indicate the particular cognitive style (CS) in terms of teaching / learning approach and modality that was used, from the Cognitive Styles Analysis formulations and designations.

Figure 6.4 Examples of what was done in numeracy lessons and how the activities were linked to particular style preferences. Reproduced from Pearson (2007) with the permission of the author.

Figure 6.4 shows how this was translated into maths activities.

This is not to suggest that these approaches were rigidly or exclusively offered to those who had emerged from the Riding CSA with a specific style label – for example, an imager was not solely taught with pictures and diagrams. However, it encouraged the teachers to broaden out and increase the flexibility of their strategies and both teachers and pupils recorded increased success in their maths lessons while using this approach. It is also clear that the two dimensions (Wholist/grasshopper – Analytic/inchworm and Verbaliser/Imager) will interact in a complex way in mathematical thinking. Therefore the suggestions for helping with mathematics have not been separated into sections according to the wholistic-analytic, verbaliser-imager continua used in the remaining chapters of this book but are presented together here in the current chapter. It must be emphasised that only a flavour of the types of strategies can be given here and that for further practical strategies reference should be made to the work of experts in mathematics and vulnerable learners. Steve Chinn, Julie Kay, Dorian Yeo and Tandi Clausen-May are highly recommended.

How can learners with dyslexia be helped with maths?

Chapter 2 presented the main difficulties encountered by mathematicians with dyslexia. To summarise:

- difficulties with the language of maths
- sequencing difficulties hamper the following and retention of step-by-step procedures
- difficulties with working memory lead to problems memorising the most basic and important facts of mathematics
- sometime dyslexia brings visuo-spatial difficulties
- frequently dyslexia is associated with slow processing.

Kay and Yeo suggest (2003; Gold, 2006) that dyscalculic children, and often those with dyslexia, do not see how numbers relate to each other. This tends to lead to an over-reliance on counting and the tendency to see a jumble of disjointed facts, with no obvious way of learning them and the urge to give up. These learners inevitably work very slowly – they will need frequent repetition and topics seemingly mastered may well disappear from memory when needed subsequently. Julie Kay stresses the need to embed and intermesh every new topic with ones that have gone before. It is as though these learners cannot create and sustain a 'big picture' of any of the mathematical principles learnt without considerable individualised and multi-sensory learning. This should not surprise those who work to develop literacy skills in learners with dyslexia. These basic characteristics seem to underpin the needs of the majority of dyslexic learners who struggle with maths, regardless of style preference in broader areas. Those with experience in mathematics teaching suggest that each dyslexic mathematician is likely to have an individual profile, that strengths need to be identified as a starting point and that these learners need to be encouraged to become problem solvers with a range of ways of working at their fingertips so that they can select the method that suits both the learner and the problem. Even if a learner tends towards the wholist approach in general, they may cling to the inchworm strategies in maths.

Clausen-May (2005) explains that it is essential for most vulnerable learners to be able to develop models to think with, to be encouraged to use what may be strengths in visualisation or practical skills to underpin the abstract, word or number based concepts and practices of maths. It seems to be a matter of encouraging flexibility of teaching and learning and then encouraging learners to select the strategy and approach which best complements their individual mathematical style preferences.

So what are the major principles behind teaching mathematics to learners with dyslexia?

1. Teaching the key facts.
2. Structuring teaching carefully to support difficulties with the creating and subsequent retention of the 'big picture'.
3. Enriching your teaching with multi-modal methods that create multi-sensory connections to underpin specific concepts.

Key facts

Kay and Yeo (2003) are particularly helpful here and are highly recommended. They suggest that teachers select and target a small set of indispensable facts for each area of maths. These should be placed on individualised rehearsal cards. These cards can be used to teach vocabulary, key facts and related information and should be constantly reviewed, rather as a reading pack might be reviewed. Many dyslexic learners over-rely on counting, which uses up the processing space, which should be devoted to reasoning using fact derived strategies. This can also be a weakness of students who prefer analytic approaches or of those who lack confidence in their ability to understand what a problem requires of them. These learners should be encouraged to develop an overview – estimate the answer first. Is my calculated answer sensible? Learners should be helped to develop reasoning strategies based around these key facts.

Kay and Yeo emphasise that students with dyslexia can be bewildered if they are presented with a number of alternative ways in which to figure out basic facts. (This is not, however, the same as encouraging different ways in which to practise or understand.) In the early teaching stages in particular, these learners need to be offered one easy to use 'universal fact-derived strategy' (Kay & Yeo, 2003, p. 28) for each of the four operations (addition, subtraction multiplication and division). They should be encouraged to think aloud while working things out. Care should be taken to start with simple easily visualised language; introduce specialist vocabulary alongside the easy (e.g. minus – take away); link equations with the concept of fairness (How can we be sure that your little brother has the same number of sweets as you?). Concrete materials should also be used (items in ones, coins, single coloured nuggets, base-ten materials, Cuisenaire rods). Items can be counted in a concrete way on to tracks or strings to help with sequencing and arrays. Children can move physically around a circle of 12 chairs to understand concepts such as the passage of time. Be sure, however, that this kinaesthetic activity relates closely to the conceptual aims of the activity undertaken, that the learner understands how the tools are used or structured and that the activity is hands on rather than simply observed. Choose everyday real life, accessible situations and examples (e.g. If I have 13 chocolate buttons and the dog grabs three …) as illustrations. Using a range of concrete activities of this sort should help learners with verbal, image or kinaesthetic preferences.

Structure

- Start from where the student is at – their previously acquired understanding.
- Make the immediate and long-term goals of each lesson/task absolutely clear.
- Sequence the steps carefully in order of difficulty matching level of challenge with the pupil's ability and confidence. You will find that some students need very small steps whereas others can make confident leaps. Be sure, however, that the wholist grasshoppers can understand the process they have followed and that the analytic 'number counting' inchworms are encouraged to make sense of the overall situation.
- Give ample opportunity for practice and the necessary thinking time.
- Revisit and reinforce.

Multi-modal methods

The maths classroom already caters to those who prefer to verbalise or listen. Tandi Clausen-May (2005) provides excellent suggestions to support those whose preferences are more kinaesthetic or image based and for those for whom multi-sensory activities are necessary. She suggests that learners need to be helped to build pictures in their minds and do develop a sense of numbers as wholes or as arrays, as well as sequences, so that they can subitise and estimate without constantly having to overload their memories by counting sequences. She suggests that teachers make use of the Slavonic abacus, spatial array cards and blocks of interlocking cubes to offer visual representations for the four operations. Scale and movement are the keys to understanding place value for her. She recommends that cubes, sticks, slabs and sliding models that demonstrate what happens when a decimal model is multiplied to the power of 10 will help students to visualise, understand and store these pictures in their minds. She offers clock faces and area models for fractions and suggests that angle machines or computers are used to grow shapes for ratios. She advocates the making of models, folding and cutting to impress concepts through concrete experience and her book provides not only practical suggestions but photocopiable materials for their implementation.

Summary

This brief exploration of the difficulties experienced by dyslexic learners and some of the recommendations made by the maths experts illustrates both how useful style theory can be in individualising strategies and approaches for vulnerable learners but also how it is not always possible, or indeed advisable, to attempt to separate strategies out into their style dimensions or to expect learners to be consistent in their approaches. It is, however, important to help students to understand and utilise their strengths and preferences to compensate for their weaknesses. The suggestions for helping students to develop their use of language and powers of visualisation provided in Chapters 9 and 10 could also be applied to their work in mathematics.

Working with adults

The strategies described in the following chapters can all be adapted for work with adults, including students in higher education and many of them have been applied very successfully in a range of contexts. Although adults with dyslexia may not simply be dyslexic children grown up (Frith, 1997), those who have compensated in some measure for early deficiencies in decoding still report that their reading remains effortful and slow. Evidence from neuroscience indicates that the brain patterns occurring during reading differ between readers with and without dyslexia (Paulesu et al., 1996) and there are frequent reports of students with dyslexia encountering difficulties with written skills including note-taking, expressing ideas in writing, spelling and structuring and organising assignments (Mortimore & Crozier, 2006b). Studies and anecdotal evidence also suggest that any deficiencies in memory and organisation existing within childhood are also likely to continue. However, it is important to acknowledge and respect both the effect on attitudes to self and learning of negative educational experiences and also the range of compensatory strategies the adult has adopted. You need to ensure that you tread carefully and act as an emancipator and facilitator in support of the student's own expressed needs. Many students with dyslexia have acknowledged that using style theory has helped them to understand the ways in which they learn, to understand their strengths and weaknesses and to develop appropriate strategies (Cooper, 2006; Sumner, 2006). Ways of identifying style in adult learners are suggested in Chapter 2. Learning support professionals need to work closely with the individual to help them to pinpoint the major areas of need in the context, identifying what the specific demands might be, adopting the appropriate approaches and then using one's creativity to adapt the material. It therefore seems unnecessary to provide separate sections in this book which are devoted to adults. However, a few tried and tested strategies provided by facilitators have been included.

What is the impact of teaching style?

The last few chapters have focused almost entirely on the learner rather than the teacher or the context in which the learning takes place. Style theory has been criticised for its focus on differences within the individual learner (Fraser, 2007) and the impact of the teacher's preferred style of delivery and response should not be underestimated. How do different teaching styles affect learners?

Just as there are specific and differing learning styles, so are there also different teaching styles. What might be the effect of a match or mismatch of the teacher's and learners' styles on the acquisition of skills and knowledge? Riding and Rayner (1998) and Keefe (1982) have carried out a range of classroom studies that, with some exceptions (Mortimore & Crozier, 2006b; Stellwagen, 2001), show that people do tend to learn more effectively and remember more when the style of presentation matches their own predominant learning style. In any classroom, there is bound to be a range of style preferences and it is therefore unrealistic for a teacher to expect to cater all of the time for all of them. Similarly, teachers are likely to have unconscious preferences both in terms of how they learn and how they structure their teaching and delivery. There is evidence that university students tend towards a more analytic-verbaliser style than the general population and that this will be reflected in the teaching profession (Clausen-May, 2005). This makes it very important for teachers to be aware of the fact that they may learn in a different way from many of their students and that different students of seemingly similar ability may well absorb information in very different ways.

Teachers therefore need to monitor their own activities to ensure the use of many different ways and modes of presentation within a series of lessons or activities to avoid consistently disadvantaging a particular group of learners. This is particularly salient in the teaching of maths where Chinn and Ashcroft (2006) suggest that the maths learning style of a teacher may well influence the way in which mathematics is presented in lessons and that students are likely to be turned off by methods that do not resonate with their own preferences or that do not acknowledge the validity of different ways of arriving at a solution to a problem. For the individual student, developing the ability to monitor their own progress, it is important to know what their predominant style is so that the most effective way of studying can be established. Ultimately the buck must stop with the student, and the aim of this book is to help both teachers and students to develop useful self-knowledge and ways in which to make use of it.

What about the style friendly classroom?

Of course style goes beyond the learner and the teacher and will be implicit in the classroom environment. An examination of both theoretical and practical handbooks aiming to develop inclusive, or dyslexia friendly classrooms (Booth et al., 2004; Hart et al., 2004; McKay, 2004; Mortimore & Dupree, 2008; Reid, 2005) will reveal that the practices recommended do resonate with style approaches. Inclusion places the focus on observing the differentiated needs of individual learners and on adjusting more rigidly organised classrooms to offer flexibility in structure, furniture, grouping, access to and type of resources and personnel to ensure that everyone is valued and no-one misses out. Reid (2005) provides some examples of types of classroom and how they can vary. However, again there is no easy answer – for every learner or teacher who thrives in a stimulating, varied and varying classroom environment, there is likely to be one who is disturbed by lack of predictability. It would seem that the onus must, however, be on teachers to maintain a knowledge of the possibilities inherent in classroom design and management and to reflect regularly on how alterations might affect the learners in their care.

What about modes of assessment?

We are frequently powerless to influence the selection of modes of assessment. However, where different examination boards at school level offer wider scope than the standard written assignment, it is worth attempting to encourage the adoption of a board which encourages students to choose and use alternatives that match their preferences more closely and offering them the training to do this. It is also helpful to examine sample papers to see whether, for example in maths, examination papers offer pictorial representations or diagrams, whether the language is simple and easy to follow and whether there is a strong emphasis on mental arithmetic which is likely to disadvantage those with poor working memory resources. At Further or Higher Education level, it is also helpful to check how the course is assessed, whether alternatives to examinations and traditional assignments like presentations, oral examinations or portfolios are accepted and whether, for example, a fine art degree necessitates a long dissertation as part of the award. Lecturers should consider who they might disadvantage by their selection of assessment methodologies and students should take this factor into consideration when selecting courses or modules.

Chapter summary

This chapter provides a recap of information about the nature and importance of cognitive style, with a focus on Riding's Wholistic-Analytic/Verbaliser-Imager continuum. It introduces the idea that students with a more flexible learning style have an advantage over those whose style is more unitary and suggests that some students with dyslexia may tend towards a wholistic or imaging style, which can be less flexible.

It makes a clear distinction between learning style and learning strategies and examines both how these strategies are generated and the two major areas of education theory underlying learning strategies:

1. schema theory
2. memory function.

It outlines the difficulties people with dyslexia may encounter with memory and suggests that these probably originate from deficits in the phonological processing aspects of memory, although research is now investigating the role of the visuo-spatial sketchpad, the episodic buffer and the central executive. Other difficulties may arise in the area of automaticity.

It introduces the most effective strategies available for supporting students and helping them to develop awareness of their own strategies. These 'scaffolding' strategies are based on the work of Vygotsky (1978). It introduces the role played by teachers and the classroom environment in developing a style friendly context.

It provides an introduction to the application of style theory in the areas of mathematics and working with adults and examines the impact of teacher style, assessment and the 'style-friendly' classroom.

The following four chapters offer a selection of practical techniques aimed at helping teachers and students to develop and utilise learning strategies based on a knowledge of their own style preferences. They come from a wide range of sources and have been used successfully by a number of colleagues and mentors to whom I am indebted. Although they have been organised for clarity according to whether they seem to suit the four style categories – wholistic, analytic, verbal and visual – it would be wrong to assume that these categories are in any way mutually exclusive. Experience of working with groups and individuals is that the teacher needs to try a whole repertoire of approaches and that individuals will never cease to surprise you with their preferences. They are offered to enable practitioners to overview all opportunities and select what seems to be appropriate to suit the contexts in which they work. Likewise, most of the strategies offered can be adapted, with a little imagination, to suit any learner from primary to higher education and beyond. Many may seem to be targeted at secondary school level. However they have been applied successfully in far wider contexts by many practitioners, including those who have generously shared their use of them to enhance this second edition.

Chapter 7 explores the experience of learners with wholistic preferences; Chapter 8 does the same for analytic learners. Chapter 9 describes support for those students who tend to verbalise and Chapter 10 presents visualisation techniques. Each chapter follows the same structure:

- A brief description of the kinds of behaviour typical to each type of learner and reminder of the theories that underpin the suggested strategies.

- A three-part section describing teaching and learning strategies. Each part corresponds with one of the three stages of learning:

  1. Getting the information in – modes of presentation
  2. Processing the information – storing and retrieving
  3. Getting the information out – modes of expression

- Revision and examinations
- Working with adults

Part Four

STRATEGIES FOR WHOLISTIC AND ANALYTIC LEARNERS

Chapter 7
WHOLISTIC APPROACHES

Introduction: What types of behaviour and approaches to learning might be characteristic of a wholistic learner?

Many studies have been carried out to investigate the differences in behaviour between individuals with contrasting learning styles. Although there has been criticism of some of these studies, particularly on methodological grounds, there is a long-standing tradition of research establishing the credibility of the wholistic/analytic continuum (Riding, 1993, cited in Riding & Rayner, 1998; Peterson et al., 2003) and Riding's (1993) study, which measured mental activity during processing, indicating differences between wholists and analytics both in location of activity within the brain and in intensity of activity. If cognitive style affects the way in which anyone relates to and represents incoming information from the environment, it must affect behaviour in a range of situations.

Riding's group has also attempted to establish what effect these differences may have on behaviour and Riding's (1994) Cognitive Style Assessment package contained the Personal Styles Awareness (PSA) booklet, which describes behavioural attributes associated with each cognitive style. These attributions should, of course be treated with caution. It must be emphasised that cognitive style is only one of a range of physiological and environmental factors that shape our behaviour and that currently there is a paucity of reliable research to support these attributions. Many students in one study investigating cognitive style and dyslexia (Mortimore, 2006) did agree that they showed some of the different types of behaviour assigned to their measured style, others inevitably declared that they were nothing like that! Whatever the response, however, this is yet another way of getting students to think about their behaviour and its implications for their learning.

Riding and Rayner (1998) suggest that a student's behaviour is likely to be affected by two important factors:

1. The student's position on the scale between wholistic and analytic; this will determine how flexible their approach will be.
2. Whether the student tends to prefer to learn visually or verbally. A strongly wholistic approach may be made more flexible if the student has skill

in processing verbal information which tends to encourage sequential thinking.

It has already been established that learners with wholistic preferences would tend towards taking an overview of any situation. They also would tend to absorb information from a number of environmental sources simultaneously, often in a random order. They may find performing in any linear fashion constricting. Their strengths reside in their tendency and ability to make links between aspects of any situation – their intuitive, answer-orientated approach. Their weakness lies in the lack of detailed analysis and, frequently, their inability to deal with sequences or lists or to spot sequential processes. If they are more extreme in their wholistic preferences, their ability to see the broad perspective of a situation, may very well make them more indecisive.

So what types of behaviour have been ascribed to a wholistic profile? Riding and Rayner (1998) suggested that the wholistic-analytical dimension affects an assertiveness-shyness dimension. Socially, people with wholistic preferences seem to be more open, aware and people orientated than those who are more analytic, being realistic and flexible in their relationships with others. They were also said to be more spontaneous, generous and caring. The negative side, however, is that this urge for social integration can lead to a lack of independence; flexibility can become inconsistency, and in social life, as well as study, their responses may be shallow, rash or superficial with a tendency to avoid backing impulse judgements with evidence. The analytic approach, on the other hand, means that students are frequently focused on narrower interests, are more self-reliant as learners and less expansive. An extreme analytic profile might indeed have some of the obsessive interests and inability to empathise characteristic of the learner with Asperger's syndrome (Attwood, 2006).

How might this affect learning behaviour? A wholistic approach is one that prefers to deal with the whole before focusing in on the parts. A learner with these preferences would, therefore, find the current chapter easier to absorb if it had a brief overview at the start as well as a summary at the end and would be well-advised to skim any chapter before reading to spot any overviews or summaries provided. This type of learner is said to be more confident when given the context and a framework within which to work. Since they find analysis and retention of detail less easy, they need to be given the opportunity to link or chunk pieces of information together to facilitate comprehension and memorising. The learner who prefers to operate wholistically may well be the student who drives the teacher mad by cornering her during the lunch hour and asking what they are going to be doing in the lesson that afternoon. It isn't simply that these learners have so little going on in their lives they are already longing for the lesson, it is more likely that they realise instinctively that they have more chance of understanding it if they are forewarned and can begin to predict what will come up.

It could, of course, be argued that all learners are likely to benefit from predictors and advanced organisers and should be given the opportunity to develop this skill for themselves. It may well be that some are instinctively more aware of this need. From a longer term perspective, some research from the University of London (cited by Rose & Goll, 1992) suggests that the most successful students are not necessarily the ones who seem most able on entry, but those who had consciously related their subject to their long-term life goals. This crucially raises their motivation. There is obviously a lot to be gained by focusing any student's attention onto both the short- and long-term 'big picture'. A wholistic learner may well tend to want to do this automatically; so educators should take advantage of it!

Being aware of and making use of the students' social preferences can greatly enhance successful study and research. Riding and Wright's study (1995) found that those learners labelled wholists were more people-orientated than analytics. However reliable the results of this study might be, there are implications for the educator in terms of considering social preferences when organising working methods. Some students in any group will prefer the chance to work collaboratively, sharing ideas and tasks with others and be good at summing up the contributions of others. These may be the students who prefer to think wholistically who may also be good facilitators, strongly and spontaneously empathising with others, helping to draw out and support the students who find social interaction more difficult. On the other hand, some analytic thinkers may operate in this way too. However, whether wholistic or analytic, just because a student may flourish in a group situation, it does not necessarily mean that they are particularly articulate or linguistically competent. As stated earlier, some students with dyslexia also experience difficulties with speech and language. They may prefer to work wholistically and visually and spontaneously gravitate towards the visual in a range of forms both for learning and expression.

The learning implications for people with dyslexia

Further research needs to be carried out to confirm any suggestions that many people with dyslexia could be wholistic learners.

However, learners with dyslexia frequently have trouble in the following areas:

- memory, as outlined in Chapter 6.
- academic self-esteem
- social self-esteem.

Undergraduates with dyslexia reported less confidence in their ability to retain facts than their non-dyslexic counterparts (Mortimore, 1998). Maybe their difficulties with memory processing led them to focus more successfully on the outline of any topic rather than its details or sequences of information. This may well lead by default to the adoption of a more wholistic learning style across a range of study activities. The central executive function of memory may well need strengthening; so students with dyslexia will probably need to be shown explicitly how to organise strategies and construct schema so that they can both relate new information to previous experience and lay down strong foundations for memory. Chapter 6 discussed how this might apply to the teaching and learning of mathematics.

As discussed earlier, people with dyslexia frequently do not see themselves as successful students and suffer from higher anxiety levels in academic situations. Being able to predict what will occur in a lesson or lecture and having a framework into which they can slot new information will decrease stress levels and therefore lead to more successful learning. A wholistic learner with dyslexia and low academic self-esteem may well find group work within a supportive group allows them to gain confidence from collaborative work or the scaffolding provided by more competent peers and provides a less exposed situation in which to try out ideas before they come under the scrutiny of the teacher or the whole class. Approval or respect from peers can begin to rebuild students' confidence in themselves as learners with opinions that deserve attention.

Some people with dyslexia fall into the group of students who have been unhappy in school, have become withdrawn or socially inept as a result of negative classroom experiences and may well need careful support to rebuild confidence and social skills. Virtually any subject area can provide opportunities for productive and absorbing group work to which a learner with wholistic preferences will respond. Providing an interesting and challenging task that has to be completed co-operatively takes the emphasis away from general socialising where students may have developed destructive behaviour patterns. Experience of carefully structured pair or group situations where appropriate social behaviours, such as turn-taking, are articulated and practised should result in many spin-offs, such as the development of the ability to listen to each other and the mutual respect and friendships that can arise out of shared success. Some sources for ideas for group work can be found in the additional reading section of this book.

What strategies can teachers use to help learners with wholistic preferences?

Many learners discover through experience that they need a big picture of the whole of a writing task before they start. Without this overview, they can be blocked, they can panic and, when they do start, they scatter and lose

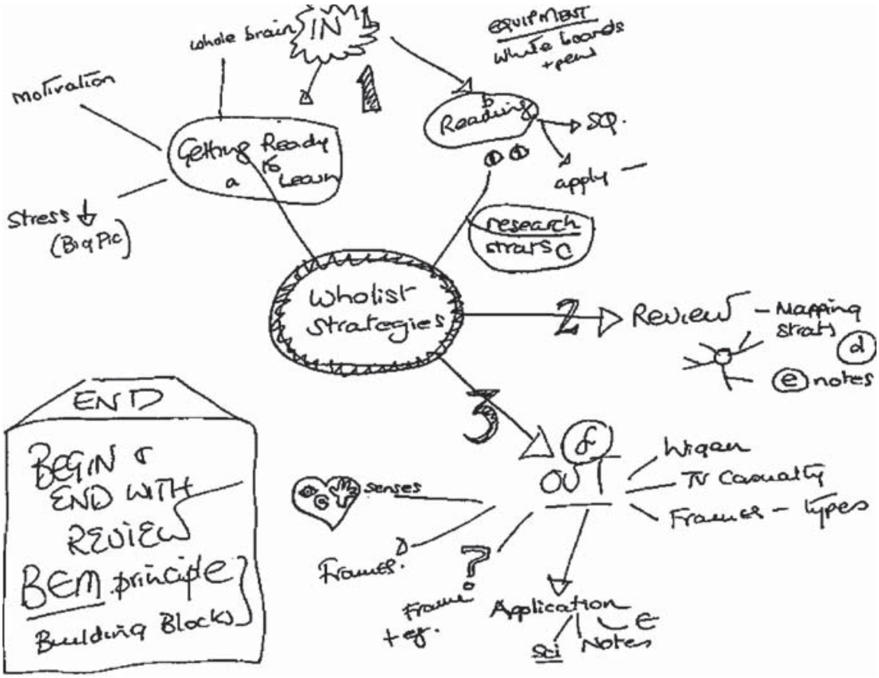


Figure 7.1 Concept map for Chapter 7.

information before they can write it down … and this is without having dyslexia. Figure 7.1 shows the big picture that I used to plan this section of the chapter.

Wholistic learners are alleged to respond to the 'whole' picture rather than making a detailed analysis of the parts. Many students with dyslexia may tend towards this approach. Ross Cooper, who works with dyslexic students in higher education, suggests that this need for an overview is characteristic of the individuals he supports (2007). They may be naturally wholistic thinkers, or they may have perceived or existing limitations in memory for detail or difficulties with automaticity. An extreme wholistic thinker should have trouble finding the facts or details to support overall assumptions and may well struggle to remember lists of facts. Strategies that will particularly help wholistic learners include:

- schema or overviews to aid prediction and comprehension
- memory aids to help link information
- scaffolding frames to support the oral or written expression of information
- co-operative learning techniques to develop and make use of collaborative strengths.

Getting students ready to learn

Learning style seems to make no difference to the following premise. It seems to be true that people learn best:

- when they *want* to learn
- when they feel *challenged* but not stressed
- at the *beginning* and *end* of a session rather than in the *middle*
- when the *whole* brain is involved, i.e. all senses are engaged.

Motivation

> *When students can't see the point of learning – when they don't want to learn – they almost certainly won't. (Hughes, 1999, p. 5)*

Motivating students has to be the key – how to do it keeps teachers awake at nights. There are no miracle solutions here – all suggestions gratefully received! However, below are a few contributions.

Goals or the 'What's in it for me?' factor seem to be crucial. It is probably wise to forget about love of learning for all but an eccentric few. Goals are as personal as learning style preferences and probably unrelated. The general principle must be that students need to be helped to identify and set their personal goals at the start of the learning experience. Try asking the students.

Here are a few goals that have worked. They can be long- or short-term and frequently bear little relation to the expectations of the teacher.

- Long-term goals – sometimes, obviously, students are motivated because they want to do well in public examinations, but, frequently, vulnerable students and those with dyslexia have developed little belief in themselves as learners or their ability to get reasonable grades and therefore find it safer to disparage exam success than to allow themselves to expose themselves to failure at something they fear they will be unable to achieve. It is often more successful to look beyond school examinations and to focus on the rest of their lives. Either, 'OK, if you want to join the army to get their mechanics training, you'll need a C in this subject.' Or: 'If you're going to do media studies at college, you don't want to waste time retaking English there.'
- Short-term goals – some vulnerable students with dyslexia are so unused to success in the classroom that they are desperate for some form of positive feedback, whether it is a report going home or just a smile and a positive word. Some have been so damaged that they are unprepared to accept any type of verbal praise. Others will do anything for a jelly baby or the promise of a video later or for a chocolate bar if they earn enough plus points. The only essential is that they should know both what they will get and how to win it. This is, of course, very Pavlovian and unashamed bribery.

Control seems to be highly significant. If students feel in control both of their learning and their goals, this reduces stress and increases involvement and security.

Challenge – not stress

All teachers will know the student who bursts into their lesson furious about something that has happened in the recent or not-so-recent past. This individual is usually burning up and unable to focus on anything you might want to teach them. Educators obviously cannot be responsible for the emotional baggage students bring with them, but they can try to ensure they don't fan the flames. Stress is not conducive to learning. People are all programmed in such a way that stress turns on the fight or flight mechanisms of the brain, which override any other processes. Many students with dyslexia find that classrooms and teaching situations can automatically trigger these responses despite their best intentions and motivation (Given, 2002, 2006).

People learn best when in a state of restful alertness. The classroom can consciously be turned into an environment that puts people at ease. There are a range of things that can be done to promote this:

- *Welcoming students* – the way in which a teacher welcome students creates a mood. For any students entering anxiously, the sight of the teacher actually smiling can make them relax and return a smile. It can also change the teacher's mood if the last lesson was stressful. Making eye contact individually with as many students as possible also sends out the message that it's all right, you're OK here. Classroom greetings reduce tension and provide security right from the start.
- *Establishing routines* – many students with dyslexia need the confidence of routines. This does not mean turning to page 10 in the same textbook and boring them to death with the same stale old format but giving them a stable framework for new experiences. Knowing that there are unlikely to be any nasty surprises makes students with dyslexia far more willing to take risks and move into new areas of learning.

Once students are relaxed, how can educators be sure they are alert?

Seizing the best moments for learning

The suggestions below can be applied to any session within the curriculum and at any level from primary to higher education. The start and the end of sessions are the golden moments. They should not be wasted. This is where the learner whose preferences are wholistic will particularly respond to a frame showing the direction the lesson will take. This could be either verbal or visual, or preferably both. The wholistic learner will often want to know the big picture into which it fits:

> *It's a bit like a train. If I'm in a carriage, it helps to know what's in front and behind and where we're going. (John, 16, wholistic learner with dyslexia)*

This can be done in the form of a flip chart, a chart on the wall or reproduced in the students' files or books at the start of a topic so that students can see where today's lesson fits in with the whole. For university or further education students, lecturers can make use of electronic, web-based sites such as Blackboard or Minerva to post an outline of the lecture slides before the lecture. This will also help the students, with and without, dyslexia to structure notes from the sessions. Don't forget to refer back to the previous session. Focusing attention on this big picture reduces the stress of uncertainly and allows the student to start to use prior knowledge. It can also be used at the end of the session to reinforce new learning and help the memory process (also to mop up bits that have had to be left out if time has run out too soon).

Figure 7.2, a topic web from the secondary school with a You-are-here pointer, shows that it doesn't need to be particularly fancy. Since each group

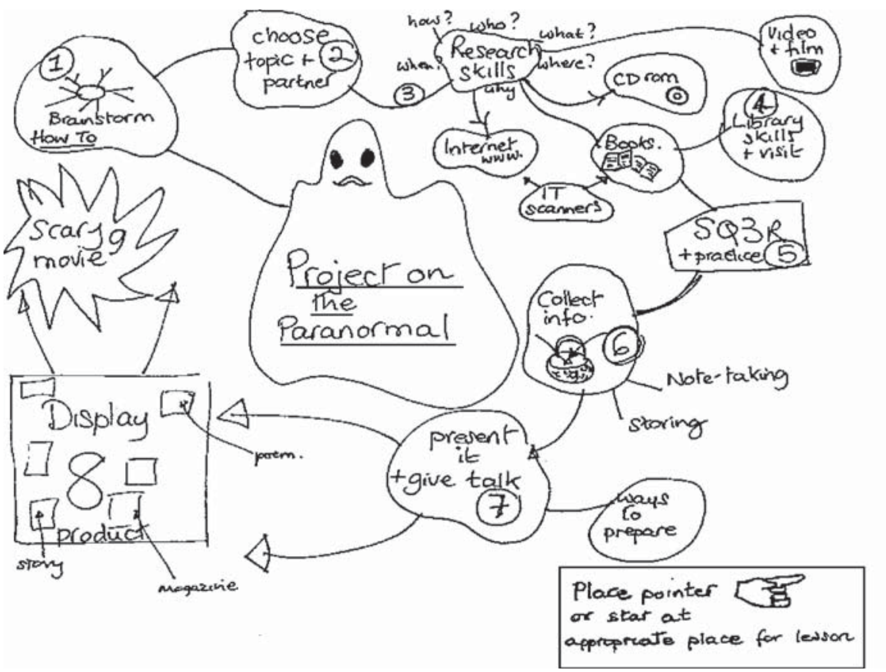


Figure 7.2 Numbered topic web with (movable) pointers.

will need a different chart, a series could be kept on a flip chart; a smaller display board can be kept on the wall for this purpose rather than taking up space on the main board. Alternatively interactive whiteboard or PowerPoint can be used.

The *start* of the session is also the point at which relaxed students are ready to respond to challenges, particularly if goals and rewards have been spelled out. Hughes (1999) suggests the following types of challenge and phrasing:

- I bet you can't think of three reasons …
- I bet you can't think of a really hard question for me to answer …
- I'm setting you a real challenge in asking you to do this in 10 minutes, but I know you're good enough …
- This is really challenging. I wonder if you can do it …

Obviously, educators need to be sure with vulnerable students that they *can* do these things. The session is then structured for rewards and success. The students should be relaxed; they may even be alert. It also helps the student to start from a point of previous understanding. However, it is good to remember that secondary school-aged students of all sorts can rarely concentrate for more than 15 minutes at a stretch, even adults tend to drift off after about 20 minutes (Hughes, 1999). For students with dyslexia or ADHD, the time span is usually shorter – often much shorter – and the signals that their attention is wandering may be that bit more disruptive. Some may really need a couple of minutes' break, to switch off completely, chat, even move about. This can be used to everyone's advantage if the session has been structured as a series of varied but linked activities. It gives teacher and students alike the opportunity for several new starts, where focus is re-established, plus several endings with the chance for a sum-up and rewards for goals achieved.

So, the students are in the mood for learning. They're restful but alert and they know what's in it for them. The teacher has provided the group with a 'picture' of the lesson and located it within the 'big picture' of the topic. What next?

Teaching and learning strategies to help wholistic learners

This section is divided into three parts. Each one corresponds with one of the three stages of learning:

1. Getting the information in – modes of presentation.
2. Processing the information – storing and revising.
3. Getting the information out – modes of expression.

All the strategies suggested can be adapted to suit the relevant age group.

Strategies for getting the information in – modes of presentation

Students get new information in by:

- reading
- listening
- watching
- doing.

Whatever the medium may be, the student who operates wholistically will value the big picture and will be helped by focusing on it in advance.

Helping the wholistic learner with reading for information – using SQ3R

Try asking most students in most classes why they are reading a text and the most likely answer will be, ‘Because you told us to.’ Try asking them how they started and the answer (with a pitying look) will usually be, ‘At the beginning.’

Fair enough (possibly) if the students are highly competent readers who will dash through the text with a minimum of effort and recall and regurgitate all the salient points. Unfortunately, this is not typical of the majority of mainstream adolescents, let alone a student who struggles in any way with reading, comprehension or memory. It is also not typical of many students at higher education level who are overwhelmed with the amount of challenging independent reading they are supposed to do and find the development of critical thinking extremely difficult (Cotterell, 2003). One of our main aims has to be to provide vulnerable students with compensatory strategies and shortcuts, and why shouldn’t other students use these too?

SQ3R is a method that has proved useful to all sorts of students, whatever their age, learning style or degree of difficulty. It could, however, be said to complement the wholistic approach. Versions of this method occur in a range of sources, including accelerated learning texts and Science Research Associates (SRA) materials, which were, allegedly, originally devised to help American service personnel improve their reading skills. It is soundly based on the schema and comprehension skills theory cited in earlier chapters. SRA called it SQ3R (Survey, Question, Read, Review, Respond). Using an acronym like this and sticking it on the classroom wall can serve as a memory cue and remind students to use it (see Figure 7.3).

However, it isn’t enough simply to suggest that students use it. A bit of groundwork has to be done first to demonstrate why it might be worth giving it a try. One way is to take the group through this process:

1. Provide the students with a text – use any short newspaper article or short section of a textbook that is within most students’ reading level. (For ways

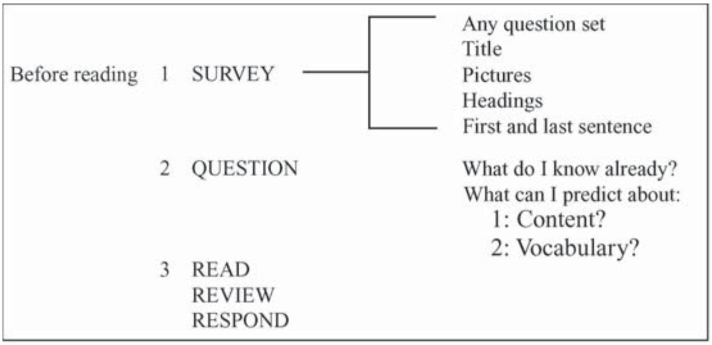


Figure 7.3 Information finding system SQ3R.

of assessing reading level of texts, see Gunning's Fog Index in Appendix 1 or Google for it on the internet.) It is useful to have a text with a couple of comprehension questions set at the end.

2. Offer the students a prize for the first one to come up with the correct number of times the word 'that' is used.
3. Ask them to work either individually or in pairs to answer the comprehension questions. Ask them:

   - How did you do the comprehension questions?
   - How did you find the 'that's?
   - Did you use the same method to do these two tasks?

4. Ask them, again individually or in pairs, to come up with the best summary of the main point of the article in fewer than 20 words.

   - How did you do this?
   - Did you use the same method as before?

   You'll find a range of strategies will come up. Then a challenge, 'I bet you can't work out why we're doing this!' – someone always does. Answer: (just in case!) Different tasks require different types of reading.

5. FOCUS the students' attention on this fact:

   Different tasks require different types of reading skill. Don't waste time. *always ask yourself why you are reading a text*. Choosing the right strategy will save lots of effort. *Once you know what your task involves – why you're reading – use SQ3R*.

   Provide them with Figure 7.3 and tell them to follow the instructions.

Through using this strategy, a teacher has followed apprenticeship procedures recommended by a range of research studies in guiding the students through two ideas:

1. that different purposes in reading necessitate different approaches
2. that it is essential to identify the purpose of each reading task prior to starting to read.

Why is this technique so helpful for students with dyslexia? This activity is encouraging them to develop the independent metacognitive skills that research suggests that students with dyslexia may find difficult Most of these students are bad at decoding; comprehension is hard because so much mental energy is used up in simply working out what the words say. Trying to hold on to meaning takes real effort. If you've staggered to the end, the idea of going back to the beginning to find answers to questions or key points for notes is the last thing you want to do. You want to find a way of cutting down the amount of reading you have to do. This technique makes use of the student with dyslexia's strengths. How?

- *Surveying* – the wholistic learner is beginning to get an overview of the content of the text. The analytic learner is forced to start to consider the gist of the material before getting caught up in detail. The visual learner can make full use of any graphic clues here. The verbaliser will be tuned into headlines, main statements and keywords. Those with no preference will be encouraged to use a selection of strategies.
- *Questioning* – what do I know already? This is the really strong area for many students with dyslexia. It is vital that readers should be asking themselves questions about their own knowledge as they survey. Students with dyslexia often have a real fund of general knowledge picked up from the environment in a range of ways that do not depend on the written word. They are used to piecing things together and making assumptions. Telling them that their own knowledge is both valid and useful in this academic task is a real boost for their self-esteem and a chance for them both to show their knowledge and to use it.
- *What can I predict from this?* – students with dyslexia habitually make use of context (Stanovich, 1988). They should be able to predict in two ways: (1) What is the text going to tell the reader? (2) What kind of vocabulary will come up? Prediction reduces the demand made on exact decoding and increases the likelihood that context supported guessing will be accurate. Often students will read the text to discover that they have predicted most of the contents.
- *The 3 Rs: Read, Review, Respond* – students now read, review and respond in the way most suited to the task and questions set. They should always have access to highlighters and often find small whiteboards and dry-wipe

pens useful for collecting information. If there is a time constraint, as is often the case in examinations, students with dyslexia will want to avoid lengthy re-reading so they can use highlighters to mark key points and information as they go.

This techniques has been found to be particularly useful for students in higher education tackling complex journal articles. Five minutes spent using this technique will save far more time that could be wasted in having to re-read to understand. This cannot be repeated often enough for dyslexic students. *This is what is in it for them!*

Helping learners with wholist preferences to review information

This type of reviewing involves the ongoing process of checking that the text has been understood. Strategies for revising and memorising will be dealt with in the second strategy strand of this chapter – which deals with processing.

Learners with wholistic tendencies often have difficulty following the sequence of an argument. They need to be shown how to monitor their understanding and practise sequencing. They can review in the following ways, either working alone or with a partner:

- After reading a paragraph, find the main topic sentence – frequently the first – and highlight it or write it on a separate slip of paper. At the end shuffle the slips and work with a partner to reconstruct the whole passage orally.
- As you go through, stop at the end of each paragraph and answer the question: 'What have I learnt?' If you're not sure, go back and check.

Helping the wholistic student with research reading

These students are likely to welcome the security of a frame or big picture. Without this, they won't know where to start on an open-ended task such as: 'Find out all you can about ghosts for a talk next week.' Frequently, students preparing for school-leaving examinations can find themselves thrown in at the deep end and be expected to collect information independently. This is really hard without support.

One excellent way of doing this is to use what it sometimes termed a *brainstorm*. As with all other reading, students should start off with what they know already. So they should collect this information at the start. Figure 7.4 shows a rough one about the paranormal collected by a group of 13 year olds with dyslexia and recorded from the whiteboard. The students' names showed which topic each had decided to follow up.

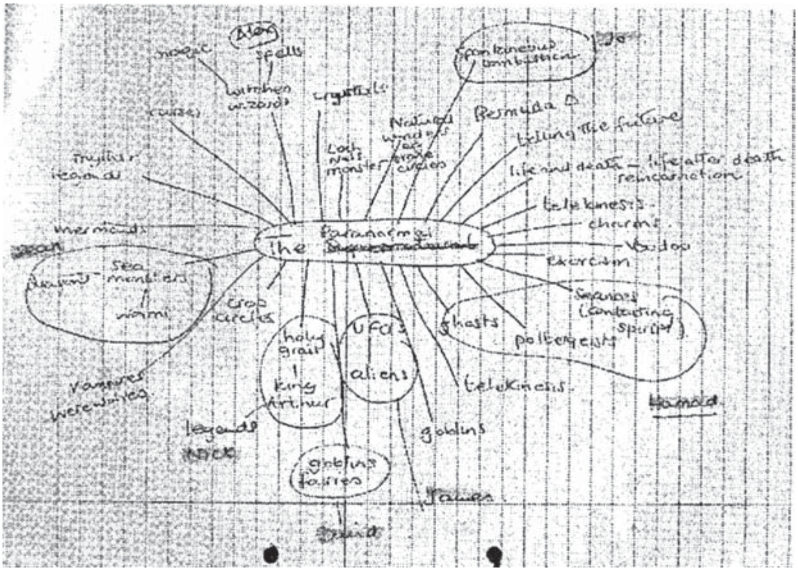


Figure 7.4 Students' brainstorm about the paranormal.

This is how this stage was reached:

1. Each student turned a piece of A4 paper landscape and wrote the topic 'The Paranormal' in the centre.
2. The group had five minutes in which to collect as many paranormal things as possible and either write words or symbols to store them round the centre point.
3. Everybody's ideas were collected on the whiteboard where they were printed as simply and legibly as possible. The teacher can then make neat copies by hand or computer and give them to the group. Of course, the teacher's work is halved if the classroom is equipped with the sort of interactive whiteboard from which copies can be printed. A less high-tech way of doing this is to write on an overhead projector transparency and then photocopy it.

It is also possible to use methods such as the post-it method (Dupree, 2005) where, instead of compiling the brainstorm by writing on the sheet or whiteboard directly, ideas are written on post-its and stuck around the written topic core. This means that they can be moved about and grouped. A more sophisticated planner might even identify headings or possible categories before starting to brainstorm and then classify the ideas as they emerge and write them on to different coloured post-its according to their type, which could help to plan the final piece. This could, however, mean that a stage that is vital for some students, that of categorising and grouping, is omitted.

There are two main ways of brainstorming:

1. Random: The paranormal brainstorm in Figure 7.4 is a random brainstorm. The students are given no more support than the topic heading. Someone who is fluent with words would find this relatively easy. Someone with difficulties retrieving vocabulary or ideas might need more support.
2. Structured: Figure 7.5 shows the use of ‘question words’ to create a structured brainstorm. Again, it is sometimes easier to turn the page to landscape.

Further suggestions are found in Dupree (2005).

For students starting on a search for information, this question-based brainstorm (Figure 7.5) is a great springboard.

As they answer the questions, they discover what they don’t know and need to find out. They now highlight or stick their personal ‘find out’ symbols on these parts of their brainstorm. They can always leave gaps on the brainstorm to fill in with keywords or page number references as they find them. The more analytic learner may well prefer to make a grid here for the

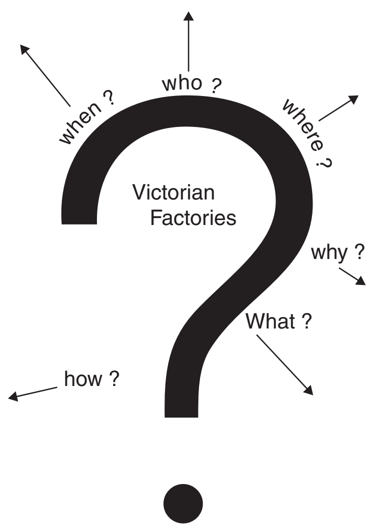


Figure 7.5 Structured question word brainstorm.

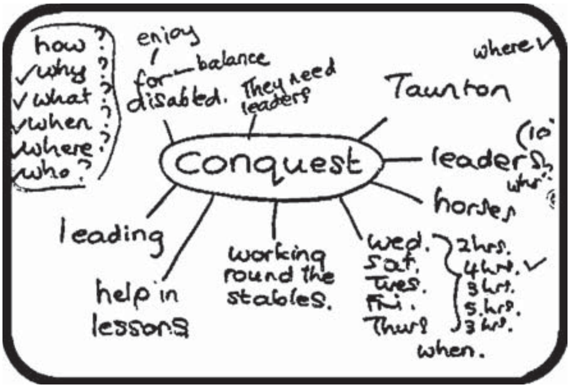


Figure 7.6 Conquest question word brainstorm.

topic using a sheet of A4 divided into columns. See Chapter 8, for examples of grids.

Figure 7.6, Conquest, was compiled on a whiteboard by the teacher while using the question words to help a young student to create a piece of writing about her experiences helping out at a riding stable. It was then photocopied onto a sheet of paper.

Holloway (1995) also gives step-by-step guides to brainstorming aimed at the 8–13 age group.

The basic principle to follow is that of giving to those who prefer a wholistic approach a frame within which to collect the information at the outset. The type of frame rather depends on the sort of information collected. Whenever possible, it is really helpful to communicate with teachers in other subject areas when teaching students how to use these techniques. That way, students can be encouraged to try them out in real situations across other parts of the curriculum to see how useful they can be.

RECAP

Strategy strand: Getting information in
Wholistic learners need the big picture before they start.
Use strategies to help them predict and organise.
Use SQ3R for general reading.
When setting out on a research project, provide frames for them to fill with information.

Strategies for processing, storing and revising

Once students get the hang of using these reading and comprehension strategies, the next stage is to help them process and retain information – whatever medium it may be obtained from.

The key to successful processing has to be organisation. Students with dyslexia find this particularly hard. Their thinking and learning life is frequently chaotic, and they need to be able to see themselves as active thinkers in control of their learning. Dupree (2005) suggests a range of practical strategies that teachers and teaching assistants can use to help their students to develop organisational skills. There are two types of 'storing' – physical and mental.

A few simple measures should help deal with the physical aspects of storing. Any teacher of students with dyslexia is likely to be familiar with the phenomenon of the exploding file. This usually erupts all over several desks and students, frequently at a point when its owner has been asked to produce a particularly vital piece of home or coursework. The fallout is usually discovered to contain anything from last year's biology notes (crumpled) to that please -don't-confiscate-this -picture-of-Kylie/Johnny Depp/that-20lb-pike-I-caught/that-skateboard-I-want, etc. By the time everything has been gathered in, you've possibly forgotten what it was the student should have given you (they hope). Either way several minutes of the lesson and the group's concentration have been lost.

Two basic principles emerge from this:

- Decide what students need to keep: *the minimum*.
- Help them organise it on a regular basis. To this end you can provide file dividers (transparent plastic envelopes or plastic dividers – cardboard usually disintegrates) with headings (e.g. Shakespeare, poems from other cultures). Categorise by colour.

Be prepared to collect in and store any information they may need later for revision. Students with dyslexia have real problems with organisation. Anxiety at approaching exam or coursework deadlines will increase this. It can be argued that the teacher shouldn't take responsibility for organising older students, because they won't get this kind of support in further or higher education. There are, however, two counter-arguments to this: one is that, without this kind of help, they won't get the grades they need to get into higher education; the other is that teachers should be helping students to develop strategies to use independently later on and that the best way to do this is by modelling them. For further suggestions on how to help organise work physically, see the further reading section at the end of this book.

To be organised mentally is a real advantage. Most students need guidance as to how to organise incoming information effectively. Students with dyslexia, in particular, are likely to need to be taken through the most user-friendly techniques. One way of doing this is to help them to practise frameworks to organise incoming information. Although these techniques have been placed in a chapter ostensibly dedicated to wholistic approaches, all students, regardless of their preferences on the wholistic/analytic continuum will be helped by these strategies. It is perhaps possible to suggest that some might come from a more wholistic perspective than others, however it is more important to introduce all students to a range and let them choose the ones they find most helpful. Whether or not this might give the teacher who likes to classify learners by style an indication of the students' preferred style, it will in any case help to personalise the approach used with each student. These frameworks are an excellent way of storing mental representations of information that will be needed for exams later. Any student with dyslexia should be helped to organise these and to keep the physical records safely for future reference.

How can this be done? Here are two ways:

1. mapping and imaging
2. using structures.

This mapping and imaging technique develops from the brainstorms previously described and has the added advantage of ensuring that both hemispheres of the brain are involved. It comes from the work of Tony Buzan (1982) on mind-mapping and also Levy's (1993) brain-imaging programme and has been given a range of titles. Students must be led through the technique and given the chance to practise it before deciding whether it is useful to them. Students who take a wholist approach will usually adopt it quickly; the more analytical may be more reluctant, but even they may get to like it eventually.

Mapping and imaging

> *I hate it. It's useless. I won't do it. I like lists. (Tom, 13, dyslexic student)*
>
> *Oh, go on [trying to hide his concept map] you've caught me at it. I suppose it works for me really. (Tom, 16, at public examination time)*

Mapping is also a great tool to use to boost listening comprehension and should stand students with dyslexia in good stead way beyond school. If students are expected to map from written text, it is best to start with very simple information for those with dyslexia or any kind of reading difficulty as they will also have to focus on decoding

Here is how to do it. The teacher's knowledge of the group will help to decide how many sessions to spread this work over. Students with dyslexia will, however, need a brief recap of the previous stage each time.

First stage: Modelling

1. Discuss and model the idea of creating a brain image or concept map. Tell the students that they will:

(a) Identify the main concept or idea of a passage.
(b) Build a concept map around this main idea.

2. Take a simple, short passage of information such as 'the dangerous dingos' from Levy's brain-imaging programme (1993):

   The Dangerous Dingos

   Dingos are wild dogs that live in Australia. They were brought there by the first people to live in Australia called Aborigines.

   Dingos are farly large dogs that have yellowish-brown fur. They rarely bark and mostly howl. If Dingos are caught as puppies, they make good pets. Dingos' most important food is a small kangaroo called the wallaby, but they also kill sheep. Because of this, the Australian Government has spent a lot of money to catch and poison them.

3. Read the passage out to the group once.
4. Issue students with a blank concept map (Figure 7.7)

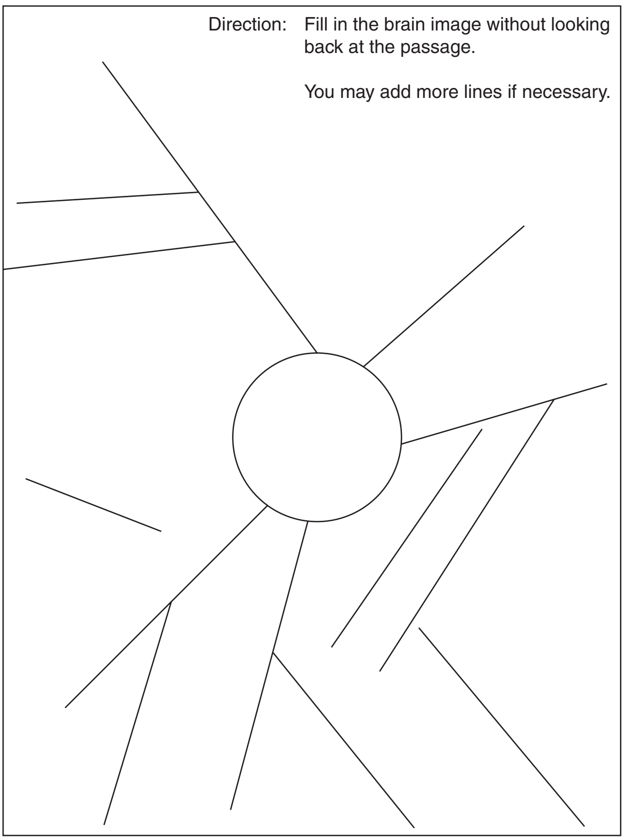


Figure 7.7 Blank concept map.

5. Tell them to identify main idea and write it in the central circle. Tell them to fill in on the lines as many ideas as they can remember – keywords or pictures.
6. Tell them to put their pens down while you read the passage to them again.
7. Immediately tell them to add more information to their brain images.
8. On the board create class brain image/concept map taking ideas from the students.
9. Issue completed concept map (Figure 7.8) and discuss why theirs is better!

Second stage: organising

Chunking and labelling information will help the memorising process. (Chapter 11 provides a range of further sources and suggestions to help with this.) The main aim of this process is to help the students to organise the information into categories, which they can memorise and use as hooks on which to hang details. Use the completed concept map. (See Figure 7.8.)

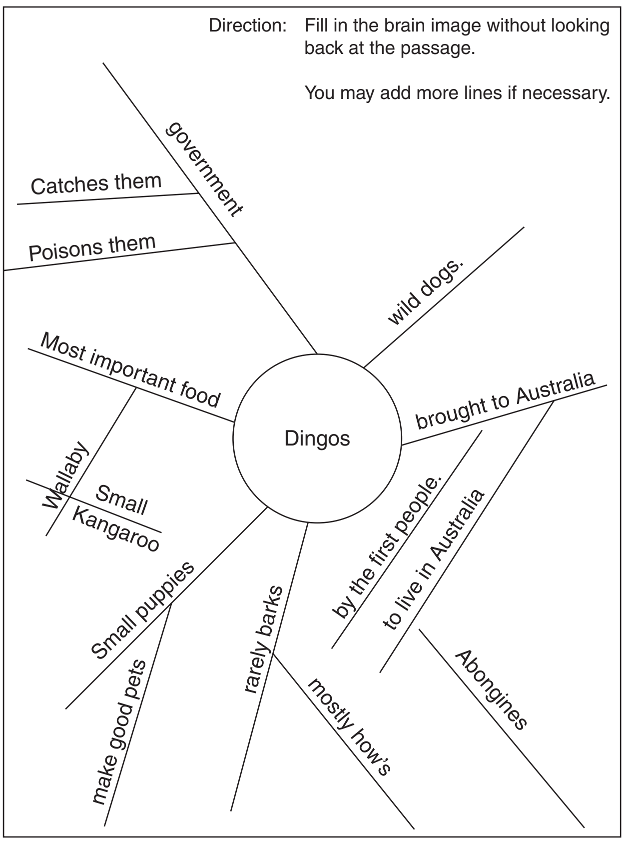


Figure 7.8 Completed concept map.

- Ask for suggestions as to how all this information could be organised into 'boxes' for storage. A range of methods will come up, possibly linked to different students' learning style preferences. (Observing these may give you an idea as to how individuals prefer to work.) These could be answers to questions such as where? when? who?; 'meaning' or semantic categories, for example food, controlling dingoes, uses for dingoes; visual symbols used to express these semantic categories. Different students will choose different approaches and individualise their maps (see Figure 7.9).
- Count the number of main categories – dingoes has six – and try to find a way of remembering the number, for example six letters in dingoes, a cartoon or mind's eye picture of a dingo in a number six football shirt.
- Finally – issue a challenge: a prize for anyone who can fill out a completed dingo concept map next lesson.

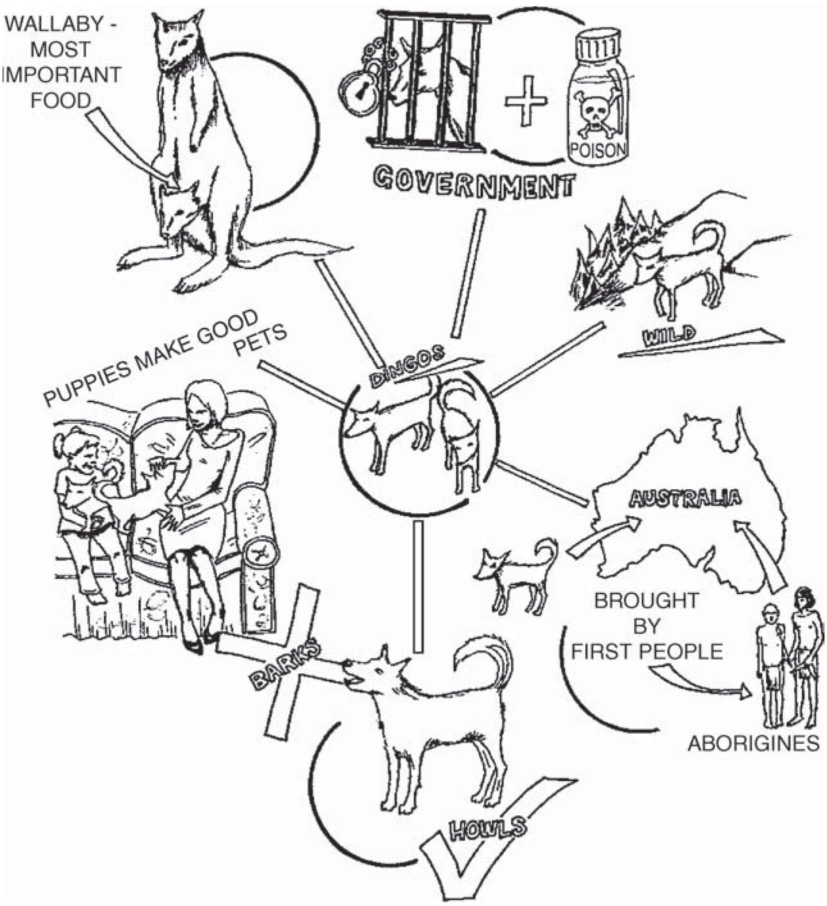


Figure 7.9 Visual concept map. Illustration by Elly Wdowski.

Third stage, testing out the strategy

Next lesson, issue a blank concept map. Set a time limit (optional). Check the key number of concepts and see how well the students' memories work. In general, they will be surprised by how much they can remember.

Further steps

Concept maps are useful in a range of situations, particularly when listening to information or watching films or videos. It is usually helpful to practise this strategy as a group with a particular video related to a topic they may be researching. A3-size wipe-clean whiteboards and board writers are invaluable tools here. Students can jot down a concept map of keywords or pictograms and then, at a later stage, develop these into more storable notes on paper, either individually or in pairs. It is important to give individuals the opportunity to explain their maps to each other and the group and to explain how they developed them. It is an opportunity for those individuals with dyslexia who take everything in to gain some status and for others who are less fluent to practise developing expressive language within explicit boundaries. They usually like to compare their maps, and it is often positive for the teacher to attempt one too, particularly if it gives students a chance to do something better than the teacher. It's also a good way of validating the use of symbols and pictures as a storage tool. In addition, there are some students who are more receptive to advice from their classmates than from their teacher.

Most research suggests that strategies are far more likely to be internalised when used in a practical situation where students can see why they are doing things and how useful these strategies could be. Every method from bribery to coercion should be used to get them to try them out but with the understanding that it is experimental. If any strategy really isn't working for a particular student, it can be dropped and something else put in its place.

There are two obvious and related ways of putting concept mapping into context:

- Introduce concept maps as a way of reviewing information. Time this as part of a revision strategy a couple of weeks before examinations, and set specific topics to be revised and checked with the rest of the group.
- Make sure that every student selects a lesson from another curriculum subject, such as science, history or geography. Suggest that they make a concept map of the lesson. Then review these maps with the group. These self-generated concept maps can then be used as revision-test aids where the information is blanked out and the students have to recreate them, checking accuracy with the original and highlighting areas they find hard to remember. It can be helpful to let other staff know that the students are doing this.

The aim of this supported work is to enable students to create their own maps independently and then spontaneously. The amount of support needed will vary from individual to individual. In either of the above tasks, teachers will have to choose how much support they offer the students, ranging from a sheet of blank paper to a half-prepared map with category headings. This will obviously vary according to age group, context and purpose although the strategies are universally useful from primary to higher education contexts and within the classroom or the individual support setting.

Using structures

Concept maps or brain images are an all-purpose tool that can be applied across the curriculum, all age groups and all style preferences. Different subject areas or situations may require other frameworks. Students should be encouraged to try out a range. For example:

- *Time-lines*: In history, or any other chronological narrative, students often find time-lines useful. Figure 7.10 shows a simple time-line of the events in John Steinbeck's *Of Mice and Men*. Buzan and Coleman's (1998) excellent

Events in 'Of Mice and Men'

Day	Time	Place	People	Events
Friday	Evening	By the river	George, Lennie	Camp near ranch before job. Dream of owning land. G looks after L.
Saturday	Morning	Ranch bunk house	G, L, Candy, Boss, Curley, C's wife	Meet others. G tells L to keep away from Curley's wife.
Saturday	Early evening	Bunk house	Candy, G, L, Carlson, Slim, Curley, etc.	Carlson shoots Candy's dog, males G and L's dream possible. Curley attacks L. Fist crushed.
Saturday	Night	Crook's room	Crook, L, Candy, Curley's wife, G.	L visits Crook. Talk about land and loneliness. Crook offers to join dream but humiliated by C's wife.
Sunday	Afternoon	The barn	C's wife, L, later G, Candy.	L kills his puppy then C's wife. Manhunt starts.
Sunday	Later	By the river	L, G. Later Slim, Curley and others	G shoots L to save him from Curley.

Figure 7.10 Vertical time-line.

series of literature study books uses a range of these methods. A time line could be seen as a classic example of analytic/sequential processing.

- In science, *cycles* can be helpful where they can be used clearly to show such pieces of information as how to test for starch or how plants use glucose. Well-illustrated revision books such as *The Science Co-ordination Group* publications provide a wealth of examples that can be adapted. Beware,

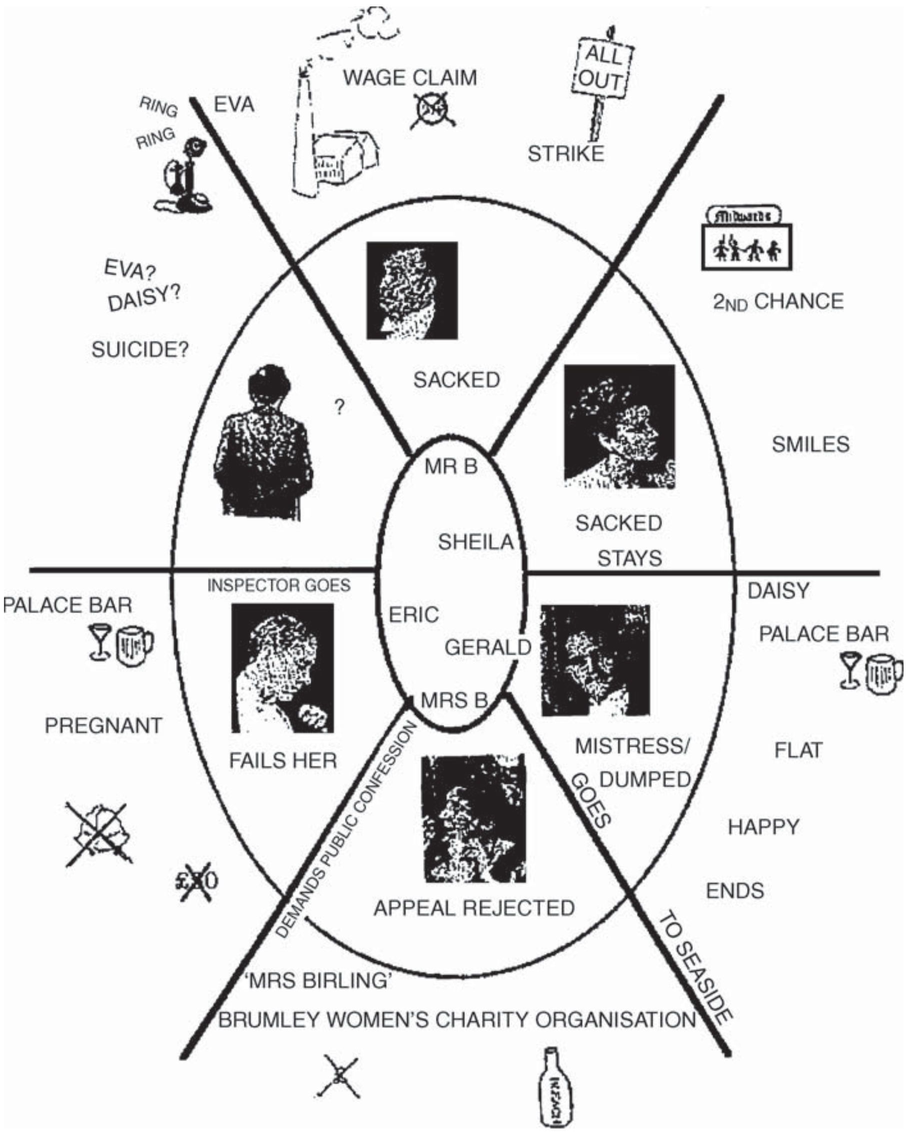


Figure 7.11 Characters and events in *An Inspector Calls* by J.B. Priestley (ILEA, 1990).

however, of overloading pages with images and text. Try to extract and isolate the images that you want students to absorb. This is also useful for studying subjects such as literature. Figure 7.11 is taken from a study book (ILEA, 1990) on J.B. Priestley's *An Inspector Calls*. It is an example of how visual icons can be used to help students to remember characters and incidents within a text. This model combines both wholistic and analytic characteristics.

- English literature – character study. Figure 7.12 shows a *character icon* for an imaginary character created by a dyslexic student; strongly visual learners may prefer icons and like to draw their impression of the character. This is obviously useful as a memory or comprehension aid while reading or listening to a story.

Students' preferences will vary:

- some like seeing events as a series of boxes
- others like to be given a set of blank squares
- others like boxes with lines
- some like unlabelled diagrams that can be prepared easily by photocopying any relevant diagram and deleting headings.

Some of these structures, such as time-lines or sequenced boxes, may well appeal more to those analytic students who are happier with sequences.

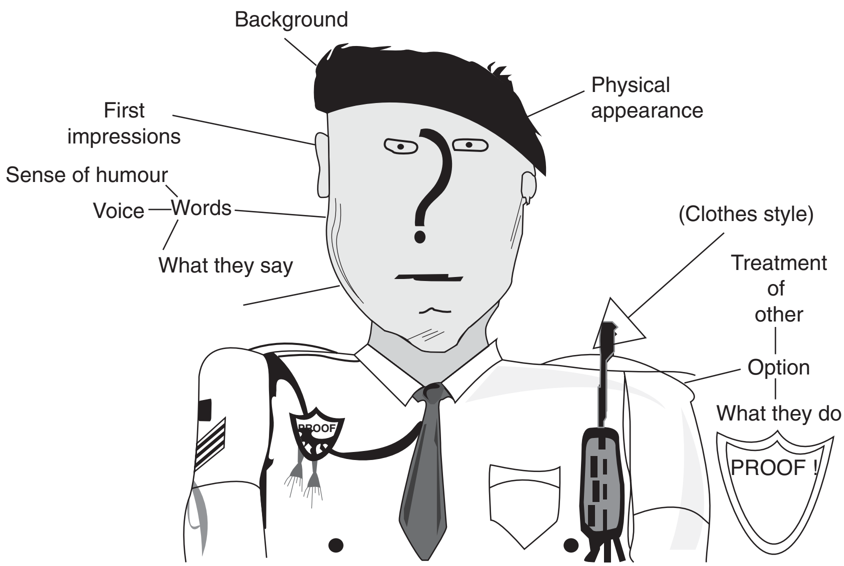


Figure 7.12 Character icon.

Any of these frames can be suggested as a way of collecting information from any visual or verbal text and students can generate their own or be provided with them.

The *I See What You Mean* series (Kilpatrick, McCall & Palmer, 1982), unfortunately no longer in print but perhaps lurking in store cupboards or available on the internet, was a really excellent resource for a variety of frames and activities enjoyed by students and teachers alike. It was particularly useful as it was targeted at the middle-school years but could be used successfully until around the age of 13. These middle years are an ideal time to develop students' awareness of their learning style preferences and how to work with them, as they are mature enough to deal with the concepts and responsibility yet young enough to develop useful strategies before hitting the years of public examinations.

Whatever type of frame used, the eventual aim is that the students should decide which is going to be best in each situation and should be given the skills to devise their own.

Revising

Once students have mastered using maps and structures, they should be encouraged to use them to review newly learned topics regularly. The more students process information, the more they will remember each time. They should be shown how to convert information from one mode of presentation to another – for example from a graph to a mind map, a recipe to a flow chart or a set of instructions to a diagram. Doing this develops flexibility of learning style, makes learners think about the ways in which they can learn, allows students to experiment and discover their preferences and reinforces information in a multi-sensory way. It also caters for the full range of learning style preferences. The *Headwork Series* of books (Culshaw & Waters, 1984), again sadly out of print, was an excellent resource for practising these skills. Mason (1990) provides other opportunities.

Converting new information from a lesson from one mode to another is a really useful homework task for any subject as it will both help to reinforce information and practise ways of storing it. For example:

- Provide a squared page like a storyboard. Ask students to write a key new point in each square.
- Provide a time-line. Ask students to fill in the events leading up to a particular event.
- Ask students to write up an experiment in the form of a cartoon flow chart.
- Ask students to use the full range of question words to set a quiz on a new topic.

Another advantage of these activities for learners with dyslexia is that it minimises the amount of language they will need to generate or revise from. It also provides self-generated revision aids that can be stored in preparation for exam time.

RECAP

Strategies for processing, organising and revising
Students with dyslexia need help with ORGANISATION.
FRAMEWORKS may be the structure of choice for students with wholistic preferences.
Try out MAPPING and using STRUCTURES so that students can make a choice.
Practise using a range of types across the curriculum.
Encourage students to CONVERT information from one type of structure to another to develop flexibility and discover their preferences.

Strategies for getting the information out – modes of expression

Many students with dyslexia seem to fall into one of two categories when producing written work. Either they have so many ideas they don't know where to start or their minds go blank when presented with the empty screen or sheet of paper. Either way the result can be the same – total blockage. What is needed is the trigger that can set them off and free them. Here, as in other situations, different people will need different solutions. It is crucial to experiment with different methods and to be sensitive as to when to press students to persevere with a method and when to let them go in their own direction. Sometimes making an unwilling student stick to a particular way of planning for a couple of tasks actually forces them by default to discover their own best method and stick to it, even if it is only to show you that you were wrong.

Strongly wholistic learners also often have trouble starting to write because their ability to see the whole picture prevents them from knowing where to start. They need to find a starting point that can unlock the whole structure for them and show them the path to follow.

The most successful solutions to this problem come in the form of writing frames. Ideally, students will eventually begin automatically to be able to transform the concept maps that they use for collecting ideas into writing frames to help them express them. There are a range of different types of writing frame and students will discover by experience which they prefer. David Wray could be said to have been the inventor of writing frames and he provides excellent support on his website. www.warwick.ac.uk/staff/D.J.Wray/Ideas/frames.html.

Writing frames – a three-stage process

Many students quickly become adept at writing in two stages – straight from mind maps or brainstorms to written text – once they are used to ways of organising and sequencing ideas into paragraphs. (Chapter 9 describes how to structure and adapt mind maps or brainstorms in this way.)

From brainstorm to text is a two-stage process.

brainstorm ⇨ text

The majority of students will, however, certainly need to be taken through a three-stage process.

brainstorm ⇨ writing frame ⇨ text

The question-word brainstorm shown in Figure 7.5 is a good example of the first stage of a three-stage process. The brainstorm can easily be transformed into a writing frame for factual writing where each paragraph answers a particular question. (see Figure 7.13). This can also obviously be provided very easily as an IT template. Here is an example of a writing frame used to help a student with dyslexia write up information acquired from a video. It may seem almost ludicrously simple for those of us who are used to organising our ideas, but it can be a lifeline for a panicking student.

Writing frame

Victorian factories

Paragraph 1
When did factories develop?

Paragraph 2
Who started them? worked in them? profited from them?

Paragraph 3
Where were they? (and why?)

Paragraph 4
Why did they start?

Paragraph 5
What did they do? **What** was the effect on people's lives?

Paragraph 6
How did they produce goods?

Figure 7.13 Writing frame.

A writing frame is a bridge between ideas and text that provides an organised shape for a student to follow. Most brainstorms can be transformed into a simple frame structure.

There are basically two types of frame:

1. blocks
2. chains

Both types are based on schema theory and discourse analysis, and aim to make students aware of the way different types of text are usually structured and to enable them to use these structures to help organise their own thoughts and writing. This also builds their confidence in the predictability of pattern in texts. Both types can be applied to narrative and non-fiction. Blocks may appeal more to students who like the wholistic approach, while chains are more sequential and are dealt with in detail in Chapter 8.

Blocks

Lewis and Wray's (1995) work on writing frames offers the basis for the block system of organisation. Their book of templates for the six non-fiction genres of writing is invaluable. Although designed for children, they can be used successfully at all levels, most recently seen in action on a Masters in Education course. They follow the same scaffolding approach of:

demonstration ⇨ joint activity ⇨ scaffolded activity ⇨ independent activity

Lewis and Wray provide block frames for six types:

1. recount
2. report
3. procedure
4. explanation
5. persuasion
6. discussion.

Figure 7.14 shows examples of Lewis and Wray's basic frames. They can obviously be adapted to suit different situations and subjects, for example a frame can be structured to reflect the stages of a scientific experiment or created as an IT template. The frames also provide phrases and connectives appropriate for each type of genre. A range of these phrases and connectives is provided in Chapter 10. These are particularly helpful for people with strongly wholistic preferences, those who have difficulty creating or retaining sequences, learners with dyslexia whose sequencing skills are weak, any visual learners who may have difficulties with expressive language or learners with speech and language difficulties.

(a)

Goal
Equipment and materials required
Actions plan (step 1, 2, 3, 4 etc.) Step 1. Begin by Step 2. Then
Evaluation How well has the goal been achieved? Any further action to be taken?

(b)

Although I already knew that...
I have learnt some new facts from our trip to I learnt that ... I also learnt that ... Another fact I learnt ... However, the most interesting thing I learnt was ...

Figure 7.14 Basic frames. (a) Procedure frame. (b) Report frame.

Teachers sometimes forget that these abstract connectives do not come naturally to many students and that it is therefore safer to provide them and model them. Those students who already use them will make use of the spelling and generate more of their own. Figure 7.15 shows a Lewis and Wray explanation frame.

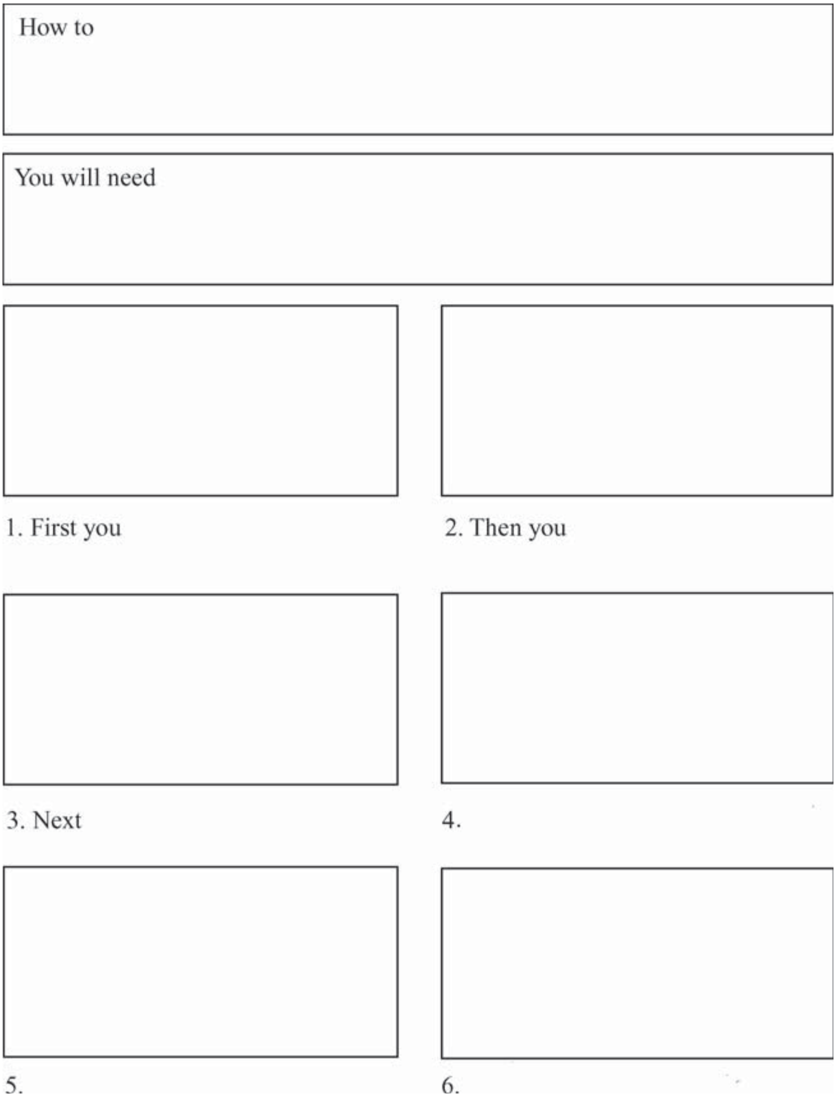


Figure 7.15 Explanation frames.

There are criticisms of the use of frames. It has been suggested that they can limit potential for thought. However, the type of thinker who might be limited is possibly not the student who is paralysed without the frame and should be encouraged to move quickly beyond the frame. It has also been suggested that a frame is only of real use if it is generated by the student rather than offered by someone else. Again, this is to take for granted that a student can generate their own frame. Frames should be used as part of the scaffolding process, part of the way in which Vygotsky (1978) suggests that teachers can move a learner on from a stage where they might become stuck without a model to follow. A strong point in their favour is the help these frames give to those many students whose work is usually a single, several-page paragraph. The simple recount-genre frame forces a student to use five paragraphs and provides an opener for each paragraph. This can easily be adapted to provide a framework for independent coursework. Once students are familiar with the process, they should be able to use it at any educational level, generating their own openers and moving beyond the original models offered.

Figure 7.16 shows how Lewis and Wray's (1995) discussion frames were adapted and used for postgraduates on a module at Master's level (University of Birmingham, 1999). These strategies are useful at every level of learning.

Writing Activity *Discussion* This activity should help you to plan the discussion of the main points of your argument. It could help you organise your sections and your paragraphs.
There is a lot of discussion about whether . . .
The people who agree with this idea, such as . . ., claim that . . .
They also argue that . . .
A further point they make is . . .
However, there are also strong arguments against this point of view. They believe that . . .
They say that . . .
Furthermore, they claim that . . .
After looking at the different points of view and the evidence for them I think . . . because . . .

Figure 7.16 Lewis and Wray discussion frames.

Chapter 10 examines how this block-frame structure can also help students to develop detail.

Frames for adults with dyslexia

Throughout this book, the strategies described can be adapted for use for adults and adjusted to suit the context. Block frames can easily be adopted in the workplace by utilising the conventional frames of the business world, for example agendas or minutes. At university, frames should be adjusted or compiled to suit the subject matter. Students may need to keep field diaries or experimental notebooks and should be encouraged to obtain frames from the lecturers. Figure 7.17 shows an equation frame designed and used by a chemistry student, applied to much of her work and shared with other students (Lapraik, 2007, personal communication). Each section (E_e, E^{o}, $\underline{RT}$ and In[a^{o}/a_r] was represented in a different colour, which matched the accompanying notes. Colour is frequently utilised in a range of creative ways to help organise, categorise and memorise information. Frames can also be useful as cues to help with oral presentations and students can be encouraged to use Powerpoint in this way.

Frames for narrative writing

Persuading any student to plan a story is heavy going. Many talented writers say that their characters adopt lives of their own and the writers do not know how the story ends until they get there. This is obviously fine in any situation except the typical exam where there is a time limit and the candidates are expected to provide a crafted piece. The ‘and then I woke up’ ending usually means that the writer has lost the plot, run out of time or both. Examiners have rumbled this. Not making a plan also makes life difficult for students

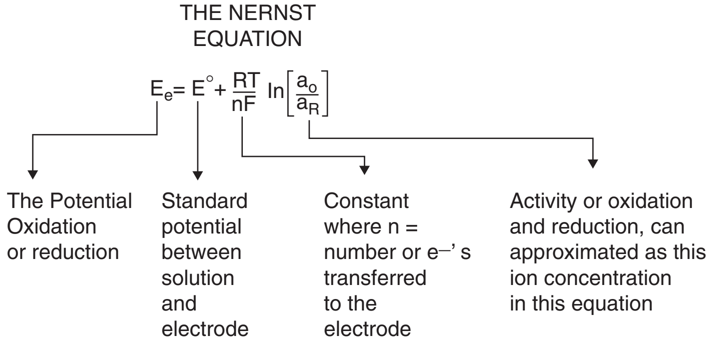


Figure 7.17 The Nernst equation.

who get lost, forget where the story is going or dry up. The student with a strongly wholistic approach may well have an overall idea of a story but will then frequently have difficulty articulating it as a coherent narrative and incorporating detail. The more analytical student will frequently focus on detail but get stuck when it comes to structuring an overall plot.

It is, arguably, almost impossible to structure a story without a combination of wholistic and analytical approaches. Most stories, particularly at a simple level, tend to be analytical – a linear structure with one event developing from another. A clear example is the picaresque novel such as Voltaire's *Candide*. However, before developing this sequential narrative, it is usually necessary to have an overall idea of the whole. This is a situation where approaches from both this chapter and Chapter 8 have to be combined. It is possible, as Figure 7.18 demonstrates, to express both the wholistic and analytical natures of a story in one frame.

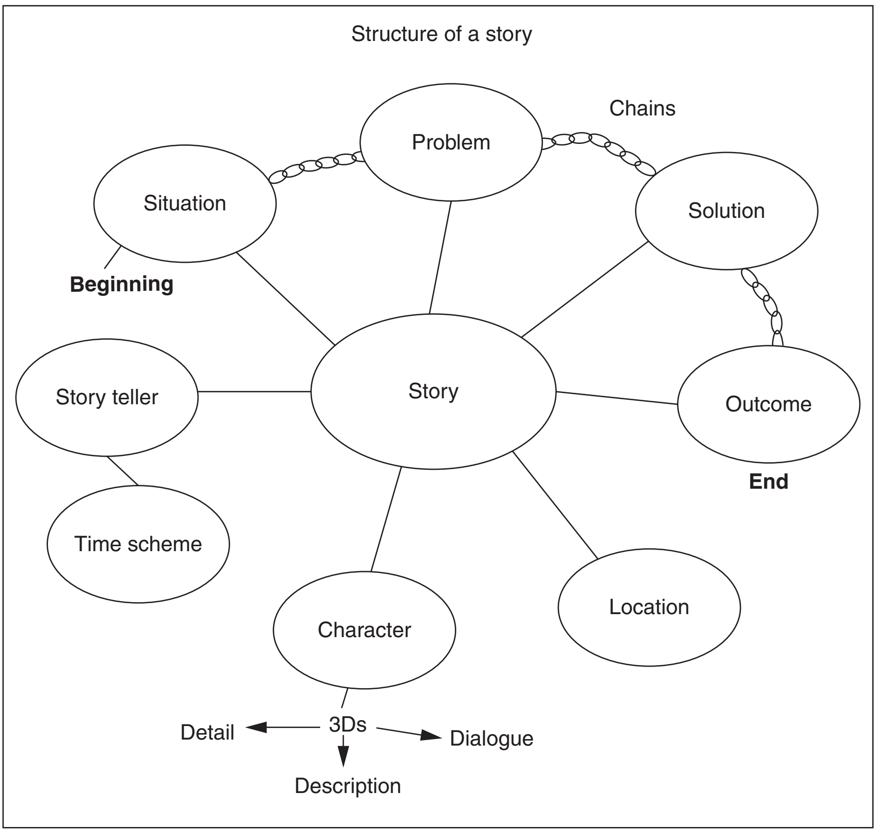


Figure 7.18 Story as a frame.

The situation-problem-solution-outcome chain represents the sequential narrative while the wholistic elements are shown in the lower half of the frame.

This is one way of making the wholistic learner think about the separate ingredients that must be examined when writing up an idea for a story. It is, of course, equally useful given in advance to students as an aid to memory, attention or note taking while reading or listening to a story. Chapter 8 describes in more detail the story-chaining or storyboarding techniques that can be used to structure the sequence of the narrative.

RECAP

Strategy strand – modes of expression
Creating written work is a three-stage process

brainstorm ⇨ writing frame ⇨ text

A writing frame is a bridge that helps the student organise ideas into text. It follows the structure of the type of text written – factual or fictional.

Any learner is likely to be helped by the provision of frames.

A vulnerable learner is particularly likely to need a frame.

Those learners with strongly wholistic or analytic preferences may respond to different types of frame. Wholists may prefer blocks or maps, while analysts may respond to chains. Stories often require both types of frame.

Wholistic examination and revision techniques

Revision is a headache for everyone, but it is often a nightmare for students with dyslexia. They frequently state that they do not have the faintest idea how to revise and that they cannot read their notes anyway; so what is the point? This chapter has already suggested ways of using the transfer from one type of frame to another as a way of processing and revising information. Writing frames can be used in a range of ways for exam support. Here are two approaches:

Preparation

Students need to interact with any material they are trying to learn. For most people with dyslexia, reading through notes is hard, because the effort expended in reading interferes with memorising. A way of getting beyond this is to take a discrete section of notes and read it through with the purpose of extracting keywords and main points and building a grid or mind map from this. Those with wholistic preferences will probably want to create a graphic map, analysts may prefer grids or sequenced lists – either way the aim is to personalise the material and make it manageable. Once the map is ready, the student can start to see it in the mind's eye and to memorise the shape and the detail, to count how many arms it has. At this point, they should prepare an unlabelled version on a separate piece of paper and see how much information can be filled in from memory, going back to the original to retrieve forgotten details and filling these in using a different colour. The aim is to be able to produce the map spontaneously (ideally, the next time the student sits down to revise this topic). This is another situation where use of colour is frequently helpful.

Using keywords

Students who lack confidence in their memories or organisation often feel as though they are swirling in a sea of evaporating information during the run-up to an exam. They often need help in structuring and reducing information to the essential. They need simple structures that they can store and use to hang information on. The most practical way to create these is to use the examination papers as the starting point. Exam papers in all subjects are structured around keywords. These fall into two types:

1. subject specific (e.g. metaphor, industrial revolution, erosion, etc.)
2. test specific (e.g. compare, contrast, evaluate, etc.)

Chapter 10, which deals with ways of strengthening the verbal channels, describes more work with keywords.

There is a finite number of types of question that can be asked about any topic, and all teachers are familiar with the concept of question spotting and preparation of trial answers. For most students with dyslexia, however, whether they prefer a wholistic or analytic approach, these answers will be more user-friendly if they are placed within a frame hung on keywords. Here is an example taken from an English GCSE paper where students have been studying a group of poems for the exam:

> *Question:* **Compare** *the ways in which* **two** *poets from this selection explore the idea that your own* **identity** *is closely linked with the* **language** *you use.*

The keywords are written in bold. The students will have practised identifying keywords and their meanings. They will also have created a grid showing which poems deal with which themes (see Chapter 8). They will have practised using a comparison grid (see Figure 8.13). They are, therefore, ready to create either a grid or a concept map to frame their answer

Students should be able to create a basic frame within minutes. Students with dyslexia find writing onerous. Practising full exam answers takes up time and often provides them with revision material they can read only with difficulty. It is frequently more useful for them to practise creating frames like this and then to discuss the details with a partner using keywords or images as memory joggers. They can then cover a range of possible questions and store the frames or concept maps they have created in a file for later revision.

Helping wholists to identify detail and sequential structure within a topic

A useful technique is described by Race (1992). It is called a Question Bank. He suggests that all students should devise a set of questions for every topic they study. They should decide exactly what questions they would need to ask someone to get them to show that they understood the topic. Students should write these questions down to build up a bank of questions to accompany all topics that they need to revise. Dupree (2005) also offers some excellent suggestions for supporting revision.

Exam technique

Getting started on exam questions under time constraints is often a major problem for students with dyslexia. Frequently, they will have to produce a full example in as little as 30 minutes, and they can waste half that time staring at a blank sheet of paper. Even if they have been awarded extra time, they will often need help to gain the confidence to make a start. If they have practised producing quick keyword frames, they will have an automatic procedure to follow. This security will often provide the push start that they need.

Working with an amanuensis

In the United Kingdom, it is now possible for students with dyslexia to apply to the examination boards for concessions and to gain up to 25% extra time in all public examinations and assessment tasks at university level. Further concessions such as 50% extra time, use of IT, transcripts of written papers, readers and amanuenses for all examinations except English Language and some foreign language papers can be applied for. (For further information about concessions at school and higher education levels, see Backhouse Dolman and Read (2006) and the annually revised Regulations and Guidance for Candidates with Particular Requirements from the Joint Council for General Qualifications, the PATOSS website (www.patoss-dyslexia.org) under Disabled Students Allowances, Final Report SpLD Working Group, 2005/DfES Guidelines.)

If a student is allowed an amanuensis or writer, training in this skill must be provided. Although many students with dyslexia are fluent orally, dictating

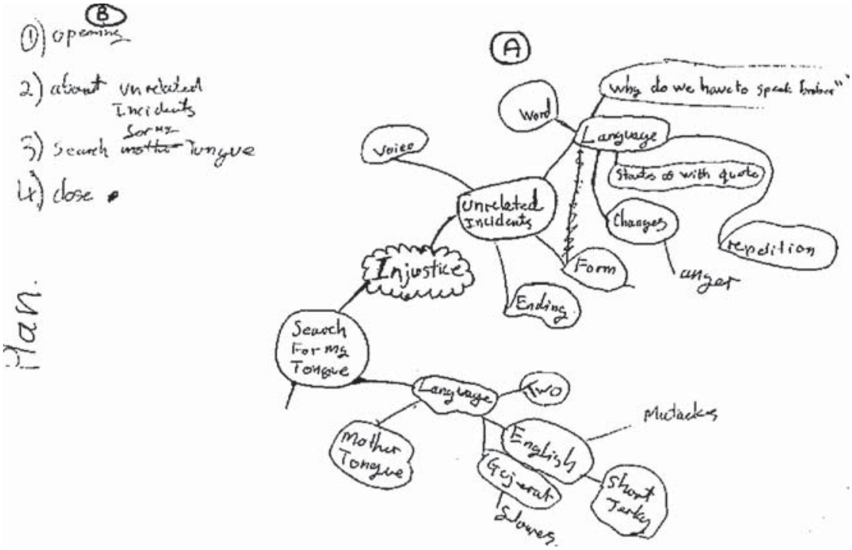


Figure 7.19 Exam planning.

essay-length exam answers is a particular skill which involves organisation and memory. Using a concept map and writing frame before starting to dictate is a proven method. For more visually orientated students or those whose verbal processing is slower, this device allows them to anchor ideas in a shaped form that they can then elaborate on while dictating. Figure 7.19 is an example of practice in GCSE English Language by a dyslexic student. He needed organisation time to retrieve the language he wanted to use. It shows his three-stage plan from which he dictated a more developed B-grade answer to an amanuensis. He has stuck closely to the keywords in his brainstorm (A) and made a clear paragraphed frame (B).

Chapter summary

This chapter discusses the types of learning behaviours that may be shown by learners with wholistic tendencies and by many dyslexic students. It introduces the optimum conditions for learning. People learn best

- when they want to learn – motivation
- when they feel challenged but not stressed
- at the beginning and end of a session rather than in the middle
- when a range of types of brain processing is involved.

Strategies for getting the information in – modes of presentation

- Wholistic learners may tend to respond to the provision of the big picture before they start. Use strategies to help them predict and organise.
- Use SQ3R for general reading.
- When setting out on a research project, provide frames for them to fill with information.

Strategies for processing, storing and revising

- Students with dyslexia need help with organisation.
- Wholistic students naturally take to the use of frameworks.
- Try out mapping and using structures so that students can make a choice.
- Practise using a range of types across the curriculum.
- Encourage students to convert information from one type of structure to another.

Strategies for getting information out – modes of expression

- Any learner is likely to be helped by the provision of frames.
- A vulnerable learner, or one with dyslexic difficulties, is particularly likely to need a frame.
- Learners may have distinct wholistic or analytic preferences and respond to different types of frames.
- These techniques will be particularly helpful to students under exam pressure either when revising, in the examination or working with an amanuensis.
- These techniques can be used successfully from primary to higher education. They simply need to be contextualised and presented in an appropriate way.

Chapter 8
ANALYTICAL APPROACHES

Introduction: What types of behaviour and approaches to learning might be preferred by an analytical learner?

Analytical learners tend naturally towards a linear, sequential style of learning. They tend to prefer to progress in a step-by-step fashion, focusing on each piece of information in turn and gradually building towards a conclusion. This is a logical, problem-solving approach to learning, content rather than context based. Given an overall picture, the analytical student will want to take it apart to study its components.

The strength of this approach resides in the ability to focus on details and move from one to the next. Conclusions are reached through the steady and thorough accumulation of detail rather than through flashes of lateral insight or intuition.

The weaknesses include a tendency to be unable to see either the overall structure of any topic, the relevance of its context or the ways in which different aspects relate to and complement each other. Once something is taken apart, there may be difficulty reassembling the whole. An extremely analytic approach can prevent the capture of any overall picture that might help decision making. Frequently, a quick solution is staring the learner in the face, but they are unable to see beyond whatever is of immediate concern. It may also be impossible to consider more than one piece of information at a time and the learner feels bombarded if expected to deal with tasks or ideas simultaneously or asked to work in a random fashion. At this point they may well forget the detail so carefully analysed only seconds before.

Socially, Riding (1994) suggests that students who are identified as analytic on his Cognitive Styles Analysis tend to be far more self-reliant, consistent, idealistic and organised than their wholistic friends. They are often perceived as shyer and less people-orientated, more detached and less active in social situations. However, again, it is important not to forget that style is only one piece in the jigsaw that makes up our personalities.

What are the implications here for learning behaviour?

Overview or step-by-step?

The wholistic-analytic continuum is only half of the learning style picture. Every individual also falls somewhere along the verbaliser-imager preference line. Riding (1994) suggests that analytic imagers have a complementary style in that they can use the whole-view aspect of imagery to help supply themselves with an overview of a situation. Analytic verbalisers, however, have a more unitary style in that verbalisers are also prone to linear ways of processing. They will therefore need more support in developing the ability to see a broader picture.

Many accelerated learning approaches to study, along with anecdotal evidence, emphasise the importance of presenting all students, regardless of learning style, with the big picture or an overview of a topic before embarking on the step-by-step approach. The 'try it and see' approach seems to be the best way forward here. Analytic learners probably do not naturally tend to create an overview and may, as a result, be disadvantaged in various ways. For some analytic learners, the overview methods described in Chapter 7 may enhance their learning and retention. Others may simply find themselves restricted by this or overloaded and may therefore prefer to stick to a linear progression leading to a conclusion. Chinn and Ashcroft (2006), in their work on mathematics, would probably call these students the 'inchworms'. The only way to discover preferences is to experiment.

Learners who take an analytic approach are comfortable with logical progression. They will, therefore, be more able to follow the kind of academic work that is carefully structured in this way. For example: a science practical lesson that is organised and presented from the outset as a clearly seen progression of activities will be better received than one that asks students to consider a range of possible combinable activities. In design and technology, analytic learners who like to verbalise will do better following a set of instructions for assembling a bookshelf in a way that moves from the parts to the whole rather than having to improvise their own method from looking at a finished example. In history they are likely to prefer time-lines and lists rather than overviews of a topic.

Retaining the details

Analytic learners are likely to enjoy detail. They are good at analysing and teasing out meaning. For example, they may be good at putting together utterances in a foreign language as they find it easy to analyse the syntax of a sentence, locate the meaning and reproduce it (Banner & Rayner, 1997). Research will be thorough. Written work may well be focused in depth on a narrow area. This is obviously an excellent skill for generating texts of all kinds. Difficulties can arise, however, when analytic learners need to retain and memorise, as they are likely to be faced with material that has large numbers of individual pieces of detailed information without a clear framework on which to hang and group them for storage. They are not natural 'chunkers' of knowledge, and this places a heavier demand on memorising skills. This is an area where they will need support.

Connecting topics

People with an analytical approach are less likely to see connections between ideas other than simple links. This may be the case within subject topics. In history they will not automatically see the relationship between increasing scientific knowledge about the solar system and the decline of unquestioning obedience to the church. Straightforward cause-and-effect links will be easy, but more creative links or parallels may pass them by. In literature they may find it harder to pick up on a theme in a novel and realise that it is also being dealt with in a play. In the secondary school where a day is divided into lessons in a range of subjects, taught by different teachers in separate rooms, students with a rigid analytical approach are likely to compartmentalise the knowledge they are gaining. As a result one student came straight from a lesson on Wilfred Owen's poetry to a history lesson on trench warfare without making any connections. Once the connection was made for her, she was then able to use the fund of detail she had accumulated to deepen her understanding of how it might have felt to be one of those soldiers in 1916, but it was vital for her, and will be for other students with this type of approach, that the connections are made explicit.

Social preferences

People who are strongly analytic may be less comfortable with group work, preferring to absorb themselves in individual research. It is obviously up to the teacher to decide at what point to encourage group work, but combining people with contrasting wholistic and analytic approaches can be really productive as the analytic perspective is likely to produce the detail that may be lacking in the wholistic big picture. If conforming to type, the wholistic learner's group skills might also serve to bring out the more introverted analytic.

Managing group work

It can be very appropriate to group students according to their style. There are two ways of doing this:

1. same-style groups
2. mismatched groups.

However, adopting this approach means that the teacher has to have confidence in their desire and ability to allocate students to style types.

The advantages of same-style groups:

- A teacher can use teaching methods matched to a particular style with a particular group and know that they will all respond.
- Students sharing a similar approach to a task will tend to work harmoniously, and boost each other's confidence.
- They can also share ideas for strategies and reinforce those that are successful.
- Reinforcing new information in a similar way can help retention if the students do indeed respond better to a particular approach.

The advantages of mixed-style groups:

- Grouping students in same-style groups can lead to reinforcement of less appropriate approaches to the task in hand.
- Students working with complementary styles in tasks that demand a range of activities can help to develop new approaches and also to produce a 'team' outcome that utilises all the group's strengths.
- This will avoid limiting the types of activity and resources employed for the group.

Learning implications for people with dyslexia of adopting an analytical style

Sequencing

The analytic approach focuses on the parts rather than the whole. It is sequential and gathers detail. This can cause two main types of difficulty for people with dyslexia. Firstly, they frequently have difficulty with sequencing of any sort. They may have trouble both with following the order of any sequence and with retaining more than two or three items in a sequence in their memory. Many sequences do not become automatic and have to be consciously rehearsed to be used.

Some people with dyslexia have weaknesses with language, which include difficulties with the language of time, cause and effect or prepositions. This sometimes means that they cannot access the verbal labels that would help them to operate effectively in a sequential way. This will arguably suggest that, by default, few people with dyslexia who experience accompanying language difficulties are likely to be analytic verbalisers, but there will be a minority. Beyond primary school, much information continues to be presented primarily in a linear-verbal mode without wholistic or visual reinforcement. This may suit analytic verbalisers but is unlikely to be helpful for the majority of students with dyslexia.

Memory

People with dyslexia frequently have difficulty with memory and organisation. Focusing on detail rather than on structure puts a greater load on memory processing, as one is less prone spontaneously to group ideas into bigger clusters that can be remembered more easily. This means that more processing is needed to retain this type of detailed information. Students with dyslexia also have less confidence than others in their ability to retain factual information. They find this kind of memorising stressful, which further reduces performance.

Social implications of an analytic style for students with dyslexia

The person with an analytic approach is reputed to be more self-reliant and less sociable than the wholistic counterpart. Although most individuals with dyslexia are neither more nor less sociable than the rest of the population, there is a small sub-group who suffer from language disorders. This can mean that they have problems with receptive language, either because their vocabulary is impoverished for a range of reasons or because they have difficulty with an interpretation of language or social signals. Equally, some struggle with expressive language. This can be linked to vocabulary or phonological deficits, retrieval difficulties or slowness of processing.

A third group may have pragmatic weaknesses, which means that their grasp of the social use of language is uncertain – they have trouble with the conventions of conversation (elements such as turn-taking, sticking to a topic, humour, word play or taking another person's point of view and knowledge into account). All these areas can lead to failure in social situations and can either make a student choose, or be forced, to work alone. If that student is also strongly analytical, this may exacerbate any tendency towards isolation. There may well be a need for carefully structured social-skills group work for these particular students.

Between the ages of 11 and 15, adolescents tend to move away from the family group and to forge strong links with their peer group. They begin to depend far more on the good opinion of their friends. The increasing importance of conversation with peers and social inclusion for the personal well-being of adolescents has been well documented (Coleman & Hendry, 1989; Nippold, 2000; Rawlins, 1992). Some people find that, for a range of reasons, which may include semantic or pragmatic language difficulties, the kind of social and conversational skills that gain acceptance do not come automatically. These students will benefit from explicit practice in social-skills groups. The necessary skills include:

- staying on topic
- asking relevant questions

- making supportive comments
- interrupting appropriately
- turn-taking
- shifting the topic gracefully
- using humour and figurative expressions skilfully
- exercising discretion and good judgement with personal information concerning the self and others
- employing body language and facial expressions that enhance interactions.

The majority of students need only limited support in these areas. For further suggestions and reading on speech and language difficulties, see the further reading section at the end of this book. Rose and Goll (1992) also provide some very practical structured work to help set up co-operative learning groups, Csoti (2001) suggests practical strategies to develop social awareness. Holloway (2000) emphasises the important part played by listening skills in social interaction and learning, and provides a range of suggestions for activities and classroom management to enhance these skills, as do Reilly and Murray (2004, 2005).

Mathematics and dyslexia

Do dyslexic students prefer analytical methods in maths?

The study of mathematics combines both linear processing and intuitive problem solving. Chinn and Ashcroft (2006) produce valuable insights into the role of cognitive style in mathematics, exploring the differing approaches taken by inchworms and grasshoppers, two categories of learner that seem to correlate loosely with analytics and wholists respectively.

They suggest that, despite the strain placed on memory and processing by the inchworm style, when it comes to mathematics there are still more inchworms than grasshoppers among the dyslexic population, although they point out that any individual student may use both styles. They speculate that this may be linked with the possibility that a lack of confidence in themselves as mathematicians prevents dyslexic students from following what might seem a more risky intuitive approach and makes them stick to a more step-by-step procedure, despite the overload on memory and processing (Chinn et al., 2001). They state that inchworms with poor memory for basic facts are at risk in mathematics and that for some students this lack of ability to remember basic facts (for example, the multiplication tables) could contribute to the adoption of a grasshopper style, where a student overviews data because they cannot remember the facts necessary for a step-by-step approach.

Their invaluable book suggests both the difficulties learners with dyslexia face in this subject and a range of ways of helping them with mathematics, using both types of approach.

Getting students ready to learn

It is suggested in Chapter 7 that people learn best

- when they want to learn – **motivation**
- when they feel challenged but **not** stressed
- at the **beginning** and **end** of a session rather than in the **middle**
- when the **whole** brain is involved

This obviously applies to both wholistic and analytical learners.

Teaching and learning strategies to help analytical learners

This three-part section corresponds with the three stages of learning:

1. Getting the information in – modes of presentation
2. Processing the information – storing and revising
3. Getting the information out – modes of expression

As stated earlier the picture is less clear with analytical learners than those who take a more wholist approach. It seems that analytical learners process information in a linear, parts-to-whole, sequential way. Some find it hard to grasp the whole of a topic; others have difficulty in making connections. Arguably they should benefit from being given overviews and structure in the same way as recommended for wholistic learners, as this should help them to create links and memorise the detail that they gravitate towards. However, some analytic learners are really uncomfortable with this approach and state that being forced to take an overview simply overloads them or that it restricts their ability to develop their understanding of a topic in the way that suits them. There are two ways of dealing with this. One is, as suggested in the previous chapter, to introduce a range of strategies, but to emphasise that they are free to discard any of them if they find them of no help. The other is to check whether the individual learner needs to be helped to see the big picture, and then to find more sequential, linear ways of expressing this.

Strategies for getting information in – modes of presentation

When reading for information, all students will benefit from being taken through the SQ3R procedure described in Chapter 7. SQ3R is universally useful. It allows prediction and encourages links and the use of context.

With research reading, all students will benefit from collecting what they know about a topic before they start to gather more information. However, those with the more sequential analytic approach may well find the exploding

Grids – Question words: UFO		
Things I know	**Find out**	**Facts**
Roswell incident	When? ______	______
	Where? ______	______
UFOs seen in England	When? ______	(*UFO* magazine p.22)
	Witnesses?	UFO letters page
and so on		

Figure 8.1 Grids – question words.

shape of the brainstorm hard to cope with. They are also more likely to need help with knocking some sort of shape into the random facts and details they do ferret out. The way around this is to provide them with a fill-in structure that is more linear or list based. A question-word grid or set of columns is shown in Figure 8.1.

After they have found their information, this structure will allow them to consider the big picture of the topic and how their collection of facts hangs together at the end of the research process.

There are several ways of doing this:

- Separate lists: some students will need to generate keywords or questions to start themselves off. Figure 8.2 shows some science prompt sheets.

SCIENCE PROMPT SHEETS

Planning Experimental Procedures

1. Write down a title that says what you are going to do or find out.
2. Write a plan of how you are going to do it.
   - Have you explained how you will make your method safe?
   - Have you used scientific knowledge to help you make the plan? If so, have you explained how you have used it?
   - Have you written down the names of any books or other material to which you have referred?
   - Did you try out any preliminary experiments first? If so, have you written down what these were and what you found out?
3. Write down a prediction,if it is appropriate.
   - Have you written down what you think the result will be?
   - Have you written down why you think this will happen?
   - Have you used scientific reasons to explain what you think will happen?
4. Write down what it is that you are going to measure or observe.
   - Have you explained how you will make sure that it is a fair test?

Figure 8.2 Science prompt sheets.

- Have you said which things you are going to keep the same?
- Have you said which things you are going to change?

5. Write down a list of the equipment that you are going to use.
   - Have you said why you have chosen this particular equipment?
   - Have you been specific? For example, have you just written down 'an ammeter' or have you written 'a 0 to 10 amp ammeter'?

6. Write down the range and number of readings you are going to take.
   - Have you written down how many readings you will take? Have you said why this is a suitable number?
   - Have you said what are the first and last readings that you will take? Have you said why you are not going to record outside these limits?
   - Have you said how accurate the readings must be? For example, are you going to measure to the nearest millimetre of the nearest centimetre?
   - Have you planned to repeat any of the measurements or observations? If so, have you said why you think this is necessary?

Evaluation Evidence

1. Write down how successful you thought the investigation was.
   - Have you explained whether your prediction, if you made one, turned out to be right or wrong?
   - Have your used scientific knowledge to explain your results?
   - Have you said whether all of your results support your decision? Have you pointed out any results that do not fit the pattern? (These are called *anomalous* results.)
   - Have you tried tried to explain any anomalous results that you got?
   - Have you tried to estimate how accurate your results are? For example, do you think your measurements are to within 1 %, 10 % or 20 % of the true value?

2. Write down any changes you would make if you had to repeat the investigation.
   - Have you said whether it is the method or the equipment that you would change?
   - Have you explained why these changes would make the investigation better? For example, would it make the results more accurate or would it make the evidence more reliable?
   - Have you said whether it really was a fair test?
   - Have you made a note of any difficulties that you met during the investigation?

3. Write down anything that you could do to get more information, if you had time.
   - Have you made any suggestions for other ways of getting extra information about the topic?
   - Have you said how this extra work might make you more sure about your conclusions?
   - Have you made certain that this extra work would give you new information, and not just more of the same?

Figure 8.2 (*Continued*)

Analysing Evidence and Drawing Conclusions

1. Process the information that you have collected.
   - Do you need to re-group the information, perhaps into another table, in order to show a pattern?
   - Do you need to carry out any calculations on your results? If so, have you shown clearly how you have done this?
   - Do you need to draw a graph of the results? If so, should it be a bar chart or a line graph? If it is to be a line graph, should you draw a line of best fit?
   - Have you labelled clearly, with units, any tables, pie charts or graphs that you have drawn?

2. Write down what you have found out.
   - Have you described what you have found out? For example, can you see any pattern in your results?
   - Have you said whether this is what you thought the result would be?
   - Have you used scientific knowledge to *explain* your findings?
   - Have you thought about any other ways of explaining your results?

Figure 8.2 (*Continued*)

- Box sequences – allow one keyword per box
- Question word columns (Figure 8.3)
- Grids – Figure 8.4 shows a poetry example; these are useful for collecting information for revision. They appeal to both wholists and imagers.
- Time-lines – see Figure 7.10. Some wholistic learners will like these, but they usually appeal more to the analytic way of working.
- Visual hierarchies (Figure 8.5)

RECAP

Strategies for getting information in – modes of presentation
Some analytical learners may benefit from having the big picture before they start. Others will prefer to have help pulling it together at the end.

Strategies, such as SQ3R, that encourage them to think about the context of a text and to predict both vocabulary and logic will be useful for everyone.

Analytical learners may well find linear frames useful at the start of a project. Most will find them helpful at the end for seeing an overall picture of their results.

Strategies for processing, storing and revising

Any student with dyslexia is likely to need help with organisation. Although analytical learners with dyslexia are good at disembedding the main points of

Who	What's happening	Where	When	Moods Atmosphere	Memorable lines Dialogue Voice	Message
	1.					
	2.					
	3.					
	4.					

Figure 8.3 Question word columns for writing or summarising fiction.

	Main subject	Poet's voice (tone)	Themes	Main images	Form rhyme?	Metaphors? Similes?	Students own suggestion
Stealing	Feeling of a thief (thief, people)	Thief speaks Dialogue conversation	Isolation	Snowman cold unexpected			
When you were mine	Feelings for and about mother (poet, people)	Poet as adult looking back with affection					
War photographer	War photographs (people)	Poet describes photographer's job painful		Priest visual (photos)		^{M} Priest	
In Mrs Tilscher's class	Growing up (poet, people)	Poet as adolescent talks to Mrs T memories					
Valentine	Pain of love (poet, lover)	Poet to (Painful) lover			Irregular No rhyme	^{M} onion extended met. ^{S} onion – like the moon	
Carol Ann Duffy							

Figure 8.4 Poetry grid.

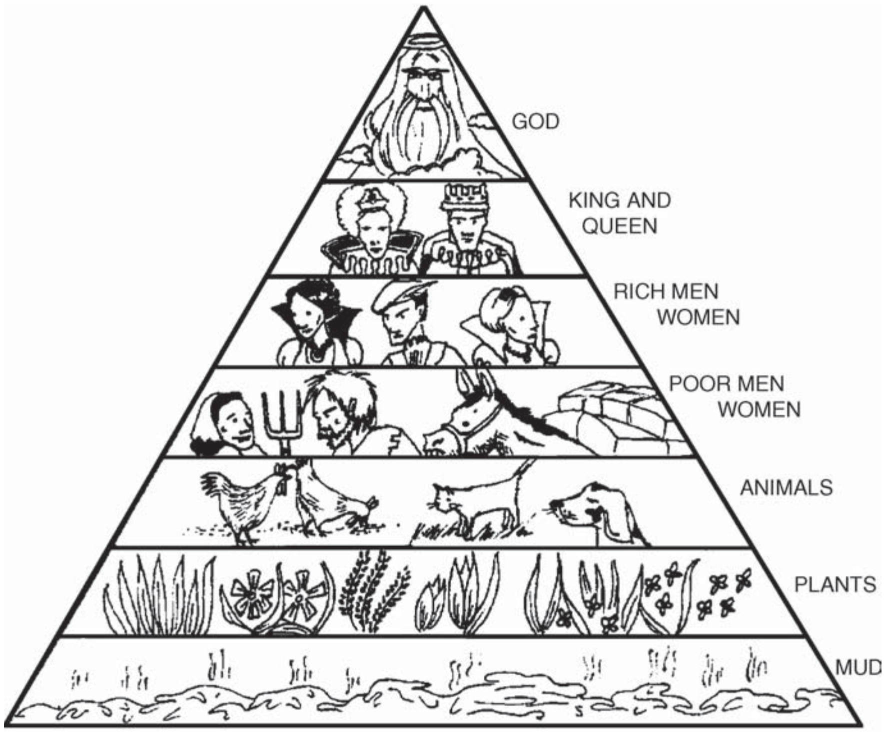


Figure 8.5 Visual hierarchies. Illustration by Elly Wdowski.

an argument from surrounding information, they may in fact be at more of a disadvantage than wholistic learners for two reasons:

1. Their linear approach can put more strain upon their memory.
2. They do not spontaneously work towards fitting pieces into a whole so that links and schema can be formed.

The solution to this for a wholistic thinker is to provide techniques such as the brain mapping and imaging described in Chapter 7.

More analytical learners, however, although needing help, are more likely to be resistant to this kind of support if it is presented in this visual wholistic form. They may be more comfortable with other structures, such as grids, boards or trees.

One way of storing and processing information, particularly from visual or auditory sources, is to issue the students with dry-wipe A3-size boards and pens. Paper can, of course, be used, but marks cannot be removed once they are on paper! Wholistic students are likely to be happy with the suggestion that they turn the board, or paper, landscape, place a topic title in the centre and then create a concept map of visual or verbal key points as they pick them up. People who prefer the analytical approach may be happier to divide the board into a grid of between 12 and 18 squares and to collect one key point per square as they go. They should be allowed no more than three or four words per point. They can, of course, experiment with different shapes – one student used to like working outwards from the centre of a spiral.

This is a useful way of developing listening skills and providing a focus for those students whose concentration span is short. Students can then be asked to present and explain their boards to mixed- or same-style groups, which allows them to add in points they have missed and either encourages them to try other methods or reinforces a particular approach. Students are often interested to see how different structures suit different people. This helps them to realise that there are really no completely right or completely wrong ways of working with information. It is just a matter of identifying the right method to suit oneself and the task. Some students also find that stopping to capture information at suitable breaks, such as paragraph or section endings, enhances their comprehension while reading.

Converting information from one mode to another

As with the wholistic techniques described in Chapter 7, analytical learners should be encouraged to convert information from one mode of presentation to another. This will also give them the opportunities to try out strategies to help them take notes. For example, they might like to try turning a section of a history textbook into a time-line, either using actual dates or numbers or time-concept words such as ‘beginning’, ‘middle’ and ‘end’. Some will find that simply turning a page of text into a numbered list or a flow chart helps to internalise the information. Those analytical processors who also visualise easily will like cartoon-type storyboards with the minimum of text, visual hierarchies or ladders to express concepts, such as food chains or social structures.

Helping analytical learners to identify structure

Being able to create or spot the structure or schema of a text or series of notes is important for a range of reasons. It will help with memorising. It helps students to predict content and shape and it will help an analytical learner to make links within one text and connections between several. Arguably, many of this type of learner may prefer to identify the structure of the information they have accumulated retrospectively.

People who favour an analytic approach tend to work sequentially. They tend not to like the wholistic type of frame where all aspects can be viewed simultaneously. The chaining system developed by the Wigan Language Project (Mason, 1990) may be more helpful to them. Mason (1990) cites Hoey’s (1983) work on discourse analysis, which looks at the common patterns within types of text. Like the block systems described in Chapter 7, it is useful for both stories and academic texts. It is usually easier to introduce its use through stories, as students are often more comfortable with stories than academic texts and are later relieved to discover that academic texts do actually follow a similar structure.

Story chains

The basic links of a story are:

- situation
- problem
- solution
- outcome.

Familiarity with these links will help an analytic processor both to extract the basic narrative line and to plan a story. For any age group, oral story telling is a good way of introducing the concept and links. Here is one way:

1. Start telling any simple story, for example:

   It was Monday morning. Jane woke with a start. For a moment she lay, feeling comfortable, then three horrible truths slowly dawned on her. Today was the day of The Test; a terrible fate awaited those who failed; she would be one of those people!

2. Stop here, ask the group to suggest what Jane should do.
3. While the group are thinking, write on the board:

Situation	Jane wakes on Monday.
Problem	The Test! She will fail.
Solution	
Outcome	
Final Outcome	

4. Ask for the Solutions to Jane's Problems and add some to the chart. Figure 8.6 shows a simple story chain with no Final Outcome. One outcome will actually provide Jane with more problems and further episodes to her story. To finish the story off in a satisfying way, the group will need to choose one that finishes the story conclusively. It is important to discuss the basic steps of the story with the group, ensuring that they understand why each stage differs from the other, before you focus on the Final Outcome. This is a simple, single-chain story.
5. At this stage it is sometimes useful to either collect some more simple story chains from the group or provide some jumbled four-part stories and ask

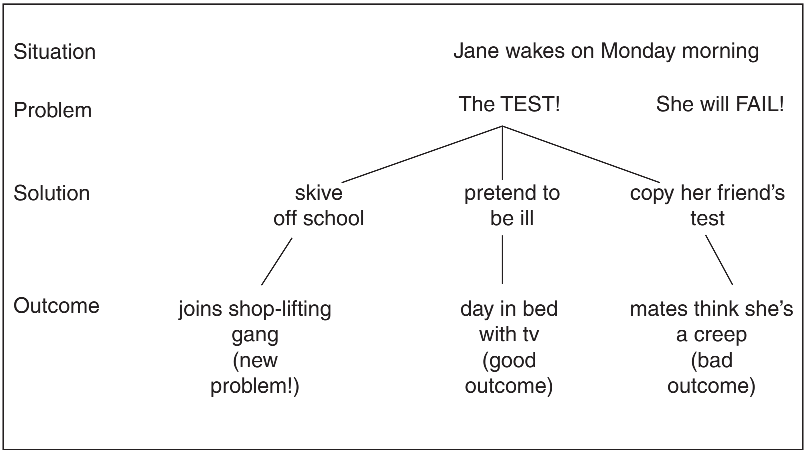


Figure 8.6 Story chain.

students to arrange them correctly and read them aloud to each other to check that they sound right.

6. Once you are certain this concept is clear, return to Jane and her Problem. Ask the students to develop one Solution from Figure 8.6. For example, if they pick Jane's **Solution** to the test being to skive off school, this has given her an even bigger **Problem**.

Problem – she's caught up with the shop-lifters
Solution – she decides to wait at the door hoping to slip away
Outcome – the security man catches her – this is another Problem
Solution – she tells the security man what the others are doing
Outcome – the gang are caught and Jane gets a reward

This could make a satisfactory Final Outcome or the story could continue as long as the tellers like with new problems to solve, such as the gang getting revenge on Jane.

This is an extended story chain, which would look like this:

Situation	Jane on Monday morning
Problem	The test - fail!
Solution	Skives off
Outcome - Problem	Pulled into shop-lifting gang
Solution	Waits at door
Outcome - Problem	Caught by security man
Solution	Tells on gang
Outcome	Gang is caught (Final outcome - reward) or (New problem - gang's revenge)

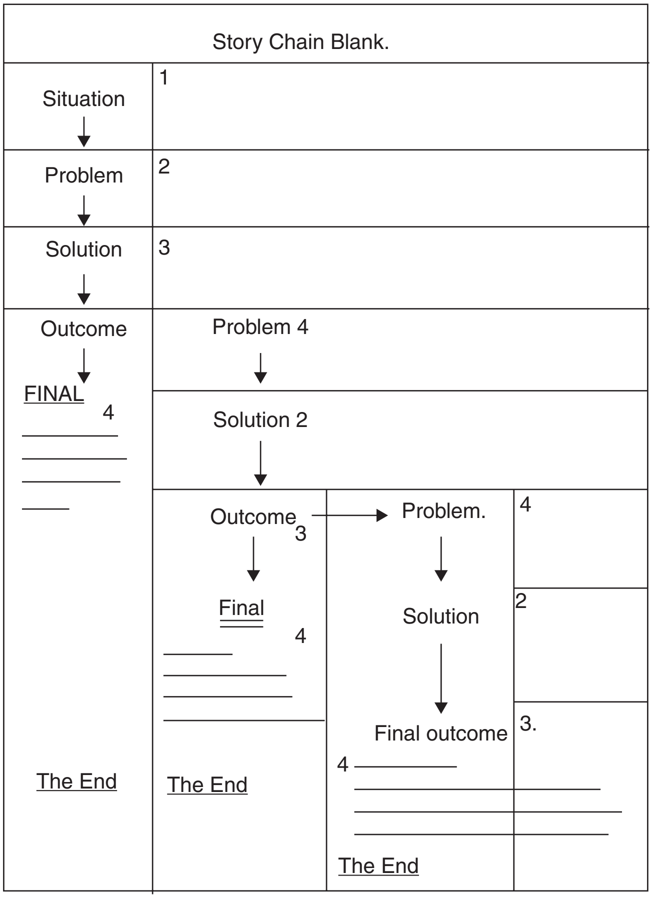


Figure 8.7 Story chain blank.

A chain like this would give a student an eight-part story, which could then be developed with detail and atmosphere.

7. Students should then be given the opportunity to turn a range of stories into the chains that hold them together to investigate exactly how this structure works. It is often helpful to provide a frame with the links.

Figure 8.7 is an example that can be adapted to suit students. Stories can be told, read or watched from video or television. Groups often like to look at soaps at this stage for an example of how more complex stories are formed from a number of separate but closely connected chains. *Neighbours*, *East Enders* or *Brookside* or any standard soap are useful. However, series such as *Scrubs*, *Casualty*, *ER* or *The Simpsons* add another dimension, as each episode contains final outcomes, frequently for several temporary characters; yet there is an ongoing group of regular characters with storylines that continue across separate episodes. Students can be asked to spot particular characters and their storylines and map how the chains interconnect. Again, printed frames, such as that in Figure 8.8 (which shows a completed story chain), can be useful.

This kind of analysis can be applied to any story – including a Shakespearean one – and this leads on to students planning and writing their own, and also analysing stories for literature criticism at a range of levels, from simple to sophisticated. There is obviously scope here for a wide range of activities, including group work devising characters, situations and scripts for soaps or group serials where each student carries on from the last problem. This is also a good memory aid for students who have difficulty keeping track of and remembering a storyline. They can be provided with a story-chain frame and use keywords or symbols to mark the main events as they read or listen to the story. This will also be invaluable for exam revision.

Chains in academic texts

Although the subject matter of academic texts is different from stories, the structure is basically the same across the curriculum.

- situation
- problem
- solution
- outcome (or SPSO) still applies.

For example:

Control and design technology

Situation	We have a dog, and he loves going out in the car. It is an estate car, and we put him in the back.
Problem	This isn't safe, as he tries to get on to the seat with us.
Solution	I decided to design and build a barrier, which keeps him in the back of the car.
Outcome	This works well. He knows he can't get at us and settles down.

History

Situation	Japan wanted to take over the whole of Southeast Asia.
Problem	The only obstacle to the plan was the American fleet.
Solution	They bombed Pearl Harbour.
Outcome	After this they were able to start to take over Southeast Asia.

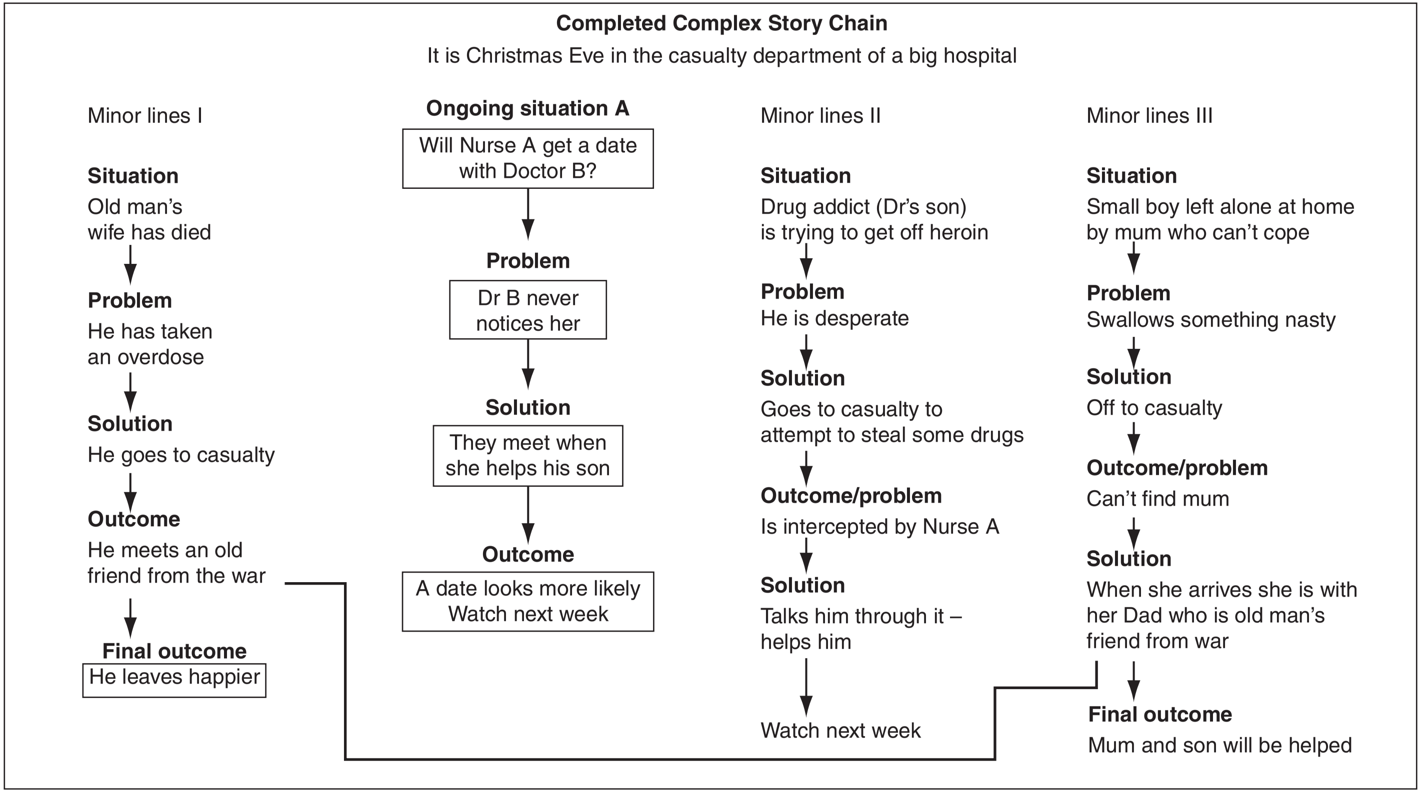


Figure 8.8 Complex story chain.

Chemistry

Situation	Two solids, salt and sand, are mixed.
Problem	How do we separate them?
Solution	We have to dissolve them in water.
Outcome	One dissolves in the water, and the other does not. This separates these two substances.

In academic texts, however, other phrases are sometimes more accurate than SPSO.

Situation could be:
State of affairs, Starting point, Background, What things were like when we started

Problem could be:
Task, Need, Difficulty, Question, Purpose, Gap in knowledge, What we had to do

Solution could be:
What we did about things, Action, Method

The above examples are all taken from Mason (1990). Her highly recommended book provides a thorough range of activities to give a grounding and practice in text analysis. These activities include:

- dividing academic texts into their component parts
- unjumbling mixed parts
- looking at several problems that can be solved with one solution
- looking at one problem that might have several solutions.

This is a useful way for those who prefer analytical ways of working to process information that they need to retain. It manages to combine a sequential approach with a developing awareness of the patterns that appear regularly in different academic activities. It makes students think about the stage they might be at in any process and about how that process hangs together without insisting, at this stage, that they take an overview.

RECAP

Strategies for storing, processing and revising

Although people with a tendency to prefer analytical processing usually work in a linear way, they will benefit from being helped to see the overall structure in a text. They may prefer to generate the structure ***after*** *going through the process.*

They may respond to some of the methods suggested for wholistic learners but usually prefer more linear frames, such as text chaining, time-lines, columns or lists.

Like wholistic learners, they should be encouraged to convert information from one form to another and to experiment with alternative strategies.

Strategies for getting information out – modes of expression

The three- or two-stage process described in Chapter 7,

brainstorm ⇨ writing frame ⇨ text

is equally relevant for analytical learners. They are just as likely as those who process wholistically to become blocked when trying to express their ideas. Working sequentially will quite frequently give them a writing order if the task provides a logical progression, such as writing up an experiment or a chronologically ordered story. However, they will often get into difficulties halfway through the text when they realise they don't know how to end their story or their account.

Stories often cause considerable difficulty. Reluctant to plan in advance, some writers will need the push of an opening sentence or situation to start them off and then not know where to go. Others will ramble on happily, only to lose their way completely and get bogged down in inconsequential detail. Five hundred words and an hour later, their hero still hasn't got out of the door. This is where an overall picture of the whole is really necessary, preferably presented as a sequence. They will need some organising structures.

Here is a storyboarding technique, devised by LePage (1994, personal communication).

1. Fold an A4 sheet to make 8 sections.
2. Number each box 1–8.

   Box 1 – Beginning of story – the opening line
   Box 2 – Location
   Box 3 – Main character(s)
   Box 4 – Character's main problem
   Box 5 –
   Box 6 – Solve the problem in three steps
   Box 7 –
   Box 8 – End the story – final sentence

Students can choose to use pictures or keywords; if using words, set a **strict** limit on the number per box.

The example in Figure 8.9, the Mad Sid storyboard, was provided by a student with dyslexia who, although an excellent oral storyteller, preferred images to words when attempting to capture his stories on paper. He then

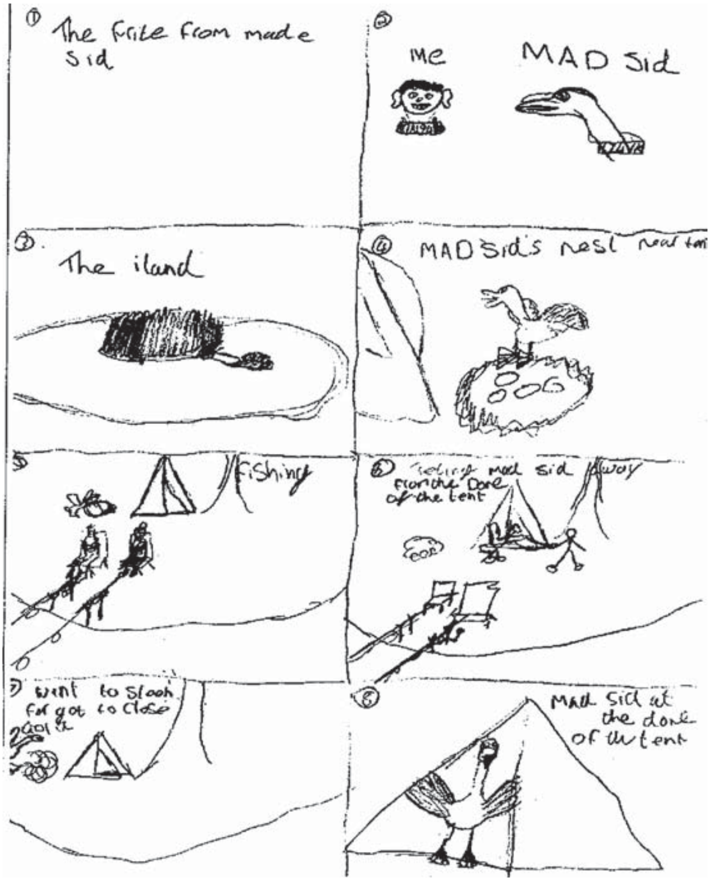


Figure 8.9 Mad Sid storyboard.

went on to write an entertaining, well-structured story, complete with paragraphs! The storyboard kept him focused.

Figure 8.10 is another example from a much younger student who had difficulty both with generating ideas and with logical outcomes. We had worked on the use of who? where? what? and why? structures, which she had internalised and used to create this storyboard. She particularly liked pictures to jog her memory.

Writing frames for academic texts (see Chapter 7) are also adaptable for those with analytic preferences. Figure 8.11 shows how story chains are adapted to use to plan project write-ups.

This use can obviously be adapted across the curriculum to write up activities in a range of subject areas.

Figure 8.12 shows a question word frame with sentence starters.

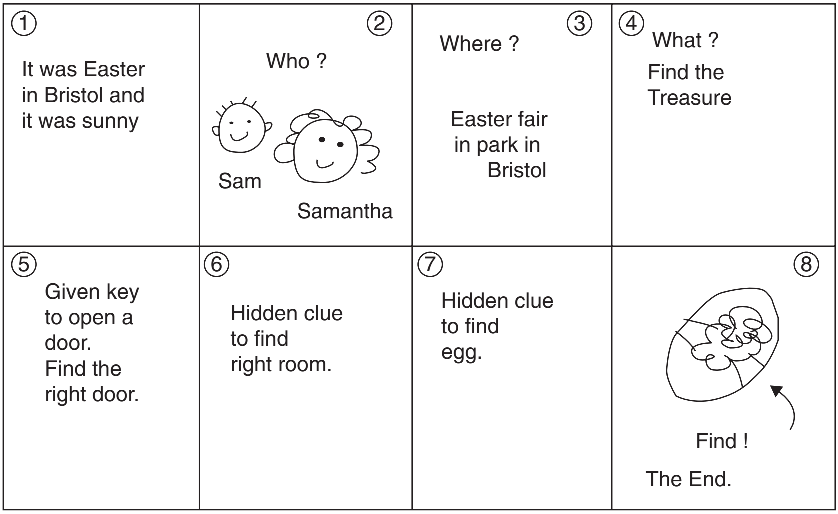


Figure 8.10 The Easter egg story.

Writing Frame Investigating ESP

Situation
Our English group has been researching the paranormal. We decided to . . .

Problem
We needed to find a way to . . .

Solution
First we set up . . .

Outcome
We discovered . . .

We wanted to find out more so . . .

Solution
We decided to try . . .

Outcome / Final Outcome

This can obviously be adapted across the curriculum to write up activities in a range of subject areas.

Figure 8.11 Writing frame-investigating ESP.

	Using question words to compile a writing frame The Shelter **who?** **how?** **where?** **when?** **why?** **what?**
Why?	We needed to build a shelter for . . .
How?	To make it we needed to . . .
What?	Inside it has . . .
Where?	It would be built . . . To hide it, I . . .
Other sentence starters ‘I decided to’ ‘The shelter consists of’ ‘It contains’ ‘We needed to’ Don’t forget defence camouflage air drainage shelter from the rain	

Figure 8.12 Question word frame – The Shelter.

Compare__________and_________Which do you prefer?

	a. Victorians	b. Present day
c. Play		
d. School		
c. Work		
f. Housing		
Conclusion	Would prefer... because...	

Figure 8.13 A blank comparison grid (based upon Lewis and Wray, 1995).

A particularly useful frame is Lewis and Wray's (1995) comparison grid. Secondary-school students are expected to be able to compare activities, ideas, places, people and texts. Many find it very hard indeed. Here is how it works. Figure 8.13 shows a blank comparison grid.

- Write the items to be compared at a and b. For example, 'Life for a child in Victorian England' and 'Life for a child today'.
- Decide aspects that they have in common. For example, housing, work, education, leisure.
- Write these in at c, d, e and so on.
- Collect keywords in the grid. Each box will form the basis of a paragraph.

This is a very simple task, but the same structure can be applied to far more sophisticated areas of study. This form is likely to suit both types of learner, as it combines sequential and unitary structures.

Although most students, whatever their learning style, benefit from trying out writing frames, some do find the block style too rigid and are more comfortable with something curvy. This is where the *chains* described in the second set of strategies come into their own as writing tools or frames.

These more fluid structures are useful across the curriculum to help students write stories or academic text, to write up practical lessons, analyse new information and revise previous information at exam times. As with block writing frames, many students are really helped by the provision of chain frames with terminology appropriate to the particular subject. For disorganised students, regular practice with a predictable form will build confidence and help the students to analyse and remember the steps they have to go through. Collaboration with colleagues across the curriculum can develop a resource bank of appropriate chains that can then be reinforced or used at exam times to enhance revision. Chains can incorporate verbal cues, visual cues or both.

RECAP

Strategies to help get information out – modes of expression

Readers are referred to Chapter 7 where the following points were explained. This is all equally relevant to analytical learners. Creating written work is a three-stage process

Brainstorm ⇨ Writing frame ⇨ Text

A writing frame is a bridge that helps organise ideas into text. It follows the structure of the type of text written - factual or fictional.

Any learner is likely to be helped by the provision of frames.

A learner with dyslexia is particularly likely to need a frame.

A sequential, step-by-step type of frame provides an analytical approach. This chapter introduces the use of storyboard techniques for narrative writing and chains for both narrative and academic writing. A chain would consist of situation, problem, solution and outcome.

The linear approach frequently adopted by analytic learners does, of course, place a particular type of burden upon the memory. Chapter 11 suggests some techniques for improving memory strategies.

Examination and revision techniques for analytic learners

Those readers who have taken a sequential approach, started at Chapter 1 and worked their way through, will recognise much of this section from Chapter 7. Revision is a headache for all students with dyslexia. They frequently state that they haven't the faintest idea how to revise and that they can't read their notes anyway; so what's the point? Sequential processing imposes a considerable memory load.

Students who take an analytical approach will need help with structuring material to reduce this load. Chapter 11 provides techniques to help with this. The strategy of transferring information from one type of frame to another as a way of processing and revising information is as valid for analytics as for wholists. The types of writing frame that appeal to analytic processors can be used in a range of ways for exam support.

Preparation

Students need to interact with any material they are trying to learn. For most students with dyslexia, reading through notes is hard, because the effort expended in reading interferes with memorising. A way of getting beyond this is to take a discrete section of notes and read it through with the purpose of extracting keywords and main points and building a grid or mind map from this. Wholistic learners will probably want to create a graphic map, analytical learners may prefer grids or sequenced lists; either way the aim is to personalise the material and make it manageable. Once the map is ready, the student can start to memorise the shape and the detail, to count how many arms it has and to see the shape in the mind's eye. At this point, they should prepare an unlabelled version on a separate piece of paper and see how much information can be filled in from memory, going back to the original to retrieve forgotten details and filling these in using a different colour. The aim is to be able to produce the map spontaneously – ideally the next time the student sits down to revise this topic.

Using keywords

Students who lack confidence in their memories or organisation often feel as though they are swirling in a sea of evaporating information during the run-up to an exam. They often need help in structuring and reducing information to the essential. They need simple structures that they can store and use to build on. The most practical way to create these is to use the examination papers as the starting point. Exam papers in all subjects are structured around keywords. These fall into two types:

- test specific (e.g. compare, contrast, evaluate, etc.)
- subject specific (e.g. metaphor, industrial revolution, erosion, etc.)

Chapter 10 provides more work with keywords.

There is a finite number of types of question that can be asked about any topic, and all teachers are familiar with the concept of question spotting and preparation of trial answers. For students with dyslexia and those who favour an analytical approach, however, these answers will be easier to memorise if they are placed within a frame hung on keywords. Here is an example taken from an English public examination where students have been studying one of Shakespeare's plays:

> *How **far** do you consider **Friar Lawrence** to be to **blame** for the **tragedy** of Romeo and Juliet? Give **reasons** for your answer.*

The keywords are written in bold. The students will have practised identifying keywords and their meanings. Figure 8.14 is an example of practice in answering English literature examination questions from Tom, a 16-year-old dyslexic student. Although he tends to be analytic in his processing, with a penchant for lists, he eventually began to like and succeed with concept maps, but his

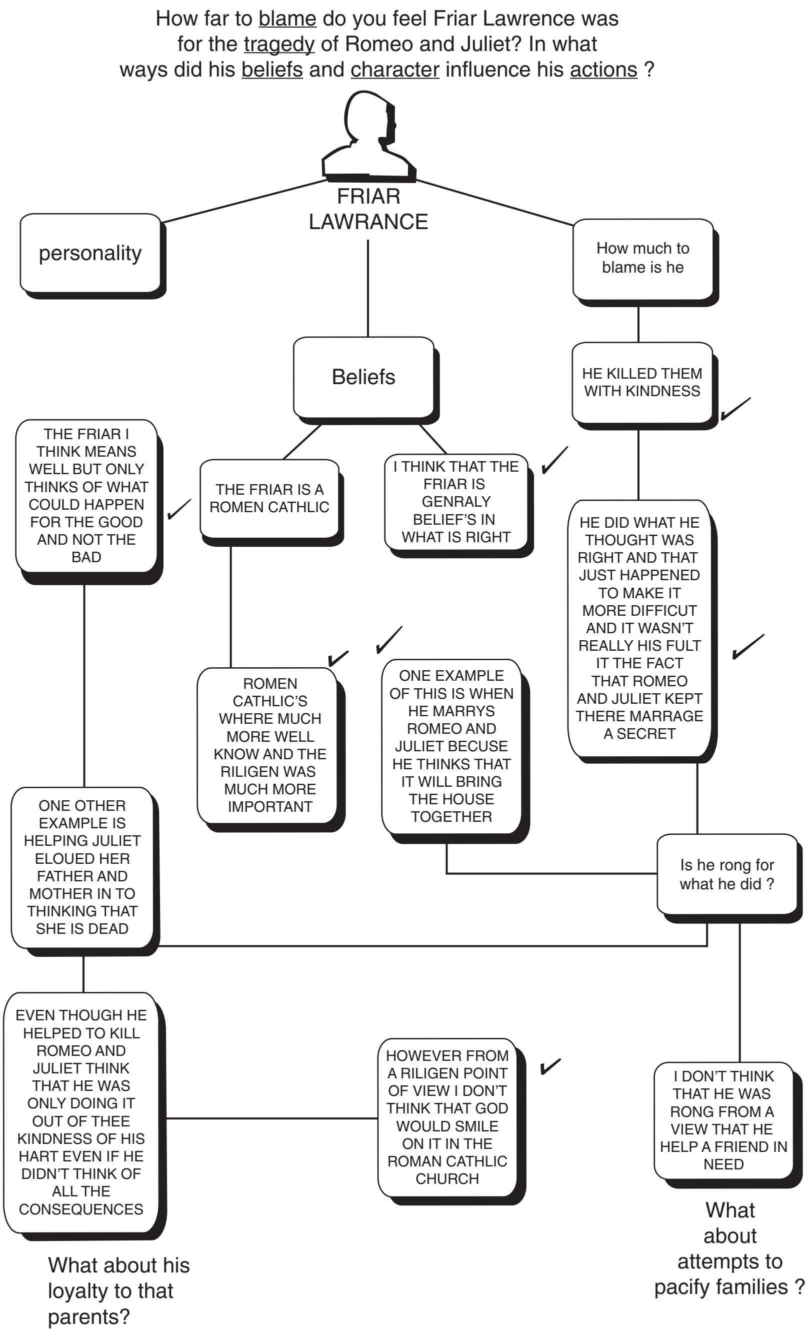


Figure 8.14 Example of practice in answering English literature examination questions.

are structured in a more sequential way and is therefore a different shape from the standard, wholistic concept map, which is likely to radiate out from the centre. He planned to use this for revision and managed to put more detail in each of the boxes than he would have done if organising a plan in the actual examination.

Students should be able to create a basic frame or chain within minutes. Students with dyslexia find writing onerous. Practising full exam answers takes up time and often provides them with revision material they can read only with difficulty. It is frequently more useful for them to practise creating frames like this and then to discuss the details with a partner using keywords or images as memory joggers. They can then cover a range of possible questions and store the frames, chains or concept maps they have created in a file for later revision.

Exam technique

Getting started on exam questions under time constraints is often a major problem for students with dyslexia. Frequently, they will have to produce a full example in as little as 30 minutes, and they can waste half that time staring at a blank sheet of paper. Even if they have been allowed extra time, they will still need the confidence to make a start. If they have practised producing quick keyword frames, they will have an automatic procedure to follow. This security will often provide the push start that they need.

Working with an amanuensis

In the United Kingdom, it is now possible for students with dyslexia to apply to the examination boards for concessions and to gain up to 25% extra time in all public examinations and assessment tasks at university level. Further concessions such as 50% extra time, use of IT, transcripts of written papers, readers and amanuenses for all examinations except English Language and some foreign language papers can be applied for. (For further information about concessions at school and higher education levels, see the annually revised Regulations and Guidance for Candidates with Particular Requirements from the Joint Council for General Qualifications, the PATOSS website (www.patoss-dyslexia.org under Disabled Students Allowances, Final Report SpLD Working Group, 2005/DfES Guidelines and Backhouse et al (2006).)

If a student is allowed an amanuensis or writer, training in this skill must be provided. Although many students with dyslexia are fluent orally, dictating essay-length exam answers is a particular skill that involves organisation and practice. Using a concept map and writing frame before starting to dictate is a proven method. For more visually orientated students or those whose verbal processing is slower, this device allows them to anchor ideas in a shaped form that they can then elaborate on while dictating.

Style and university students

Chapters 7–10 provide a range of style based strategies that can all be adapted and contextualised successfully to suit students in higher education, and many dyslexia consultants in Higher Education now make considerable use of style strategies in their work with students. Learning is seen very much as something that can be developed and style is utilised both to encourage the learner to think about the ways in which they learn, and to enable a co-operative dialogue to be set up between learner and dyslexia consultant to apply learning strengths and preferences to the tasks in hand and develop transferable strategies. Consultants such as Ross Cooper (2007) are adamant that the role of the tutor is to enable learners to understand their strengths to support their weaknesses so that a breadth of strategies can be suggested to undermine any barriers set up by the demands of the learning context. However Frances Hamblin, a university dyslexia consultant, exemplifies how style needs to be used sensitively. She says,

> *I do sometimes meet students who have become 'bogged down' to the point of inertia by a learning style label. One student actually said to me, 'How can I be expected to access information from a 300 page book of solid text, when I'm a visual learner?' So, I make use of learning styles in the following ways, to:*
>
> 1. *indicate that we are all delightfully different, and hardly anyone is only ever one type of learner, in all circumstances, thus a flexible approach is the key*
> 2. *demonstrate that learning style labels are rough and ready guides, most useful in helping us avoid the pitfalls of offering someone an inappropriate way of learning*
> 3. *assist in the process of making something more accessible by incorporating creative adjustments, e.g. for a visual preference, by breaking solid text up, say, by 'writing in' sub-heads, scanning for intros and summaries or topic sentences, by creating diagrams, colouring sections in, etc.; for an aural preference, by showing them TEXThelp to have text read aloud to them, etc.; or a combination/variations for students with AHDH.*
>
> *We try to be as creative as possible and learning styles can be part of that. (Frances Hamblin, 2007, personal correspondence)*

Chapter summary

This chapter describes the types of learning behaviours that are frequently typical of analytical learners and many students with dyslexic. It introduces the optimum conditions for learning.

People learn best

- when they want to learn - motivation
- when they feel challenged but not stressed
- at the beginning and end of a session rather than in the middle
- when a range of types of brain processing is involved.

Strategies for getting information in – modes of presentation

Analytical learners tend to operate in a step-by-step manner. They will need to be helped to make wider connections and see where details fit into the whole. Some analytical learners may benefit from having the big picture before they start. Others will prefer to have help pulling it together at the end.

They may well find linear frames useful at the start of a project. Most will find them helpful at the end for seeing an overall picture of their results. Strategies, such as SQ3R, that encourage them to think about the context of a text and to predict both vocabulary and logic will be useful. When setting out on a research project, provide columns, grids or chains for them to fill with information.

Strategies for processing, storing and revising

Students with dyslexia need help with organisation. Analytical students do not automatically see the big picture and so need help with creating the types of framework that reflect their more linear preferences. Try using a range of structures and chains so that students can make a choice. Offer the chance to practise using a range of types across the curriculum. Encourage students to convert information from one type of structure to another that suits their mode better.

Strategies for getting information out – modes of expression

Any learner is likely to be helped by the provision of frames. A learner with dyslexia is particularly likely to welcome the security and direction provided by a frame. Analytical learners are likely to prefer different types of frames but should be offered the chance to try a range.

These techniques will be particularly helpful to students under exam pressure either when revising, in the examination or working with an amanuensis. These techniques can be used sensitively at all levels of education and beyond.

Section 5 suggests ways in which to develop students' visual and verbal modes of processing.

Part Five
WORDS OR PICTURES

Introduction

Part 5 explores the different ways in which similar organisational strategies for dealing with information can be adapted to help students with wholistic or analytical preferences. The wholist-analytic continuum is, however, only half of the learning style picture. Each student also falls somewhere along the verbaliser-imager continuum.

Their preferences here are likely to determine whether words or images help them to learn more successfully and thus the types of strategies they will find most comfortable. This will not change any tendency to prefer sequential or wholistic learning, but it means that simple factors, such as whether information is presented to the ear or the eye, will affect the outcome.

Some people seem to be very consistent in their preferences which may mean that they are likely to be placed at either extreme of this continuum. Others are much more flexible, choosing to mix words and images or varying in their preference according to the task. A consistent wholist who also tends to prefer images is more likely to be uncomfortable dealing with words than somebody who is analytical but also gravitates towards images. Conversely, those who take an analytic-verbal approach are less likely to find images helpful than the wholistic imager. In general, a combination of preferences for an analytical approach and the use of images makes for more flexible learning as does a combination of wholistic approaches with strengths in the verbal department.

Any teaching group is likely to contain a mix of style preferences and, of course, students who vary from one task to another. It is always tempting for the teacher to stick to their own preferred style of working, but it is clear that this is risky. Bringing a multi-sensory element into any teaching situation can avoid difficulties. For people with dyslexia, where the weak channel for information is, arguably, likely to be that much weaker, this multi-sensory approach has already been tested in work with literacy with vulnerable learners. It is, however, also invaluable across the curriculum for everyone.

A range of researchers and teachers suggest that developing flexibility in any learner will increase success. There are always many learning objectives in any teaching session. Here, the focus is on just two:

1. getting information across successfully (teaching the content)
2. helping a student to strengthen weaker channels (teaching the strategies).

Ideally, both should be able to be addressed simultaneously, but, when working with students who have difficulties with a particular mode, a decision has to be made as to what the specific focus will be at a particular time. Is the aim to build up the weaker mode or are we hoping the student will learn a specific topic successfully? Evidence shows that teaching to a weaker mode may not be as successful as teaching to a stronger. However, very few tasks are suited to a purely visual or verbal approach; so it is necessary to put aside time for building up the weaker mode to give students more flexibility of approach.

For this reason, part four of the book has been divided into two chapters:

- Chapter 9: visual approaches – methods that can both develop and match *visual* or *imaging* skills
- Chapter 10: verbal approaches – methods that can both develop and match *verbal* skills.

Depending on the teaching goals, these methods can be appropriate for any learning style, for students with or without dyslexia. This may seem a less helpful structure than separate chapters dedicated respectively to verbalisers and imagers. The idea of assigning style labels to individuals is, as has been explained, contested and practitioners should beware of the temptation to use the index to cherry-pick and match strategies and techniques to particular learning styles. Doing this can oversimplify and give a partial picture of a learner's needs, which may vary from task to task. The important factor is to give students a choice from a variety of strategies that stimulate and use different senses to enable them to become familiar with what is most likely to work for them in a range of situations. To this end, it is essential to be aware of both visual and verbal possibilities.

Chapter 9

IMAGES AND VISUALISATION

Introduction: The power of images

> *The words or the language, as they are written or spoken, do not seem to play any role in my mechanism of thought. The psychical entities which seem to serve as elements in thought are certain signs and more or less clear images which can be 'voluntarily' reproduced and combined. (Albert Einstein, cited by West, 1997)*
>
> *I hate words. They mess up the pictures. (Ed, dyslexic student)*

Everyone knows the power of a picture. Einstein actually stated that he *visualised* the theory of relativity – it was his use of imagery that produced the breakthrough. Visualisation is undoubtedly a powerful tool for learning and inspiration, which can be undervalued in some school systems. It is believed that babies think in pictures before they develop the ability to think in words, and this visual memory remains strong and vivid. Some research, now challenged (Coffield, 2005) has suggested that up to 40% of gifted adolescents and adults are visual and fewer than 30% of the school population prefer the auditory mode (Milgram, Dunn & Price, 1993). It is also the preferred approach of many, but not all, students with dyslexia. Here a note of caution must creep in. Many students with dyslexia do not have superior visual skills and can easily feel doubly disadvantaged and dejected if they are expected to succeed in this area:

> *I'm dyslexic. I'm supposed to be good at this! (James, dyslexic student, frustrated by a diagram)*

Many, however, do use their mind's eye to create 'mental movies' as they listen to information or search for inspiration. However, even if students do not spontaneously use visualisation, they can be taught to do so and to make use of all the senses to bring anything they are learning to life. This will produce the strongest possible traces in the long-term memory.

How to develop the power of imagery

Robertson (2002) provides an in-depth account of the potential for the development and use of imagery in learning, creativity and memory. He has suggested that the visual and verbal systems are in competition and that many people have forfeited the effective use of the visual system. He emphasises the significant role visualisation plays in creativity and explains how research confirms the possibility of switching on the power of imagery and developing the skills of visualisation. Studies show that the activity of visualising in the mind's eye involves the same vision centres of the brain that fire during visual activity. They also show that congenitally blind and blinded people can create mental maps that allow them to make mental 'pictures' of objects and places utilising the same patterns of brain activity as sighted people. Thus it is possible for us all to develop our powers of imagery and there are exercises that can help us to do so.

Below is a six-stage process that has the double benefit of both developing the power of the mind's eye and also calming students. Guided visualisation can, of course, be a really useful relaxation technique. Teachers may choose to use a background of music or relaxing sound. Often used in drama sessions, there is no reason why it should not be transferred to other classrooms when a dose of tranquillity would be helpful. Students can be taken through a process like this. (The actual instructions are here written in italics to distinguish them from the linked commentary.)

1. *Sit comfortably upright and relax.*
2. *Breathe steadily and deeply for at least six inhalations.*
3. *Close your eyes if you like.* (Optional: some students feel vulnerable closing their eyes unless everyone else, including the teacher, does. This isn't always practical!)
4. *Bring your subject gently into your mind.* (If this is purely for relaxation, then the teacher can suggest somewhere, for example lying on a beach, sitting under a tree in a cool garden. If it is to develop the mind's eye, the students should be given a particular image – perhaps a perfect rose, a bowl of strawberries, a bonfire, a sleeping cat – preferably something that will engage all the senses. If it is meant to be a guided adventure, then the teacher can take the student through particular places – for example, the forest – and lead the student through events, places and meetings where the student is guided to imagine the content.)
5. *Create a detailed picture of your subject using all your senses. What colour rose is it? What time of year is it in the forest? What colour are the leaves? What do you smell? Do the strawberries have cream on them? Sugar? Is the cat purring?* and so on. The students should be helped to see it, taste it, smell it, feel it, hear it, etc. It is also helpful to place it in context and relate it to yourself. Are you about to eat the strawberries? Touches of humour also help. If you're thinking about the industrial revolution see Heath-Robinson-style spinning machines huffing and puffing and wrapping the workers in metres of thread.
6. *Open your eyes. Capture the image by drawing it, making a mind map of it, describing it to your neighbour.*

7. Spend a few moments quietly finalising and adding any other suggestions that may come to mind.

Robertson reminds us that visualising involves a number of separate skills which have to be practised and he provides further suggestions in his book *Mind Sculpture* (2000). Kosslyn (1980, 1996; Kosslyn, Ganis & Thompson, 2001) has examined this aspect of brain processing in detail. Locating and turning objects in space should be practised and Robertson (p. 81) describes a technique, effective in developing imagery, which involves keeping a mental picture alive. To do this a learner has to imagine two things:

1. a grid of 16 squares set out four by four numbered A to D and 1 to 4
2. a thing (perhaps an animal, piece of furniture etc).

Next project the object onto the grid, pick a part of the object (e.g. the head of the animal) and locate the square of the grid that should contain it.

Visual learners are already proficient in these skills and should be encouraged to use them to enhance memory and creativity. Some verbalisers, however, are surprised and delighted by the results when they are guided into it. It is also a useful technique for developing any form of creative writing, whether it be generating poetry or adding descriptive detail. It can also be adapted to any subject you are learning, from science to literature. The series of books by Nanci Bell (1997, 1998, 2003) are particularly helpful. It is also often the case that problems can be solved more effectively if a student can be encouraged to visualise them rather than using words. Frequently, particular words will encourage the kind of clichéd thinking which prevents one from thinking 'outside the box' and solving a problem creatively.

Kate, a dyslexic teenager with listening difficulties, was trying to make sense of some information about how beaches are covered with sand. She listened to the process – starting with mountain rocks, going via rivers to the sea and ending up as sand on beaches. When asked how the sand got from the sea to the beach she said, 'The rivers take it.' She had not thought through that this would involve rivers running backwards from the sea and all manner of unnatural phenomena! When, however, she was asked to start in the mountains and visualise the streams, broadening into rivers and carrying the sand downhill to the sea, she realised immediately that her answer was illogical. It was as though her difficulties with the listening process had turned off the 'common sense' side of her mind. Once she was helped to be there and experience the situation, it became clear to her. Practice in visualising the reality of information in her subject areas has helped improve her understanding and confidence.

One of the roles of a teacher is to help any subject topic to become REAL. It is useful and often fun to practise these visualising skills. Always start by breathing calmly and focusing Always try to imagine the mind as a cinema screen. Here are some ideas:

- Picture a toy car; add another and another. Are they all the same colour? Look at each one. What model is it? Look at all three. Are they the same size? Are they parked in a row? Arrange them how you want them. When they are really clear, open your eyes and draw them.
- Imagine a ginger cat; change the colour to black. Put a white bib and four white paws on the cat. Make the cat lie down. Put a red cushion under it. Change the cushion to green. Turn the cushion into a blue mat. Now imagine the cat stands up and walks out of your picture leaving the blue mat.
- You are walking into the forest. This is a forest where only good things can happen. Look around you. Are you surrounded by trees? Are you coming into a glade? What colours do you see? You look around for somewhere to sit down. You see a tree with a smooth trunk. You sit down and lean comfortably against the tree. You look up into the sky. What do you see?
- Play with abstract shapes. Create a line. Move it around to form a circle. Fade half of the circle out. Join the ends to form a crescent. Colour the crescent silver. Place the silver crescent in a black sky … and so on.

The pictures can be as vivid as the students want them to be. Some students particularly enjoy visualising and eating plates of food or conjuring up cuddly cats or pop idols. The possibilities are endless!

Psychologists and therapists also use guided visualisation to help develop confidence and assertiveness in situations that people find threatening. Robertson (2002) provides details as to how this can be structured and explores the ways in which they can be applied to enhance physical and mental well-being. They will encourage individuals to build up a picture of an ideal performance in an activity that intimidates them. They then vividly see themselves going through all the steps towards a successful conclusion. They replay the images over and over until they flow. This provides an automatic performance framework and builds confidence. Many adults with dyslexia find a range of academic and employment situations threatening and can be greatly helped in this way before interviews, presentations or any challenge. Students with dyslexia are frequently skilled visualisers with vivid imaginations. This strategy helps them to use these skills to bolster their confidence and performance.

> *At the age of 59 I have yet to write a letter and still write figures the wrong way round. At school I was put in the class for the stupid. The British denigrate the visual as something to do at the weekend, not realising that visual people are luckier than verbal people; they are not limited by their vocabulary. And who's to say what's normal? Maybe dyslexics are the clever ones. (David Bailey, photographer)*

Teaching and learning strategies to help imagers

This three-part section corresponds with the three stages of learning:

1. Getting the information in – modes of presentation
2. Processing the information – storing and revising
3. Getting the information out – modes of expression

Strategies for getting the information in – modes of presentation

> *I was bright enough to pass my 11-plus exam, but the grammar school was a disaster for me, and I was expelled. I couldn't spell, and I couldn't learn from the way they were delivering the curriculum, which was to do with teachers talking a lot and writing quickly on the blackboard. We were expected to take notes, and that's the aspect of school life I found the hardest; so I cheated and lied and became destructive. (Elizabeth Henderson, head teacher of Oldfield Primary School, Maidenhead, cited in TES 1999)*

For imagers, well-presented visual material is vital. Use images – that much must be obvious. Make sure, however, that the material is well spaced, clearly printed and, ideally, uses colour to differentiate subject areas. It is also helpful to break up extended information visually either with horizontal or vertical lines or by using different colours. Many students with dyslexia – even those who are comfortable with images – will have difficulty with complex, detailed or extended visual arrays, especially if they are densely packed. Empty spaces are reassuring. Too much information will cause anxiety. Highlighting or underlining keywords, either previously or as the material is presented, will also help. Suggesting that students with dyslexia highlight and underline with you will also improve their interaction with the material. Nearly all subjects, including predominantly verbal areas, such as languages, can be enhanced by visual presentation and the use of colour. For example, the question words used for frames, described in earlier chapters, can be written on different coloured post-its and moved around drafts to encourage development of detail. When attempting to familiarise younger learners with the sequence of seasons or months, a large time-line wall calendar can be divided into sections according to colour (orange for autumn; grey for winter, etc) and embellished with seasonal images. This first year university student, who does not have dyslexia, reflects on the impact of using colour on her learning.

> *We went through the readings in class today and I found that it was a lot easier for me to follow as I had highlighted and thoroughly read the*

information. I was able to raise valid points and compare the information that I had. I believe that I am a visual learner and so, when I read academic readings now, I have to highlight different information in different colours. This not only helps me when I re-read the information but it separates the facts in my head due to the different colours.

Use charts, diagrams, graphs and film. The Film Education website on www.filmeducation.org/suggests ideas. They also have a teachers' centre with resources and offer workshops and training sessions for teachers.

Use well-presented instruction manuals to back up verbal instructions. The wide availability of artwork online and the introduction of interactive white-boards has revolutionised presentation over the past few years. For those who are still learning, *Teach Yourself Visually* (Kinkoph, 2005) in the three-D 'Visual Series' by IDG books is highly recommended as a guide to providing materials for visual learners, teaching all of the basics, and showing how to adjust colours, apply effects, and work with filters, tips, tricks, and shortcuts in Photoshop 6.

Use symbols to back up verbally presented information. Give students regular breaks from either reading or listening to information, and either sum up graphically yourself or ask students to do so for you. When presenting new vocabulary or words to be learnt for reading, allow students to represent these with their own visual memory joggers, either beside the words or on the backs of cards.

Three years ago, I would do a bit of this, that and the other, willy-nilly, ending up feeling utterly frustrated. The turning point was the creation of a ginormous 16-square-foot time-line mind map with my past events, present state and future aspirations. If anyone had told me then, while I was carting filthy second-hand fridges round south London, that I would be studying multi-media, I would have sent them to a shrink. I try to make time for a healthy lunch before setting off for my afternoon lecture armed with my mind map pad and Dictaphone ... to keep the old concentration going if the lecture seems dull, and there are no visual aids to look at. (Why can't lectures be presented in a multi-sensory way?) I jot keywords down in bright colours. I often add notes after listening to the tape. (Toby Burt, dyslexic student, University of Kent, cited in Brenneker, 2001)

'Physical' aids to offer imagers

Just because a student is an imager does not necessarily mean that eyesight will be flawless. Students who depend on visual strengths may be putting a lot of strain on their eyes. Students with dyslexia often suffer from the glare of a white paper page or from seeming blurring or movement of print on a page.

It is often surprising how much the removal of glare can help. The following things can be done:

- Non-reflective transparent coloured overlays of the reader's colour preference can be placed over documents. Wilkins (1995; Wilkins, Lewis, Smith, Rowland & Tweedie, 2001) has carried out and reviewed research into the effect of coloured lenses on reading. Stein (2007) has now discovered that both yellow and blue overlays make a significant difference for students with magnocellular deficits.
- Documents can be printed on coloured paper.
- Some students find the use of Irlen-prescription tinted glasses or overlays a noticeable help (Irlen, 1991).
- Text size, colour and background colours on computers can be changed.
- When reading, students with visual-processing difficulties will frequently lose their places in the text. They can be helped by a range of text maskers that can be placed either over or under the text. There are some commercially produced maskers that incorporate magnification or a range of coloured overlays. For example, the E.Z.C. Reader (available from www.reallygoodstuff.com) combines an opaque masker like a horizontal bookmark with a coloured transparent edge that can be placed over the line being read. Obviously, it is also easy to create these for individual students. Arguably, it is better to encourage the student to mask above rather than below the line being read. Covering up the next part of the text can discourage scanning ahead to aid comprehension. A range of similar materials are available from Cambridge House Dyslexia Resources (www.CambridgeHouse-Dyslexia.co.uk) or Crossbow Education (www.crossboweducation.com).

Teachers should always be alert for signs that a student is suffering from a visual processing overload or problem. Straightforward signs like headaches or uncomfortable eyes should be followed up. Stein (2007) now suggests that migraine is significantly correlated with dyslexia. Any combination of reading problems such as losing the place, re-reading or skipping lines, missing words out or needing to use a finger or marker to keep the place may be suspect. Some aspects of visual difficulties in dyslexia may, however, not show up in a standard eye test. A list of optometrists who specialise in dyslexia can be obtained from Cerium Visual Technologies, Cerium Technology Park, Appledore Road, Tenterden, Kent. Tel: 0 1580 765211 (www.ceriumvistech.co.uk).

Strategies for processing, storing and revising – turning words into pictures

> *I hate thinking about poetry. The words get in the way of the pictures. (Ed, student with dyslexia)*

All imagers will also have wholistic or analytic preferences and naturally incline towards wholistic mind-mapping strategies or more sequential approaches. Imagers, however, are likely to respond more strongly to the use of images and symbols to enhance their structures and are also going naturally to want to use visualisation as a way of processing and revising material. This is not to say that they do not use words. Most thought is mediated through language – those people who have access to vivid images will, however, be more able to enrich their language and be helped to make connections. It is in the processing phase of learning that the development of visualising skills and the ability to turn words into mental pictures will be most helpful. Students should be reminded of their experience of television documentaries and encouraged to create documentaries in their minds for any subject. How can this be done?

- Students can be encouraged to view scientific, natural or historical processes as if they are the directors of a newsreel 'seeing' events unfold.
- Students can be filmmakers, filming at points of interest, such as the formation of volcanoes or from a plane flying high over coastal defences.
- Students can be TV reporters interviewing characters, uncovering motives and emotions.
- Students can look through the eyes of characters or – for that matter – atoms or blood cells! Some groups of students, even at GCSE level, will find it easier to learn the order of the planets in our solar system by being these planets and lining up. This is obviously linked too with the ideas of kinesthetic learning or learning by movement and experience.
- Students should always be encouraged to create concept maps. These are all techniques encouraged by visualisation strategies. As with these, spending a quiet few moments at the end drawing a mind map and consolidating what has been learn will be invaluable.

A caution

Some students can really be thrown by working in this more 'creative' way. One subgroup of students with dyslexia can be very 'literal' in their interpretation of information. They can be very puzzled and confused if analogies are introduced or if they are asked to pay attention to something that does not seem directly linked to what they are learning about. If it is suggested that they might like to think of the Blitz as though they are making a documentary, they will start looking for the video camera and moaning when there isn't one. These may be the same students who encounter difficulties with language and pragmatics, who are thrown by figures of speech, cannot spot inferences and are totally oblivious to sarcasm. (A highly destructive tool at any time.) They may well be imagers by default but need to be supported carefully if these types of visualisation techniques are going to work for them.

Concept maps

These students, however, should usually be happy with the concept map. By this stage in this book, the idea of a concept map or the similar mind map, as pioneered by Buzan and developed by countless disciples, should be really familiar. Chapter 7 gives a step-by-step procedure for generating one. Tony Buzan's books and video are widely available from the Buzan Centres. Svantesson (1998) also explores a range of types and takes the reader through the process of creating them. This book gives examples of mainly verbal maps using words. However, a concept map is, by its nature, a visual tool and can be ideally adapted for imagers. Students go through the steps outlined in Chapter 7 but they focus on the visual:

1. Start with the central idea.
2. Decide what shape map to do. Will it be a cluster? a family tree? a fishbone? (see Figures 9.4 and 9.5).
3. Use one big branch for each main idea. Use a separate colour for each branch. This helps memory in that a student in an exam can visualise the separate colours and thus link the ideas.
4. Use symbols or images wherever possible. When using words, use one or two and add an image.
5. Draw pictures that sum up a number of concepts.
6. Use mnemonics to remember lists, e.g. a picture of an acronym to remember three items, e.g. cat = coal, aluminium and titanium – be sure to visualise the cat effectively.
7. Use symbols and signs to show connections.
8. Make important points 3D.

Above all, be as creative and individual as possible. This is your map.

Here are some examples of concept maps created by students. Figure 9.1 shows all the elements explained above, except the colours. Figure 9.2 shows a concept wheel and Figure 9.3 shows how a student used pictures to plan an oral presentation.

There are also some useful computer programmes available to help make concept maps, although many people much prefer to draw their own; www.mindmap-software.com provides information and access to a range. Inspiration is one of them. It is a visual mapping tool that enables the user to create a visual map of ideas similar to Tony Buzan's mind mapping but using a computer. The software has a library of 1,250 coloured shapes and pictures

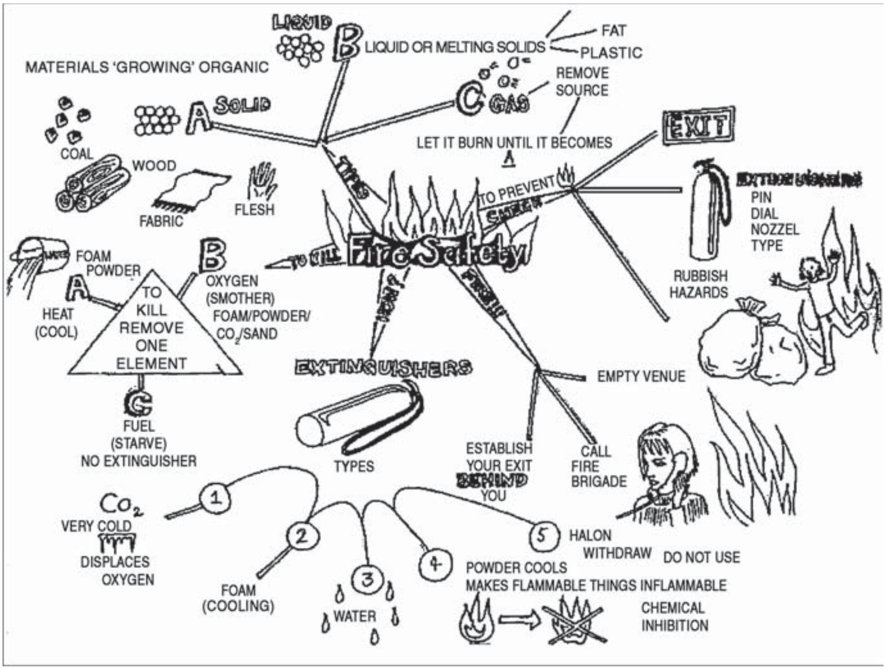


Figure 9.1 Visual concept map.

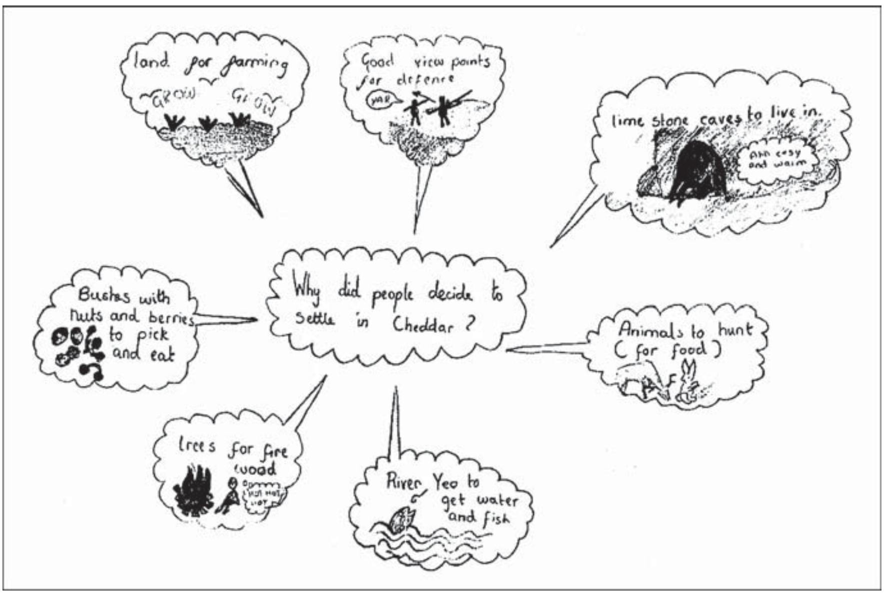


Figure 9.2 A concept wheel.

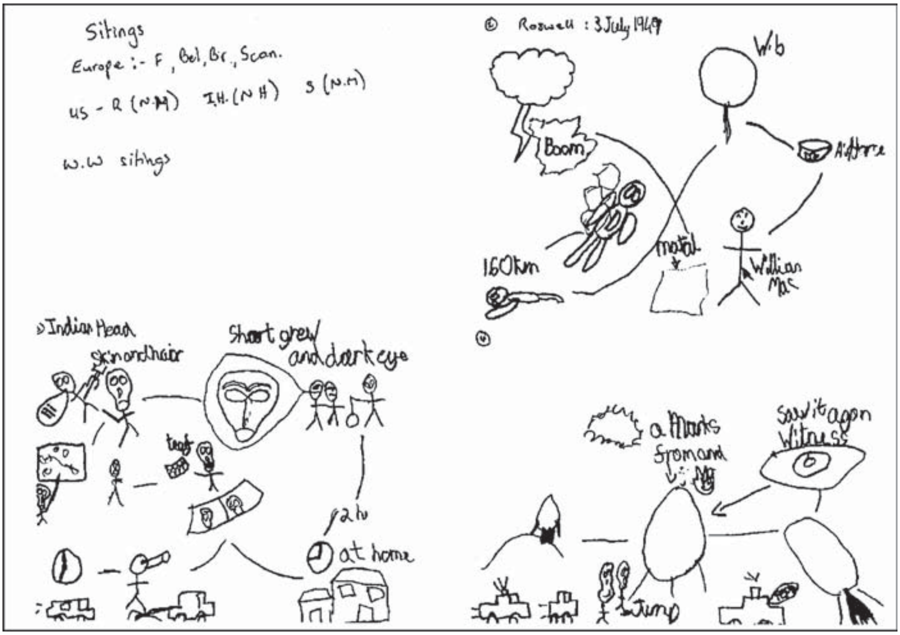


Figure 9.3 Using pictures to plan an oral presentation.

accessible from a palette on the screen, This means that every concept map can be unique and that text can be added to either symbols, pictures along arrows or not at all. A number of different icons from the tool-bar provide additional help:

- The 'outline' key can turn words to diagrams or flow charts or chains to text formats, offering a real facility to move information from one mode of presentation to another almost instantly. Ideas can be organised visually on the screen and then transformed by outline into a linear form to guide the writing of any student who prefers to work sequentially at this stage.
- The 'arrange' key places the final touch by ensuring that the diagram is orderly and equidistant. In the latest version (version 7) a spell checker is also provided.

Inspiration has a number of different templates that provide starting frames for those who need this extra support. It also provides guides for teachers including lesson suggestions for such activities as concept mapping, brainstorming or analysing events. There is a trial version available from the website at www.inspiration.com. Inspiration can be used on both PCs and

Macs; http://www.mindjet.com/uk/ or http://wwwmindmaps.com also provide good, similar, systems for PCs plus links with others who like to use these tools.

Imagers and many students with dyslexia are likely to have difficulties absorbing and retaining information from text, even if it is read for them. Even fluent readers need to be persuaded to interact with the text. This turns them from passive into active learners. There are various ways of interacting:

- The effectiveness of the Survey and Question section of the SQ3R strategy is discussed in Chapter 7. Noon (2007) suggests that, when helping younger students to distinguish between three types of reading: skimming, scanning and accurate reading, it is helpful to provide them with an icon to represent each type of reading required. Hence, she uses a figure on roller skates to epitomise skimming or surveying where one is gliding through quickly to get the general idea. A microscope epitomises scanning where one is looking for a particular piece of information and decides in advance what it will look like (Capitals? Numbers? Features of a particular word?). Lastly, a bottle of pills stands for reading for accuracy where every word must be checked. The visual icon will alert the learner to the type of skills needed for the particular task.
- Some less-confident readers find it helpful to generate a frame in advance of reading. This can be done either in a sequential or wholistic way. The simplest way is to count the number of paragraphs to be read and then create whichever structure the student prefers. For example, draw the correct number of boxes for a storyboard headed with the title of the passage or create a blank concept map with the appropriate number of spokes around the central concept.
- Many readers with dyslexia are easily daunted by the length of even a comparatively short passage. They should be encouraged to divide the text visually into a series of short bursts, even by simply drawing lines between paragraphs. (This is one reason why it is often more practical to use photocopies of the original text with students with dyslexia.) They should also be encouraged to keep a physical grip on where they are, either with a marker, a pen or finger down the margin. Some people find that drawing their finger along the line ahead of themselves speeds up their reading. When they need to take a break, they should mark the spot either by highlighting or placing a tiny post-it at the stopping point.
- Readers who are insecure about their comprehension or memory could try pausing at the end of each paragraph to rehearse the main points that it contains. Visual learners can be encouraged to create an image that can be noted on a reading record or card or to visualise themselves into the situation described – to *be* there. If they are uncertain, they can re-read the paragraph highlighting a few keywords and then store these, or related images, as a guide through the text.

- Track while listening. The unreliable reading skills possessed by many students with dyslexia will mean that they will be relying on their listening skills when the teacher reads a text to them. It is not always helpful for them to be expected to follow the text while it is read to them. Some will find that this is best for them and that they can highlight keywords happily and take away a good picture of the content. Others, however, find it impossible to decode the text at the speed at which it is read and the added fear of losing their place prevents them from absorbing the content. For these, it is probably better to accept that they should listen competently and track the information on a whiteboard or rough paper either in the form of a mind map or a storyboard. It is obviously helpful if they have had a chance to survey and prepare this frame in advance.

Dealing with words

Even when using the previous techniques, more extreme imagers or students with dyslexia may well have difficulty dealing with words in two particular areas:

1. vocabulary deficits
2. taking in new technical terms.

Vocabulary deficits

Some people who prefer to use imagery may have vocabulary deficits and need support to extend their vocabularies, both of everyday words and technical terms. Chapter 10 suggests a range of strategies for developing vocabulary. However, for these learners, it is important to try to build pictures into this process. They will be more likely to remember both new vocabulary and information if it is made visual or physical. This is particularly true in subjects such as maths where concepts can be so abstract. For example, if talking about weight, link it with something tangible for example ‘as heavy as a bag of sugar’. If looking at cones, think of ice-creams, traffic cones, draw them or make some out of paper. Use images from clip art or the equivalent on the computer to enrich information wherever practical.

Taking in new technical terms

When trying to learn new terms, try to associate them with pictures or stories. Bartlett and Moody (2000) cite the example of learning the bones in the ear: the hammer, the anvil and the stirrup. Try imagining a blacksmith hammering at a stirrup on his anvil. Then you can either place it within a huge ear or just make the link with the ear by making it really noisy. Students with dyslexia are frequently brilliant at coming up with associations like this.

RECAP

This section introduces a range of strategies all aimed at utilising and developing the visualising skills that many people, including those with dyslexia, automatically possess and use. Educators should:

- *encourage students to create documentaries in their minds for any subject*
- *turn concept maps into pictures*
- *generate keywords and link these words with images*
- *develop 'umbrella' concepts in a range of subjects and express these as images*
- *help students to interact with the text and provide visual markers for verbally presented information.*

Getting information out – modes of expression: oral and written

Whenever possible, find visual ways for students to present their information. They could, for example, compile a poster display or make a video film.

Oral presentations

Oral presentations may well be challenging for people who do not verbalise with ease. They may have difficulty with word finding, particularly when put on the spot. For people with dyslexia, their frequently slow processing skills, problems with concentration and short-term memory can mean that they get lost and forget what they want to say. In a more informal discussion it will be important for them to establish beforehand what points they really must get across in case the conversation moves off into unexpected areas. People with dyslexia may not be likely to organise themselves automatically; so there are ways in which they can be taught to develop these oral skills:

- Ensure that they plan their presentation carefully. They could prepare a large colourful visual mind map or numbered storyboard of the whole thing for their own reference and tape this to a table. Some students like to work with the support of numbered cue cards, each with a separate symbol or picture to jog their memory. These can also include reminders as to when illustrations need to be produced. It is important that these cards are not cluttered and that the student practises using them so that they don't get dropped at the wrong moment. In a more informal discussion, they can write the main points they need to express and then refer to the card at

the end to make sure nothing has been left out. This can actually give an impressive air of efficiency.
- In a more sophisticated presentation, this cue-card summary can be produced for the whole audience on an overhead projector or computer projection. This will benefit the dyslexic and usually goes down really well with the imagers in the audience who will think that the student has done this for their benefit rather than the student's own. If the presentation is being graded, this is usually seen as evidence of excellent audience awareness and worth lots of extra marks.
- Many students can find that structuring their presentation around a series of visual aids gives them the support they need to talk fluently.
- Reducing anxiety. The best way of reducing anxiety is to be really well prepared. Try to give students the opportunity to practise their talks with feedback from supportive friends until they feel confident.

As is suggested earlier in the chapter, visualising themselves going through the activity successfully is an excellent way for students with dyslexia to get to grips with their anxiety. It is helpful to experience the fear and to visualise themselves passing through that fear to a successful conclusion.

> *I have trouble word-finding, and, as far as I understand, the reason is that when I first think of a thing I see a picture of it and the picture suffices for the internal explanation of the thing I have in mind. I know what it is, there's no deficit there, I merely have to translate that knowledge into language, which involves a long-term memory seek. A bit like doing a search on a slow hard disk really. My Mum and I used to communicate about a plethora of thingummies and whatsits because she was as bad as me at it. (Lawrence Arnold, dyslexic video student)*

Bartlett and Moody (2000) give a range of helpful ideas for dyslexic adults coming to grips with oral presentations. They also suggest that students with dyslexia should check the way they actually speak to avoid the kind of aggressive mannerisms that often spring from anxiety. They provide suggestions for assertive speaking:

- neither too loud nor too soft steady, even pace
- regular eye contact but not a fixed glare
- open relaxed facial expression or expression matching words, short pause between sentences but no overlong pauses
- use of assertive statements such as: 'I'd like…', 'My view is…'

It is well worth giving people this kind of training in oral presentations at school or college. These strategies will be useful throughout their working lives.

Writing

A liking for images may be linked with either wholistic or analytic preferences. Either way, imagers with dyslexia will benefit from the use of writing frames in either a wholistic or sequential form. (See Chapters 7 and 8 'modes of presentation' sections). The only real difference is likely to be that they are likely to find visual cues, diagrams or even pictures more useful than words. Reid (1994) provides some excellent examples of using visual representations tied in with mnemonic devices to develop sequencing skills. Figure 8.9 presented a storyboard for Mad Sid, The Swan. This is also a very visual approach. Imagers may well find it comparatively easy to structure a text with this kind of support. The area where they may well have difficulty is in finding the words and detail to expand their outline into a convincing extended piece. Everything seems very flat and uninteresting. They need a bit of 3D.

The 3D technique was introduced by Mason (1990) as an adjunct to her work on story chains. The three Ds are:

- Detail
- Dialogue
- Description.

All English teachers have their own favourite ways of encouraging their students to flesh their writing out; this chapter therefore only contains two suggestions, both of which were demonstrated on inset courses and both of which have been particularly successful with students with dyslexia. The first is a technique for using the senses and guided visualisation to produce detail and atmosphere within a writing frame. The second big-sheet cut-and-paste technique provides a way of expanding a first draft.

Using the senses

Students usually find this fun and produce descriptive writing with a minimum of pain. Strong imagers are often particularly good.

Here is how to do it:

1. Each student divides a sheet of paper up until it looks like Figure 9.4 (this is a fishbone structure).
2. They draw in the symbol for each of the senses and the heart for feelings.
3. On the line at the left they write the name of a place and a mood, for example the graveyard at night, scary.
4. They must then visualise the graveyard. On each line of the eye rib they write one thing they can see in their graveyard.
5. When they have finished this, move on to the ear. Listen to the sounds around you. Write what you hear on each line of the ear rib.

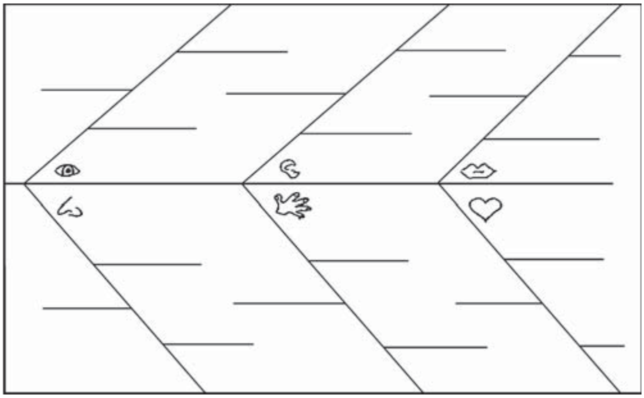


Figure 9.4 Starting to use the senses (a fishbone structure).

6. They carry on doing this for each sense, finishing with their emotions on the heart.
7. The students then share their ideas with each other in whatever way seems best.
8. Some students will inevitably still be producing nouns and be low on adjectives. This is now the chance to take them back to their graveyard and ask them to think about the details. You saw a tree? Was it in leaf or bare? Was it tall? Was it stunted? By the time they have fleshed these pictures out, the frame will look a bit like Figure 9.5.

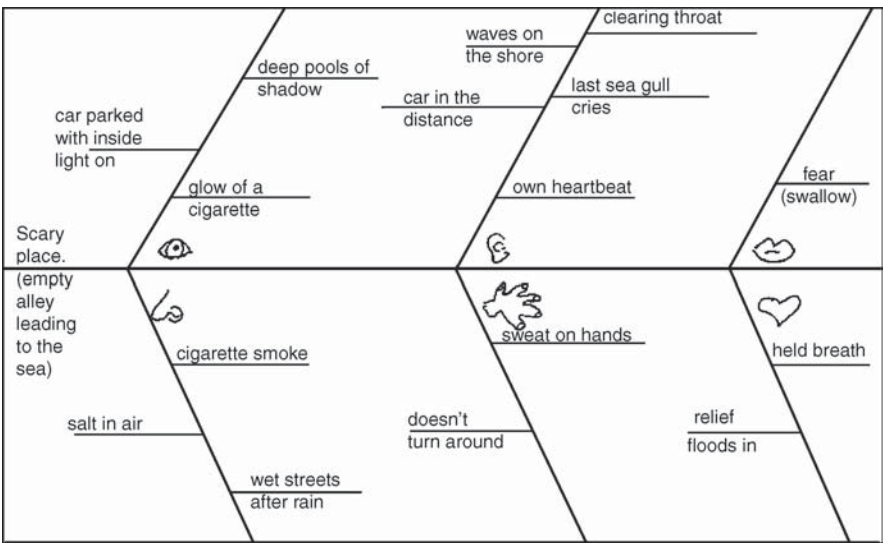


Figure 9.5 Senses frame.

9. They now have a writing frame to take away and work on to produce a complete description. It is sometimes interesting to take contrasting situations, such as the beach in high summer or mid-winter, and create a frame for each to savour the contrasts.

The cut-and-paste technique

Despite using writing frames successfully, imagers can frequently end up with a complete but very short first draft. At this stage the big-sheet technique can give the writer a break and produce a bit of extra inspiration. It's very simple.

1. Go through the draft with the student and divide it into paragraphs if it isn't already done.
2. Take a sheet of A3 paper, portrait or landscape depending on how long the first draft is.
3. Glue the draft onto the middle of the A3 sheet so that it looks like Figure 9.6.
4. Go through the text paragraph by paragraph using question words or 3D techniques to add extra detail, which you write in note form onto the A3 sheet linking each extra idea to the appropriate section of the original.

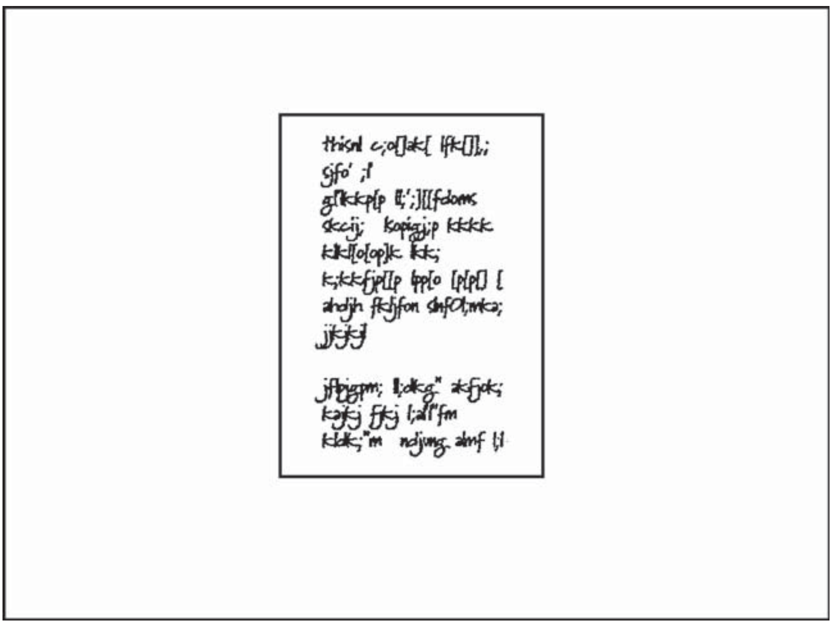


Figure 9.6 Starting cut and paste.

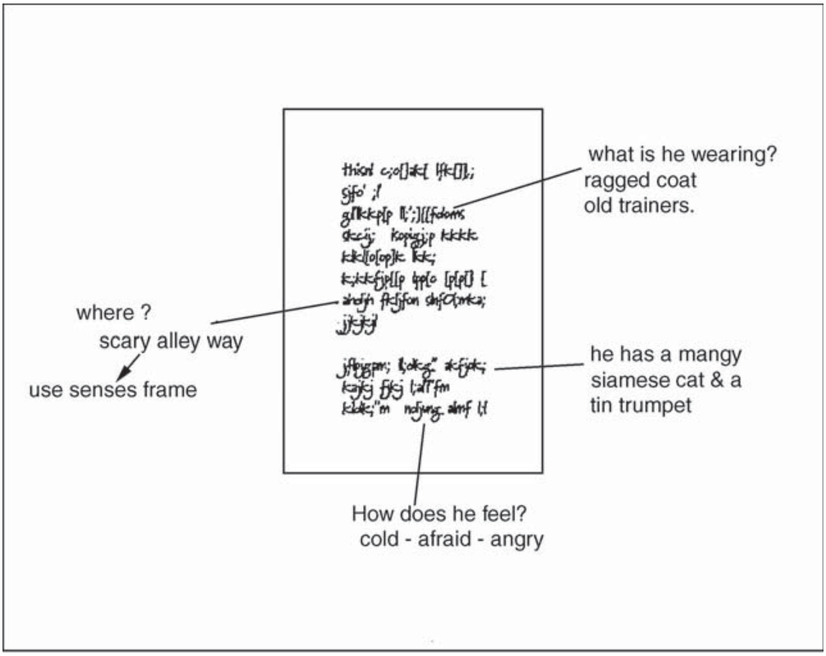


Figure 9.7 Finished cut and paste.

The extra ideas can also be written on post-its. This technique works well for some dyslexic learners. It is a separate activity from the first draft with a set procedure the student can follow. It provides measurable results and what is, in effect, an expanded frame for the final draft.

The finished draft will look something like Figure 9.7.

RECAP

This section provides ways of supporting imagers with both oral and written tasks.

For oral tasks, educators should reduce stress levels by providing much opportunity for visual reinforcement and practice.

For written tasks, help students to use more visual frames and to build in detail and description by using the senses.

Examination and revision techniques for imagers

Understanding exam keywords

It is essential that students are really clear about the precise meaning of key terms used in examination questions. Bearing in mind that many dyslexic candidates have difficulties with language, the precise meanings of these should be discussed explicitly, rather than taken for granted. For example, to *compare* two things a student must look at each one's qualities and see in what way they are similar or different. As suggested before, these words should be identified as keywords and then they can often help to form the skeleton of an answer plan. A list of test vocabulary is provided here:

Test vocabulary

argue
circle the best answer
circle
compare
complete
comprehension
conduct
context
contrast
criticise
define/definition
describe
differences/similarities
differentiate
discuss
distinguish
draw up a table
evaluate
explain
fill in the blank
give evidence to support
give reasons
identify
grammar
illustrate
interpret
investigate
issue
justify
list
multiple choice
opposite
outline
punctuate
relate
select
source
state
summarise
trace
true or false
underline vocabulary

One way of helping a student to plan an answer to a question was devised by Dr Geraldine Price (2006, personal communication) who called it the BUG technique. It has been used successfully with students with dyslexia at secondary and higher education levels. She suggests that the teacher supports the student through the following steps. Colours can be used if the student finds this helpful.

Look carefully at the question:

Compare the effect of global warming upon agriculture in the Nile Delta with agriculture in the UK.

The student then *BOXES* (B) the word which gives the *type* of answer required.

$\boxed{\text{Compare}}$ the effect of global warming upon agriculture in the Nile Delta with agriculture in the UK.

The student then *UNDERLINES* (U) the keywords needed for the answer.

Compare the effect of global warming upon agriculture in the Nile Delta with agriculture in the UK.

The student then *GLANCES* (G) back to ensure that all the necessary key words are included.

The student then needs to ensure that the requirements of the boxed word are understood. Then a form of writing frame (see the comparison frame provided in Chapter 10, Figure 10.4) can be used, as suggested in Chapters 6 and 7, to plan the answer based around the key words. This approach needs to be developed along with an understanding of the specific meaning of the subject specific test vocabulary. It has been found to be particularly helpful with maths examination questions.

Use keywords and link them with images

Most students with dyslexia are likely to find memorising for examinations difficult. Here, along with imagers, they should be encouraged to use keywords and images across the curriculum. The ideal approach for them is one that combines the use of a small number of concepts as 'umbrellas' for related ideas with vivid ways of fixing these concepts into the memory. Visual learners will welcome support in using images to 'fix' ideas.

Buzan and Coleman (1998) have produced a highly recommended series of GCSE study books for a range of set literature texts that illustrate this process effectively. For example, they will take the main characters from a text and allocate them symbols that epitomise their role in the text. So, Lennie in John Steinbeck's novel *Of Mice and Men* could be represented by a rabbit, which suggests his love of soft things, the secret dream he shares with his companion George, the way George controls him, and so on. The discussion itself of the choice of an appropriate image for a character sums up a range of issues associated with that character and the future use of an agreed image will remind the student of these issues as an almost subconscious revision strategy. This technique is not only confined to characters within a text but is also used for themes. Friendship and misuse of power are among the major themes in this novel. Friendship could be symbolised by clasped hands, two smiling heads together; the misuse of power by a whip or a boot. Again the discussion of suitable images helps to establish the nature of friendship or power. It is sometimes difficult to decide whether to allow individual students to keep their own images or to insist on uniformity within the group. The advantage gained from a student personalising images has to be weighed up against the advantage of having common images for group revision work. Important literary devices, such as plot structure, setting, language style, can have symbols attached either as cues to remind students to mention them in exam situations or as reference points in the text to enable students to locate examples. With these it is probably more useful to have agreed common images set by the teacher.

All these images can be used within either a wholistic concept map or the analytic sequential structure of a time-line, list, family tree (see Chapter 10) or storyboard. Students can often help themselves to remember complex sequences like the events in one of Shakespeare's plays with the minimum of writing The advantage also of this is that an imager will be able to use a snapshot of the whole board or map in the mind's eye to capture the content in memory later.

When it comes to revision, these symbols are invaluable for a number of purposes:

- when devising and revising concept maps as plans for exam type answers
- for memory aids in the examination itself. Students can swiftly draw the symbols on a piece of rough paper at the start of the exam to focus their attention on the core of the book and its themes.

Buzan and Coleman's books are not the only literature study-support books that use visual techniques. The ILEA series (1990, now out or print – see Figure 9.8) also offered a range of more visually based activities that are particularly helpful to imagers. Buzan and Coleman, however, focus on organising information into manageable chunks for examination purposes and then apply mind-mapping and visualising techniques to this in a way that can then be applied to other texts and subjects.

This process is applied here to English literature, but it is obviously equally effective with other subject areas especially where concepts may be wordy and can be summed up visually in a way that cues in to information stored in the student's memory.

Figure 9.8 is an example of using visual symbols in the form of a mind map to collect information for an exam answer.

Earlier in this chapter Buzan's work books were introduced. These encourage students to select keywords from topic areas and associate them with images. They can then be incorporated into mind maps. These keyword images are obviously equally useful in an examination situation where a quick plan has to be compiled either for writing or for supporting answers dictated to an amanuensis. Students can jot images down onto rough paper or onto the question paper next to key concepts in the questions. Chapter 7 looks in more detail at the use of concept maps with amanuenses.

Here is an illustration of the strengths of a dyslexic person with strong abilities to visualise: Lucy, aged 12, had just been bought a self-assembly cabin bed. Her mother was about to assemble it from the written instructions when she was called away. On her return the bed was up, and Lucy was on it. She had simply looked at the illustration on the box, automatically

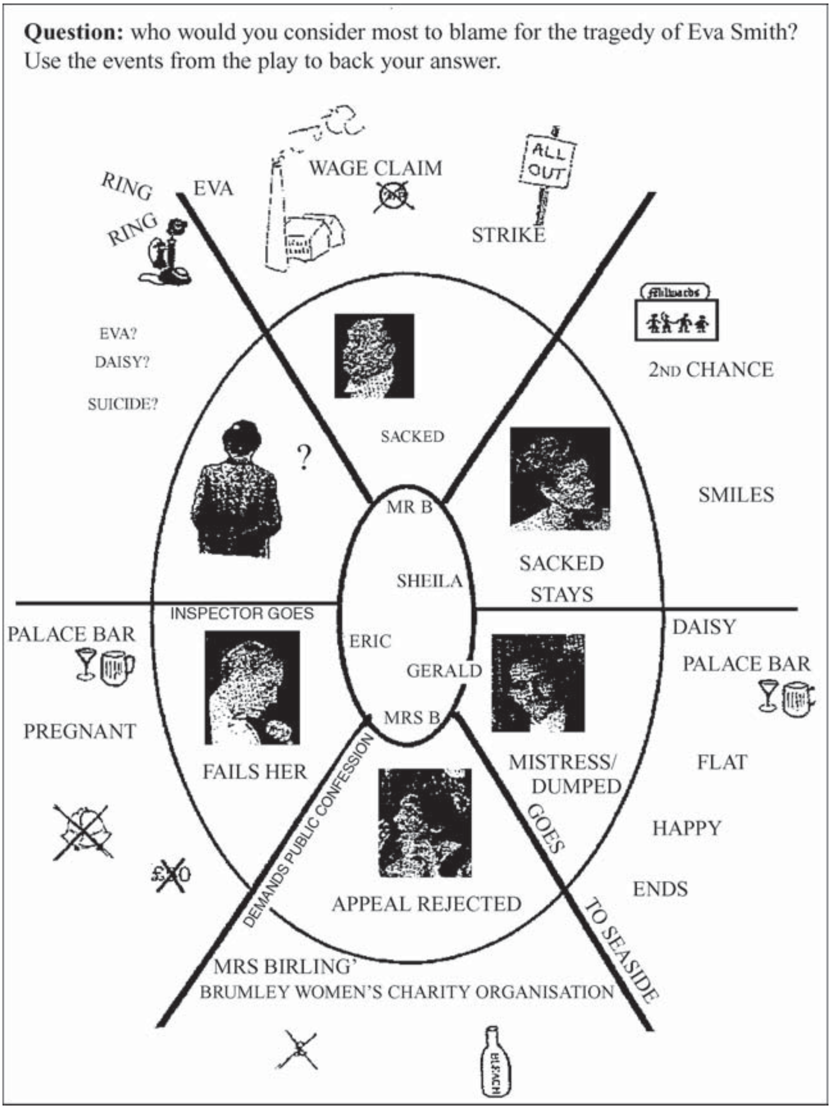


Figure 9.8 Using a concept map to prepare an answer to an exam question.

disregarded the written instructions and built her self-assembly cabin bed perfectly from the picture she had in her mind's eye. Lucy, however, had enormous difficulties when it came to writing up practical tasks for science or design and technology in school or when it came to explaining how she did things.

Working with adults

> *At quite an early age I decided that most ways people tried to teach me to do things didn't work for me. I responded by exploring ways that did. Often the solutions have a visual and three-dimensional base. (Thelma Good, quoted in Dresser, 2003, p. 337)*

It should be remembered that adults have had many years to develop their own ways of doing things. Many, like Thelma Good, will have discovered early on that they tend toward the visual or kinaesthetic and will have developed strategies that the dyslexia tutor can help them to apply. Others, however, will not have had the opportunity or the support to do this, and will not have realised that there are alternative ways to the ones constantly promoted at school which proved so unsuccessful. It is therefore incumbent on the tutor to offer as wide a range of opportunities as possible.

Many students with dyslexia gravitate towards art colleges. For example, 28% of the post-graduate students at the Royal College of Art have dyslexia or dyspraxia (Rankin, 2007). Most of these art students have to submit a dissertation, either in the final year or at post-graduate level, without which they cannot be awarded their MA. Thus dyslexia support tutors find themselves needing to support them with these dissertations, which can be up to 10,000 words long. Consequently, tutors within the art schools have developed interesting ways in which to do this, many of which make use of visually based techniques such as mind maps – either the electronic Inspiration type or constructed by hand. Oona Rankin describes one student who needed to draw physical boundaries around separate sections of his mind map in order to allow himself to 'see where the information was lacking and add this where needed' (2007, p. 79). Kay Williams from Edinburgh College of Art makes use of the ideas on visual writing available at www.writing-pad.ac.uk/index, where a group of colleges have collaborated to investigate alternative more style friendly strategies and assessment modes. There is a real need for the implementation of creative alternatives to the word-based linear assignment or dissertation.

Spelling techniques for imagers

How difficult is English spelling?

> *My spelling is wobbly … It's good spelling, but it wobbles. (Winnie the Pooh, Milne, 1926)*

A simple but clear way of looking at English spelling is that it is a mixture of:

- words that follow phonologic rules, such as 'brave', 'dentist' and 'point'

- words that follow orthographic rules to do with word building from affixes or word origins
- words that do not, at first glance, follow these rules and need to be learnt almost as icons or pictures.

This is very simplistic and may well cause problems to some spelling experts. However, the purpose of this book is not to get embroiled in debates about spelling. It is aimed at students of secondary-school age and above and so attempts to suggest ways of compensating for spelling difficulties rather than systematic ways of building spelling skills. By the time a student enters a GCSE course, the pressure is on to absorb and use information. Time for building spelling for spelling's sake is strictly limited and many students with dyslexia have had enough. It is essential that they should be happy with a range of spelling supports, such as dictionaries, spell checkers, computer programs and helpful friends and relatives. Any time remaining for focusing on spelling needs to be directed towards the most essential words. These will be a range of essential sight words, agreed with the student:

- Those on the common sight word list (see Appendix 4). These words look so deceptively simple – a child of 7 should surely be able to spell these. Look again at words like 'have', 'are', 'one'; a cursory glance will reveal that the majority of them are phonically irregular words which cannot be sounded out, hence the term 'sight words'. This therefore makes them very hard for anyone with a weak visual memory for words. It can, however, be desperately embarrassing to be caught out making mistakes with these.
- Words connected with the individual, for example addresses.
- Words that must be spelt correctly for specific subjects either for accuracy of information in a scientific or practical subject or, arguably, to prevent the writer from looking stupid in subjects such as English literature, for example *Shakespeare*, *character* and *scene*.

These words will, of course, consist of a mixture of phonically regular and irregular words. They will be single-syllable and multi-syllable. It is likely to help any student to analyse the make up of a word they are trying to spell, and there is a range of excellent books available to do this. Many of these books also help the student to extrapolate from one word they are studying to a family of similar words. A few books that have been particularly useful will be found in the further reading section at the end of this book. The more students engage with words they are attempting to learn to spell, the more thorough the processing will be and the more likely they are to be retained. But what is the most successful way for any student, dyslexic or non-dyslexic, to process spelling target words?

Some research suggests (Brooks & Weeks, 1999; Mortimore, 1995) that students with literacy difficulties tend to be more successful when using their strongest channel to learn spelling. There are a range of ways that seem at first glance to draw more either on verbal/auditory modes or on visual processing, but it is, in fact, hard to be certain exactly what type of processing is going on when students attempt to learn to spell. A seemingly visual mode of presentation may in fact be being processed in a multi-sensory way involving simultaneous letter naming or sounding. The students themselves may not be totally aware of how they are doing it. The most successful approach seems to be, yet again, to offer practice in a range of techniques and see what works best. The useful DfEE research report on individual styles in learning to spell (Brooks & Weeks 1999) provides a wide range of style-based methods and suggests weekly trials with each one to discover each child's most successful approach.

Image-based techniques

Here are some techniques that seem to be more image based. All techniques suggested have been successful for someone. The most widely successful are presented first. An important general point for students with dyslexia is that it is useful to establish at the start how many words each student will attempt. Many individuals with severe dyslexia will struggle with more than three or four words in a set. Totals can sometimes be increased by ensuring that the words are part of a closely related family, for example: *war*, *warm*, *ward*, *warn*, *warning*, etc.

With all these techniques, it seems that, for dyslexic individuals, much of the success lies in regular daily practice between tests. Topping (2002), the pioneer of the concept of paired reading and other peer tutoring practices, suggests that the idea of children supporting each other is well-suited to spelling. It also has extra social advantages, such as boosting self-esteem.

Here is Topping's nine-step process, which is a version of *simultaneous oral spelling.*

1. read word – together and alone
2. choose cues (visual or verbal) for the word
3. say cues together
4. speller says cues, helper writes the word
5. helper says cues, speller writes the word
6. speller says cues and writes word
7. speller writes word fast
8. speller reads word
9. at end of each session, speller writes all words fast and goes through the steps again for each error.

The following points seem to be very important:

- helper must cover each try
- speller checks own try

- if try is wrong, do previous step again
- helper must praise.

The following methods are all individual rather than paired.

Look – Cover – Write – Check

1. look at each word carefully – (about 10 seconds)
2. cover the word
3. write word out
4. check back with the original spelling and underline any mistakes for extra care.

This can also be done on a computer – typing the word out without looking at the screen.

Words within words
Some students have real difficulty working from sound and find it easier to examine a word visually to chunk it into smaller words, for example *import-ant*. They may then use visual links, such as a bottle of *port* or an *ant* to fix it in their minds. It sometimes helps them to pronounce words exactly as they are written, for example Fe *bruary* with the accompanying image of the pint of beer. All students should be encouraged to look at words really carefully to examine how they are put together and pick up on both areas that they get wrong, which can be highlighted in different colours, or for cues to help with memory, for example h*ear* with your *ear* - w*hat* a *hat*! – a *pie*ce of *pie*

Neuro-linguistic programming/visualisation
The first time this technique is used it will need some visualisation work.

1. Ask the student to imagine his/her house and see it in the mind's eye. How many windows are there? What colour are they painted? What shape are they? What colour is the front door?
2. Observe where the student looks while visualising. It is suggested that this will indicate their spontaneous way of visualising images in the mind's eye. These two steps are only used to establish the visualising direction the *first* time that the technique is tried.
3. The student now picks a word to learn, for example *because*.
4. Divide it into syllables *be-cause*.
5. Look in the same direction as when visualising the house.
6. Hold the first syllable in the mind's eye until it is really clear. Colour it – *be*.
7. Say the letters forwards.
8. Say the letters backwards.
9. Write the letters with your eyes closed.

10. Do the same for the second syllable – *cause*.
11. Put the syllables together to make the whole word – **because**.
12. See it.
13. Say the letters forwards.
14. Say them backwards.
15. Say them forwards and write the word with your eyes closed.

There are variations on this that omit the forwards/backwards letter naming or substitute writing the word on a large piece of card and holding it in the student's visualisation direction for seeing it in the mind's eye. They all may seem rather cumbersome but do seem to work well for some students.

Visual delay

This process can be recorded onto a tape so that the student can use it independently or it can be used by a class with the teacher leading them. It can be used with up to 15 words, but many students with dyslexia prefer to work with much smaller numbers. The students choose their words and either the students or the teacher writes them on a pile of cards. The students make sure they can read all their words fluently. They turn them face down on the table. They then follow this process for each word.

The teacher says:

1. 'Over': the student turns the card over and looks carefully at the word – five seconds.
2. 'Cover': turn the card over and 'see' the word clearly in your mind's eye.
3. *After 15 seconds* (THIS GAP IS REALLY IMPORTANT AND STUDENTS WILL HATE IT TO START WITH) – 'Write': the student writes the word.
4. 'Check': the student checks the word with the original and focuses on any errors.

At the end of the session, students should try to write as many words from memory as they can. It seems to be important that the students should do each word twice. As each one takes about half a minute, it is up to the teacher to work out how many words to work on. Daily practice, weekly testing and provision of a new list have been very effective for some students with dyslexia. These are particularly good ways of working with common irregular words. Some practitioners advocate using short phrases rather than single words.

Visual mnemonics

Some students find these helpful for a few really important words. There are lots of old favourites using acronyms of the letters that cause problems.

It is necessary to wear one collar and two socks!
The door's blocked because big elephants can't always use small entrances.

Again this is a technique that only appeals to some who usually like to devise their own mnemonics. Others see it as merely adding more detail to remember.

As with all the suggestions, try it and see.

Chapter summary

Not all dyslexic people are naturally imagers. Some use this pathway by default.

Anyone can be helped to visualise and can benefit from exploring this method of making learning more real. This section introduces a range of strategies all aimed at utilising and developing visualising skills.

The key to this section has to be: picture this. Train your mind's eye and value its skills.

To help imagers and many students with dyslexia take information in, educators should:

- Use visual presentations – film, diagram, symbols.
- Reinforce verbal presentations with visual cues whenever practical.
- Keep visual presentations uncluttered. Break them into chunks visually with colours, lines or boxes.
- Be alert for signs of physical eye strain.
- Help students to try out resources, such as coloured overlays.

To help imagers and many students with dyslexia process and store information, educators should:

- Encourage students to create documentaries in their minds for any subject.
- Turn concept maps into pictures.
- Generate keywords and link these words with images.
- Develop 'umbrella' concepts in a range of subjects and express these as images.
- Help students to interact with text and to provide visual markers for verbally presented information.

To support imagers with both oral and written tasks, educators should:

- Reduce stress levels in oral situations by providing much opportunity for visual reinforcement and practice.

- For written tasks, they can help students to use more visual frames and to build in detail and description by using the senses.

The chapter also introduces the structure of English spelling and describes some more visual ways of learning to spell.

Chapter 10 provides strategies to support verbalisers and to help them develop their ability to use words.

Chapter 10
VERBAL STRATEGIES

Introduction: The power of the word

This chapter introduces a range of strategies that can be used either to complement the preferences of the verbal or auditory learner or to help develop these verbal and auditory skills. Why might it be important to develop auditory skills? Two reasons stand out.

It has already been suggested that a high proportion of secondary-school material, particularly in language-orientated subjects, still tends to be presented to the auditory-verbal mode. Wood's (1988) research into how children learn also suggests that skilled silent readers translate visual material into sub-vocal language when memorising and that, by the age of 16, skilled readers recall more from written information than visual modes, such as video.

Verbal learners are likely to be comfortable with presentation through the auditory-verbal mode, but people who prefer to use images and many learners with dyslexia may find themselves at a disadvantage. It must not, however, be taken for granted that people with dyslexia will automatically fall into this group.

> *I love playing with the words and juggling with the meanings – it fires me up. (Max, 18, dyslexic poet)*
>
> *I've never been able to read very well because of my dyslexia. But I heard a lot of poetry when I was growing up, particularly at the church my parents went to. I would learn from Jamaican records and street poets. I used to love rhyme and music. (Benjamin Zephaniah, writer,* Dyslexia Contact*, May, 2000)*

A significant group of learners with dyslexia will be verbalisers. Many students with dyslexia are marked out by the discrepancy between their verbal dexterity and their literacy skills. Some of these may also not suffer from the more usual memory problems. For example, Nicholas Parsons, the radio and TV presenter, stated in *Dyslexia Contact*:

> *People with dyslexia are usually blessed with good memories and excellent recall. It has certainly been my survival kit in coping with the disadvantages and handicap that come with the inability to read at normal speed. My ability in this respect is way below average, but what is committed to memory is way above. (*Dyslexia Contact*, May, 2000)*

Teaching and learning strategies to help verbal learners

This three-part section corresponds with the three stages of learning:

1. Getting the information in – modes of presentation
2. Processing the information – storing and revising
3. Getting the information out – modes of expression

Strategies for getting information in – modes of presentation

> *My tutors on the Dip HE noticed that I was very audile. They advised me to do my essay plans on a Dictaphone. It helps me structure my work, whereas before there was no structure to my work because of the difficulty I had getting it onto paper. I also tape my lectures because of the difficulty in taking notes. It enables me to go back and listen to the tape so I can improve my notes. (Alex Hawthorne, research student with dyslexia)*

Verbalisers use *sound*; they respond strongly to words. They will therefore want written or spoken information along with action, demonstration or images. It seems that they recall abstract, acoustically complex, unfamiliar text better than concrete, highly visual, descriptive text (Riding & Calvey, 1981). They will prefer the teacher to talk through what they are demonstrating and will like to put their experience or learning into words as soon as possible after it has taken place. Asking a strong verbaliser to help explain a process to a neighbour will be helping both students in different ways.

Riding's studies (Riding & Rayner, 1998) have shown that those individuals labelled by the Cognitive Styles Assessment as verbalisers tend to read better than imagers. Many verbalisers may well prefer to be given references and written information and asked to research or study independently. Verbalisers with dyslexia, however, often find that their laborious reading prevents access to the printed medium that they find most useful. There are a number of ways around this, all of which involve using the voice:

- working from taped material provided by others
- taking a Dictaphone or MP3 recorder into a lesson or lecture and listening to it later rather than trying to make notes at the time
- recording any television or radio programmes and listening again
- reading text aloud to themselves
- working with partners to talk their way through new information or prepare brief presentations to other groups
- forming discussion groups for revision and projects

- creating their own revision material or notes on a high-quality recorder such as the ARROW machine
- using a text-to-voice software programme. Text-to-voice software offers an enormous advantage to non-dyslexic verbalisers and all students with dyslexia. There are some very good systems around. Keystone or textHelp both read text aloud from the computer screen and can be used in a range of ways. Here are some suggestions. It can:
  1. enable students with dyslexia to hear what they have written and decide if it makes sense
  2. enable students to listen to and alter spelling attempts before spell-checking
  3. enable students to read text that has been downloaded from sources such as CD Roms or the internet
  4. read e-books, for example any classics that are out of print can be downloaded into a text-to-voice program from: http://promo. net/pg/index.html; Listening Books is an easy to operate talking books library
  5. read material that has been scanned onto the computer from any text using a scanner. (This can be anything from complete books to pieces of the student's own notes.) Kurzweil 3000 is a useful scanning system. It also provides spell-checking and work-prediction facilities with text spoken and tracked by colour. The further reading section at the end of this book contains further information about other software and sources of advice or help.

ARROW, an acronym for Aural-Read-Respond-Oral-Written, is a multi-sensory approach to teaching information and skills central to speaking, spelling and listening. It is based on research results showing that children learnt spelling more successfully from their own voices than those of others (Lane, 1992). Thus, students listen or read information, record it onto a high-quality tape machine, listen to the fact, stop the tape, repeat the fact and then write it. The most useful machines also have an echo facility whereby the student can easily echo information several times to reinforce it. Auditory spellers are likely to find this a successful strategy for learning common sight words. Many students find that this is also a highly successful way of learning to read new vocabulary or information as they can use their tape on a regular daily basis to learn lists of words or facts until they are secure.

All of these methods help students to compensate for laborious reading. There are, however, other ways in which verbalisers can capitalise on their facility with words. These include the following:

- Students can be encouraged to talk through what they are actually doing as they do it.
- Students can be encouraged to explain what they have learned to each other.

- Use role play and drama; with younger children, use actions as well as language while making connections and telling stories. Students can be encouraged to articulate what they are about to write. Some students like to tape their ideas before writing anything. This can then be used to generate a mind map choosing the most comfortable structure.
- Use pairs and partners to generate suggestions, discuss texts or problems before writing and compare ideas.

The following strategy has been found to be successful for higher education students, particularly when revising troublesome topics. Independent dyslexia consultant Margaret Grantham suggests that students place themselves in the role of the lecturer and that they go through the process of preparing their material for a short (between 5 and 20 minute) lecture on the topic. This means that the student must select, convert text book explanations into their own words, diagrams or images, as preferred, and generate precise notes or topic headings. They then deliver the lecture to a supportive audience – family, friends, support tutor, or even their own voice recorder – and take questions. This has worked particularly well when students have been encouraged to form themselves into small groups of supportive 'study buddies' and has the added benefit of allowing the student to develop confidence in presentation skills with a supportive audience.

RECAP

Verbalisers are likely to prefer listening and talking as a means of gathering information. However, this may disadvantage dyslexic readers; so a range of ways of presenting information verbally needs to be available. This can include:

- *oral work of all kinds*
- *use of hardware and IT.*

Strategies for processing, storing and revising

Again, like imagers, people who prefer to verbalise will also have preferences as to a wholistic or analytic/sequential approach when storing information. Any of the processing techniques suggested to suit wholistic or analytic processing may be useful to verbal learners, depending on their position on the wholistic-analytic scale. Their preferred medium, however, will be words. They are quite likely to be happy with a mind map but will tend to label mind maps and use keywords to trigger concepts and sequences. Much of this section will focus on ways of developing vocabulary and using words to structure and process. Davenport and Hall (2004, 2005) and Reilly & Murray (2004,

2005) provide suggestions for activities to build these skills through primary and secondary schooling, which are highly recommended for any learner who might struggle with speech and language.

It is useful if teachers are aware of their own tendencies, as these are likely to be reflected in the ways they present information and the language that they use. Learners who are comfortable processing verbally must be given the opportunity to put information into their own choice of words. They tend to recall semantically complex material better than highly visual, descriptive and imaginable material. As discussed frequently, encouraging students to transform information across modes will be useful, particularly to encourage those people whose preferences are for the non-complementary analytic-verbaliser approach, which limits the ability to visualise the whole picture. A study by Riding and Dyer (1980) suggests that, while imagers (unlike verbalisers) generate images spontaneously without conscious effort, verbalisers can generate images if consciously encouraged to do so. It adds to the flexibility of their learning if they are reminded of this approach and many practitioners with experience of working with children with underdeveloped language recommend these strategies (Bell, 2003).

This should be remembered when utilising concept maps with verbalisers. They will get as much benefit as imagers from the use of concept maps as advance organisers and note-taking strategies. However, for verbalisers, the identification and use of keywords when taking notes helps to unearth the underlying skeleton structure that the writer has used to get the ideas across and to build links between different categories and concepts. When reading text to collect notes, they can highlight keywords or, if listening, they can write them down either randomly, or in whatever shape suits them. They can then organise them into a structure.

Students can start off by being given keywords and then, after reading or listening to the relevant information, asked to develop them into a family-tree structure, which gives the main points of the topic. Figure 10.1 is an example of this family-tree structure. The students can be helped by using questions such as: 'What do they do?' 'Where do they come from?'

To enable verbalisers to get the most out of their preferred mode, it is essential to help to build the necessary vocabulary. Subject teachers who do not consistently work with students with learning difficulties sometimes underestimate both the language difficulties their mainstream students may have and the wide-ranging effect this can have on their attitudes, behaviours and learning. Some of the trying behaviour teachers have to deal with may well be masking underlying problems with language. The 'speech and language difficulties' section in the further reading section at the end of this book provides insights into this area and a range of excellent practical strategies. There is also strong evidence that many students with dyslexia also suffer from language deficits (see Snowling & Stackhouse, 2006 for details). Any teacher working as a SENCO or supporting students with dyslexia should, as a priority, ensure

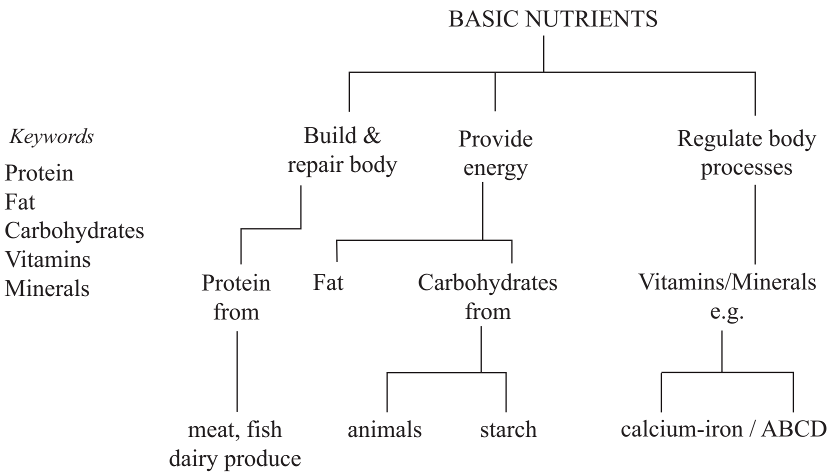


Figure 10.1 Basic nutrients (Hamblin, 1981).

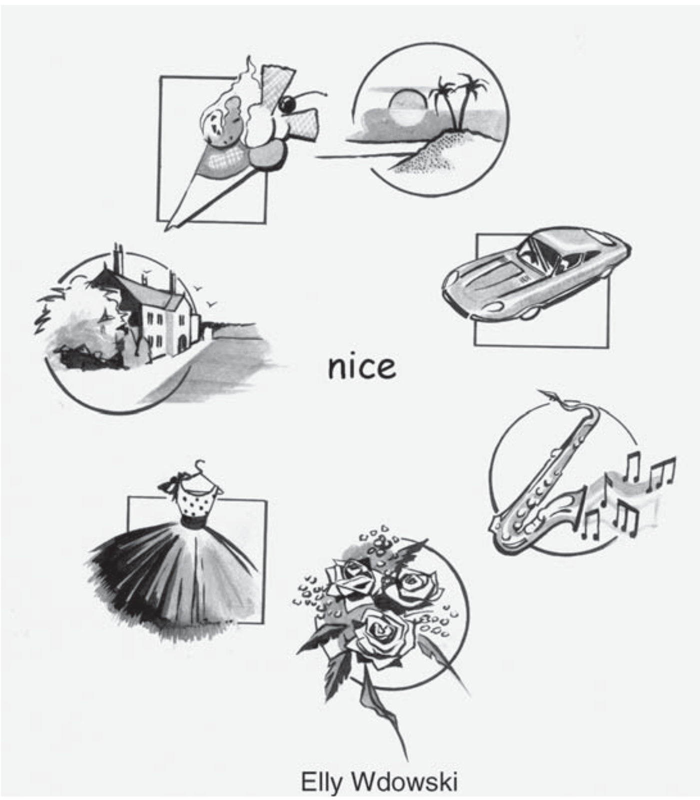
that other members of staff are aware of any students with this hidden difficulty, how it can affect classroom interactions and where to go for support for these students and themselves. Staff are generally very aware of students with major learning difficulties, but this is a subtle area that can go unrecognised. Davenport and Hall (2004) provide a checklist for indicators of this difficulty in their excellent book *Target Listening and Understanding in Secondary Schools*.

By the time students begin GCSE exam courses, it is arguably too late to spend time working individually on general language development. Most of the work must of necessity go on within the general classroom; so it is important that all teachers are made aware of the need to introduce and define subject-specific vocabulary. They should ideally also be aware of any students for whom language may be a problem so that they can carry out simple support measures for them such as:

- asking them to repeat important instructions back to the teacher or a study partner
- providing written instructions for any tasks that have to be performed independently
- providing access to lists of vital subject vocabulary both prior to and during the topic so that they have the words to place within whatever structures they use to help organise their learning
- working through any test or instruction vocabulary, for example ‘compare’, ‘define’, ‘distinguish’. (A list is provided later in the chapter.)

Many teachers do actually report that these measures have helped improve performance, not just for less academically able groups but also in some of their most able classes.

Most English teachers will have a range of successful strategies for building vocabulary. Some of the most useful are those employed when building word association for creative writing and poetry. Games such as starting with one word and each student in turn providing the first word they can think of, brainstorming words on a large sheet of paper from a central word or object, comparing unlikely word associations or giving a group an object like a brick and getting them to find as many associations as they can. These are all common within English classrooms and are an invaluable way of using the stronger members of a group to enrich those whose vocabulary is impoverished. It is, however, important to use the multi-sensory approach of providing images. Noon (2007) suggests an effective way of developing descriptive vocabulary beyond such overused words as ‘nice’ is to provide a series of different pictures as shown below. The learner produces suitable words to replace ‘nice’ in each context.



Some teachers have the luxury of working individually to develop language and vocabulary with students at this late stage, even if it is only for a short, weekly session. It is really important to kill as many birds with one stone as possible. For example:

- When working through more advanced structured reading schemes, such as The Dyslexia Action Units of Sound Programme Levels 2 and 3 (Bramley, 1975), be sure to work to check knowledge of word meanings as well as decoding. Any oral activities, such as '*find the word in the list that means … is the opposite of …*' both helps the student to use semantic knowledge to put down traces of the word in memory, practises skimming skills and also extends vocabulary. You can also deal with word categories and relationships in a similarly informal way. '*This word is "lorry". What other types of transport can you think of?*'
- If a student with dyslexia is working to improve decoding skills, it is crucial to liaise with a subject teacher to obtain a list of relevant vocabulary both to practise with and to define. Alternatively, look at general examination vocabulary or even specific subject test papers.
- When working to improve reading fluency, sections from relevant course texts can be used.
- It is not sufficient to introduce new vocabulary; the student must retain it and be able to use it. The most recent research suggests that a three-pronged attack is the most successful:

    1. A student should define the new word.
    2. A student should count and say the syllables.
    3. A student should identify and say the first sound.

This means that the student has established traces for this new word in the three-most-common types of word identification stored in the lexicon – meaning, phonological pattern or initial sound.

It is really useful for any secondary-support teacher to build up a store of subject-specific vocabulary, ideally in conjunction with subject teachers. Copies of standard textbooks in use or the revision guides provided by the examination boards are a helpful source. Finding out which topics are being taught at what stage in the school year is ideal, but not always realistic. There is, however, no substitute for liaison with subject teachers. Mainstream school life is so pressured that some subject teachers, with the best intentions, can see the special needs of students in their groups as an implicit criticism of their repertoire of teaching strategies. These teachers need to see support staff as useful allies who will lighten their load rather than increase it. Teaching assistants who move across the curriculum can also research vocabulary within the different subject contexts.

For some students with dyslexia, simply having the opportunity to go over the topics that they have been taught that week makes an enormous difference to retention and confidence. It does not matter if the support teacher's knowledge of chemistry stopped at the end of primary school. Students are frequently delighted to find that someone who seems so competent in some areas has, like them, great gaps in others. It also focuses their attention on the gaps in their own knowledge that need to be plugged. Their task for the week can be to ask their subject teacher to answer these questions so that they can tell you. By the time they have done this, they should remember it.

Semantic and content mapping are both excellent techniques that combine vocabulary building with using words to predict and organise. They are, therefore, a particularly useful approach for verbalisers. They do, however, provide support for both verbal and visual learners and are useful exercises, which work on several levels:

- For a student with a limited vocabulary, they provide the chance to extend vocabulary and check understanding of concepts.
- For the articulate learner who likes to verbalise, they are types of advanced organisers or ways of preparing a student for a topic.
- For the verbaliser who prefers an analytic approach and who may have problems seeing links and transferring knowledge from one content area to another, they can be used to bridge areas within a topic. For example, if students are studying Victorian England, looking at scientific inventions, art projects and social conditions, a semantic map can be drawn up to show how each section relates to the central idea of the whole topic – Figure 10.2 shows a semantic map drawn up for the topic 'Victorian England'.

Heimlich and Pittelman (1986) provide an excellent introduction to this approach, which was originally suggested by the schema theorists Johnson and Pearson (1984) as part of their work aimed at improving reading comprehension.

A semantic map is very similar to the kind of concept map described in Chapter 7 and is prepared in the same way. It is, however, nearly always used as a class work tool, either as preparation for a topic or as a study technique to design a map of content information from a text. When used as preparation for studying a topic, the following steps can be followed:

1. The classwork topic is written on the board.
2. The students collect individual rough lists of all the words related to the topic that they can think of.
3. Word lists are shared orally, and all words are written on the class concept map as categories. This gives students practice in classification. It is up to the teacher whether categories are provided prior to writing the words on the board or if students are asked to work out categories as they go.
4. Discussion of the map is probably the most valuable part of the exercise. It provides new words plus meanings, shows further meanings for old

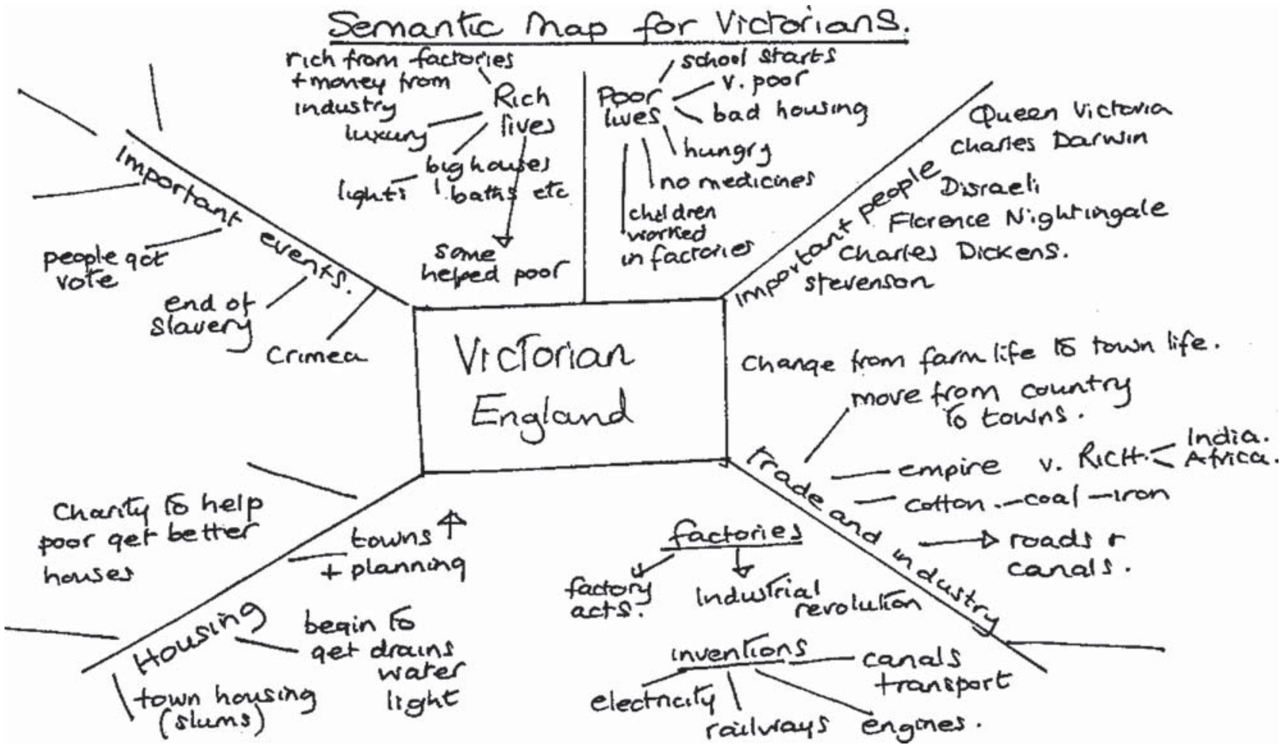


Figure 10.2 Semantic map.

words, allows students to see relationships and gives much opportunity for expressive language use. It also gives the teacher some idea of the level of prior knowledge within the class.

This technique can obviously be integrated into the SQ section of the SQ3R technique described in Chapter 7.

A content map is similar to Levy's concept mapping from Chapter 7. The difference from a semantic map is that it is used for processing material already gained either from text or other modes of study rather than generating material. It is a three-staged strategy that divides information into three categories: main idea, secondary categories and supporting details:

1. Identify main idea, write it in the centre of the paper. Draw up to six lines radiating out.
2. Skim read or listen to/watch text to find the second category headings. Write them on the lines.
3. Try to remember as many details or facts as possible for each of the categories. Add them to the maps.

After this stage, a range of activities can take place depending on the purpose of the map. It is always useful, however, for a group to share their individual maps and create a group map that can then either be reproduced for everyone or else individuals can augment their own. These maps will tend to be verbal in that they will utilise language rather than visual symbols. They also give much opportunity for language building. Figure 10.3. shows an example of a content map.

RECAP

Learners who prefer the verbal approach will find word-based information easier to deal with than descriptive, visual material. They will need practice converting material into this mode. Their concept maps will use words rather than images. Do not take it for granted, however, that all who tend to rely on words will be articulate and good with language! Some students become verbalisers due to a combination of the response to the predominant teaching style in secondary schools and their difficulties with visualising. Many of these students may need help with vocabulary building to enable them to take advantage of their preferred mode.

Semantic or content mapping is an effective way of simultaneously providing structure and new vocabulary. All students can benefit from being helped to develop and use vocabulary – particularly vocabulary that is relevant to specific subjects.

Establishing mutually supportive relationships with mainstream-subject teachers will benefit everyone.

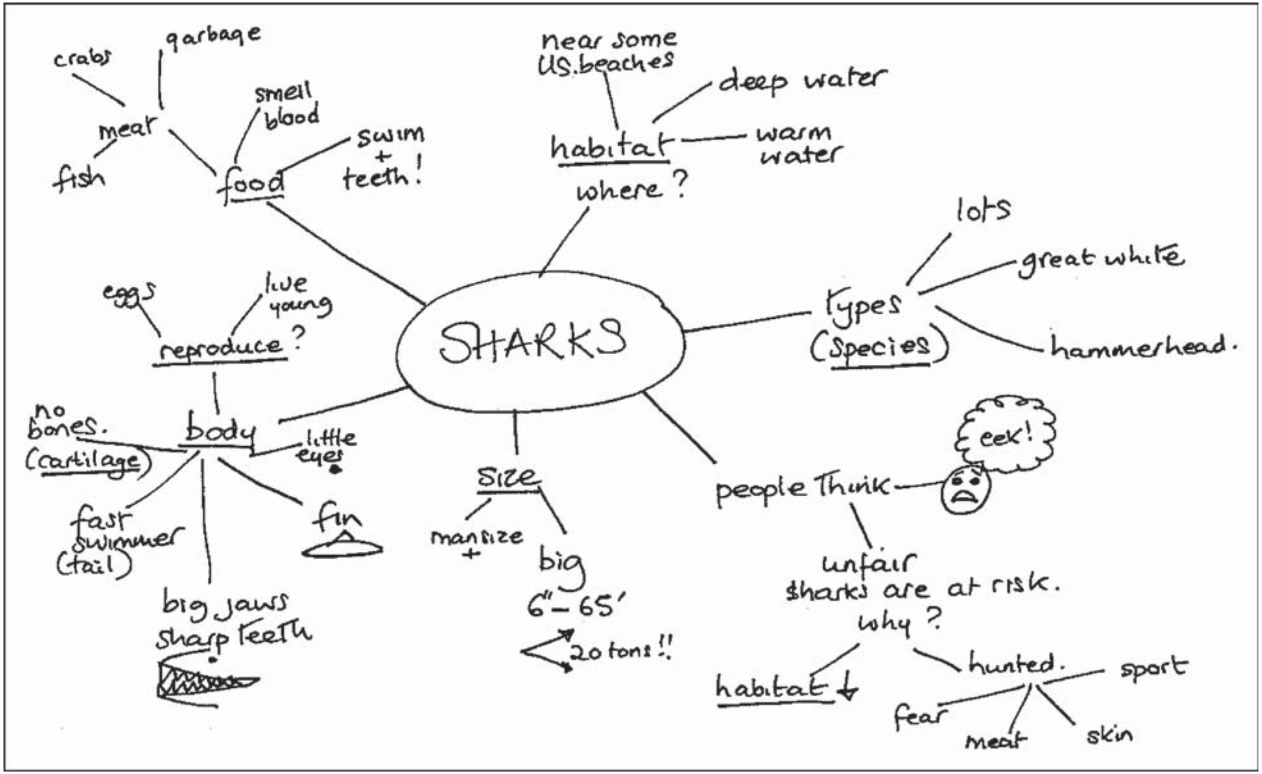


Figure 10.3 Example of a content map.

Strategies for getting information out – creating text, writing frames for verbalisers

People who prefer to verbalise will require as much help as visualisers in organising their written work. They are likely to prefer to work from mind maps or more sequential frames, according to where they fall on the Wholistic-Analytic continuum. They will, however, tend to prefer working with words to working with images. Some students, with and without dyslexia, seem to have been dealt the proverbial double whammy. They may have problems with auditory processing, yet their visual difficulties are far worse! (A checklist for visual processing difficulties is provided in Appendix 3.) They frequently end up as verbalisers by default. These verbalising students may well need unexpected help. They may be depending on words as their learning mode, yet suffering from an impoverished vocabulary, both for receptive and expressive language. They will frequently have difficulties not just with understanding and generating subject vocabulary but also with the kind of vocabulary that can move them on from one stage in a piece of writing to the next. This is also a way of helping students who tend to get stuck in the middle of a piece and do not know how to proceed further. These students will be helped by the use of writing frames but a frame alone may not necessarily be sufficient for them.

There is more detail about providing writing frames in Chapter 7, based on the Lewis and Wray model. However, it will help some students if they are provided not only with the frames for the different types of writing but also with selections of phrases that can move students through the creation of a piece of text. Students whose knowledge of word meanings is quite extensive can find the more abstract, structure-creating words – such as prepositions – very hard. Providing a range of these in addition to a frame gives students a model for future use, which will stand them in good stead throughout their academic career and beyond. In fact, one of the current GCSE grade criteria includes use of such words and phrases.

Here is a non-exhaustive list of suggestions for text structuring phrases:

Starters

- To begin with…
- Although not everyone would agree, I want to argue that …
- I have several reasons for this point of view. My first reason is … I think that …
- You will need …
- First you …
- I want to explain why …
- There are different reasons why …
- There are differing explanation as to why/what/how …
- I would like to suggest that …

- There are several reasons why …
- Before I …, I thought that …
- To begin with …
- It starts by …

Connectives

- moreover
- although
- on the other hand
- as a result
- a further point they make is
- a further reason is
- in addition to these points
- because
- furthermore
- first
- next
- therefore

Endings

- My conclusion is …
- Finally …
- Consequently …
- I think I have shown that …
- These facts/arguments show that …
- So now you can see why …
- Despite any arguments to the contrary, I believe …
- Bearing all this in mind, I have decided/come to the conclusion that …
- Despite all the evidence I would argue that …
- As a result …

Figure 10.4 is an example of a comparison grid using a range of phrases.

Here is another list of conjunctions and prepositions and time words that sometimes cause problems both for writing and for listening

Conjunctions

if	for	since	unless	yet	while	because	
and	that	until	whether	but	when	though	although

Prepositions

aboard	behind	from	through	about	below	in	above
beneath	into	to	across	beside	near	towards	between

GCSE COURSEWORK
WIDE READING

What do different writers think the future will be like? Compare different versions.

(Using a comparison Grid)

	Ray Bradbury	**H.G. Wells The Time Machine**
Opening	*Both____ and _____ write about the future. In some ways their visions are similar but there are some major differences...*	
People	*In____ Bradbury gives us a picture of ...*	*H.G. Wells's people also... but they are different in that they... and...*
Houses and Food	*Both the...and the...live comfortable lives. But everything els about them is different. For example (1.)... Also (2)*	*while...*
Is it a good society?	*Neither society is particularly good. Bradbury thinks...*	*Wells feels that...*
Your opinion?	*This society is good. In some ways*	*There are also good points about*
Good		
Bad	*However.*	*Wells also...*
Sum up		

Figure 10.4 Example of a comparison grid.

of	under	against	beyond	off	along	by	on	up
among	down	opposite	upon	around	over	with	at	
except	past	within	for					

Time words

before	after	at	during	between	past
since	until	till	to	about	beyond

Marks (1998) provides more in a highly practical handbook of suggestions for helping mainstream students cope with a range of speech and language disorders. It also includes lists of test-vocabulary terms and textbook language.

Verbalisers are as likely as imagers to use writing frames successfully. They are simply more likely to use words than pictures while planning them.

RECAP

Both verbalisers and imagers will benefit from the use of frames.

Some verbalisers and learners with dyslexia will need help with generating the words or phrases that connect parts of a text. Providing these or sentence starters for transition points will help the writing to flow.

Speech-recognition software or speech-activated systems – talking to computers

Speech-recognition software is arguably as useful to those with a preference for images as for verbalisers. However, it has been placed within the verbalising chapter as it is dependent on a student's ability to generate verbal information, which is then processed by the computer.

What are speech-activated systems?

A speech-activated system (SAS) uses speech-recognition (VR) technology. Through the installation of a sound card into the computer, people can speak to their computers, and the speech will be converted into text on the screen. It was not originally designed for people with dyslexia, more for business use. However, many people with dyslexia have found it liberating. There are two forms of software:

1. continuous speech; this is where the speaker can speak at a natural pace
2. discrete or spaced speech; for this the speaker needs to pronounce each word separately with a short but deliberate pause after each word, rather like dictating to a secretary.

The more recent computer programs use continuous speech but can be adapted to operate in the discrete mode and it is recommended that this discrete mode remains available for learners with dyslexia as some individuals, especially younger users, have found it helpful as it helps them to focus on the writing.

For users with dyslexia it has been found to be essential that the computer program is run in conjunction with a screen reader which reads the words as they appear on the screen so that the user can be sure that the text corresponds with their spoken words. Earlier models did not offer this feature but it is now standard in Dragon Dictate. (See below.)

Use of a SAS can provide a real breakthrough for students with dyslexia, particularly for older students at secondary or further education level, but it is not a panacea, and there are some drawbacks:

- All speech-recognition computer programs have to be trained to respond correctly to the user's voice. It is not helpful simply to issue the software without the support as initial failure will put a student off trying the strategy at a later date and undermine confidence.
- At an earlier stage it was suggested that the further a user's voice deviates from an adult-male standard English voice, the longer the training will take. This, however, no longer seems to be the case (Litten, 2007, personal communication).
- Ideally, students should be trained and supported by somebody who is an expert user and who is available to offer support over a period of time, as the computer program starts by introducing a limited amount of vocabulary and builds up over time.
- Impulsive students will frequently become impatient that they are not getting perfect results immediately. SAS can then easily become yet another tool that has failed, confirming the student's impression that they are hopeless.
- In a school environment, background noise can be a problem as can be ensuring that children's personal speech files do not get overwritten by other users. These are, however, management problems that should be solvable.

Overall, those students who have mastered the use of SAS find that it is well worth the effort and is particularly useful for producing coursework and essays at GCSE and higher-education levels.

SAS is a particularly useful tool for strong verbalisers, who are happy working orally with words since, when working properly, it is like having your own mechanical amanuensis. For others, who are less spontaneously fluent, it is a good way to proofread uncorrected drafts, providing they can read their own work easily. There is no danger that they will forget ideas if they are already captured in rough. Students who find it hard to generate ideas using SAS often find it very helpful at the proofreading stage.

Which programs are the most user-friendly?

Cotgrove (2000) supplies a helpful rundown on the available systems and the hardware required to run them successfully.

The Dragon Systems, including Dragon Dictate, classic discrete speech and Dragon Naturally Speaking, have all been used widely and successfully with students with dyslexia. The iANSYST web pages at www.dyslexic.com provide a regularly updated review of developments as well as useful resources, such as the Earlswood School training routines.

For checking the accuracy of text as it appears on the screen, the most effective echo-back system is Keystone supplied with Dragon Dictate by Aptech (Words WorldWide) of Newcastle (www.keyspell.com). BECTa was also evaluating ways of using SAS. Results and a range of helpful suggestions can be found on their website although these may no longer be at the cutting edge (www.becta.org.us/inclusion/speechrecog/userforum/index.cfm/).

Developing phonological awareness

This section applies to most students with dyslexia, but it is included in this chapter because the strategies suggested involve sound and verbalising. Phonological processing is a common weakness for a large proportion of people with dyslexia, whatever their style preferences. (This is a well-researched area and much is available in terms of phonological assessment instruments and programs to develop phonologic skills. For further information see work by Snowling and Stackhouse, 2006, and suggestions in the further reading section at the end of this book.)

Although many individuals with dyslexia are often extremely adept with the semantics or vocabulary of language, even those learners with dyslexia who prefer verbal strategies may well have problems with processing and remembering sound patterns for reading, spelling or memorising. These students can often be identified by their extreme low scores on non-word reading tests. These are tests where students are asked to decode non-words, for example:

- lut
- thraip
- gonplat

To do this successfully, they have to rely on phonologic knowledge, both of letter-sound links and syllable patterning, rather than visual memory. Phonologically disordered individuals with dyslexia will score many years below their chronological age. The Graded Non-word Reading Test (Snowling, Stothard & McLean, 1996) provides an age-related baseline assessment. Another rough way of assessing whether students are relying on visual or phonological cues for reading is to ask them to read a series of sentences, including homophones, and to state if they are correct. For example:

- To ride on a train, you must pay a fair.
- He put his hand through the pain of glass.
- The child loved his teddy bare.

Students who make errors with these are likely to have poor phonological-analysis skills.

Verbalisers with dyslexia will be likely to respond well to the verbal strategies described in this section. They may, however, suffer from a range of phonological weaknesses including:

- weak auditory memory for words
- poor discrimination between similar words and sounds
- poor linkage between sound and symbol both when reading and spelling (this obviously exacerbates spelling problems when the learner also suffers from a weak visual memory and therefore has to rely on phonological spelling skills)
- inability to develop the phonological decoding skills that allow unknown words to be identified through their letter patterns
- problems with accessing the right word from similar-sounding words when generating talk or writing.

There is also the possibility that some students with dyslexia may be verbalisers by default due to the lack either of stronger visual pathways or the encouragement to use the visual mode. The following questions are often asked:

- If a student with dyslexia suffers from poor phonological processing skills, should time be spent attempting to develop these skills?
- Would it not be more realistic to attempt to build compensatory visual or kinesthetic approaches?

The answer is that this must depend on the age and goals of the student. Poor phonological processing will have an impact on the higher education student studying a subject such as medicine or physiology where much new technical vocabulary has to be acquired rapidly. All of these words will be complex non-words at first sight. If it does seem to be a priority to develop phonological awareness, there are a range of well-researched and tested phonological assessment and development programs available. Several chapters in Hulme and Snowling's (1997) collection of papers from the BDA International Conference discuss a range of approaches. One example of an assessment battery is the PhAB or *Phonological Assessment Battery* (Frederikson, 1995). *Sound Linkage: An Integrated Programme for Overcoming Reading Difficulties*

(Hatcher, 1994) is a reliable system for developing phonological awareness. These are designed for children but can be adapted for adults. The Lindamood and Lindamood (1997) approach with its emphasis on sensory feedback is also interesting. These programmes do demand, however, considerable hours of study and practice. The present book is aimed mainly at students at secondary school and above, whose education time is running out. Is it worth spending precious time on the possibly unsuccessful task of developing phonological awareness in people with dyslexia who have so many other demands on their time?

I am dyslexic and therefore a creative speller. (Thelma Good, theatre critic)

Using phonological awareness to improve proofreading skills

Dyslexic spelling is one of the most difficult skills to improve. Later in the chapter some suggestions for helping verbalisers to improve sight-word spelling appear. In general, however, by the time a student embarks on GCSE courses there is insufficient time and frequently zero motivation to follow spelling courses. It is really a case of providing compensatory strategies and encouraging students to hone their proofreading skills. As described earlier, students with dyslexia should always be encouraged to produce written work in three stages:

brainstorm ⇨ writing frame ⇨ text

It is hard for them to focus both on ideas and accuracy; hence, it is suggested that they do not worry about accuracy of punctuation or spelling until they have produced a rough draft of the text. Some students feel very uncomfortable relying on their own spelling efforts, even at this early stage. For these, it is best simply to give them the spellings they ask for as quickly as possible so that they are not distracted from the flow of ideas. Once they have produced what is, in effect, an 'ideas draft', a decision has to be made. Do they always need to go through the stage of producing a neat copy? For many students without dyslexia, the production of an error-free neat copy is really onerous. It is a secretarial task, and it is boring. For the individual with dyslexia however, it can represent hours of tedious work, at the end of which there will still be errors glaringly obvious to everyone but the writer.

There has to be a really good reason for putting a writer with severe dyslexia through this activity regularly. Although giving practice in proofreading techniques, it is highly unlikely to improve general spelling skills in any measurable way. It is far more constructive for the student to choose to proofread a piece of work thoroughly for a special purpose. It could be a piece of work for a coursework folder or a display. In this case, there is a really good incentive to get the work as error-free as possible.

How should the student go about it? There are a range of possibilities. These include:

- using a computer spell checker
- using a dictionary
- using speech-recognition software.

Why is phonological training relevant here? If a writer does not have a strong mental image or picture of the spelling of a word, it will cause difficulties. Research suggests that naturally good spellers store visual images of words in their mental lexicon, which they then gain access to instantly. They know if words 'look' right and often use the strategy of writing alternative spellings to select the correct one. The majority of learners with dyslexia, even those who seem to have visual strengths, are unable to do this with more than the most basic sight vocabulary. They are thrown back onto using the sounds within words – or phonemes and attempt to represent words from appropriate letter strings – or graphemes. Dyslexic writers with reasonable auditory and phonological skills may thus end up with spelling that is logical and readable but wrong. For example:

Thay sor the flars in the gardn.

This is unlikely to cause a reader major difficulties and likewise will probably not defeat any of the more phonically based computer or hand-held spell checkers available. However, write it like this:

The sa the frs in the grdun

and things won't be so easy! Whether the writer is using a dictionary or electronic support, it is important to be able to isolate sounds within words and produce logical, recognisable spelling. Some students with dyslexia and that level of spelling difficulty would be able to read their work; others would not. For them, arguably, the world of predictive software (details of which are given in the further reading section at the end of this book) is probably one solution. For everyone attempting independently to proofread text, the development of the ability to isolate and represent sounds must be a priority.

A practical approach to developing phonological awareness

There is a range of multi-sensory programmes for developing spelling. Reid's (2005) handbook provides a useful overview. The focus in this chapter, however, is on a less familiar approach, that of the THRASS (Teaching Handwriting, Reading and Spelling Skills) system devised by

Davies and Richie (2003). This programme arguably has some drawbacks for teaching students with dyslexia with poor visual memory for letter patterns in words, in that they will find choosing the 'correct' spelling from a range of phonic alternatives virtually impossible without other types of prompt. However, it can be effectively adapted to help build the phonological skills to support proofreading skills. It is particularly useful for the following reasons:

- It turns the concept that one letter represents one sound on its head.
- It suggests that the English language consists of 44 phonemes or sounds, and that spelling consists of finding the most likely grapheme, or letter string, to represent each sound. There are 120 common graphemes.
- It provides the 44 sounds in the form of a box chart. Each box represents one phoneme and shows the most common graphemes for that phoneme.
- This chart can be reduced to easily carried pocket size and used as a resource to build words from their phonemes. Alternatively, it can be taped to the wall beside each computer terminal.

The program provides a range of ways of listening to, segmenting, learning and practising the phonemes correctly, which builds phonological discrimination. It also provides a CD Rom for practising the phonemes independently and in a multi-sensory way. This is a useful tool for helping to build a range of phonological skills. Phono-Graphix (McGuinness, 1998) is another system, which follows the same principle that written words are made up of sound pictures that represent individual sounds.

It can be used to develop proofreading skills in the following way. Many students with dyslexia have real difficulty hearing sound in words and therefore representing these words in text. This is one way to help. There are three lines of attack:

1. Help students to separate out or segment the different sounds within words, for example *hedge* has three sounds or phonemes: /h/- /e/- and /j/. It is *essential* that the intrusive voiced schwa /ur/ is *not* included in unvoiced phonemes such as /h/. *Hedge* is not pronounced *hurejur*!
2. Teach students the 44 voiced and unvoiced phonemes in a multi-sensory way. Davies and Richie provide a rap tape that some students enjoy. For many learners with dyslexia, the most effective method is to feel the sensations and analyse the parts of the mouth used to make each phoneme. For some students only the difference between movements they feel within their mouths when moving between different sounds can help them distinguish between them. For example /f/ is made by grabbing your bottom lip between your front teeth and blowing. To make /th/, grip your tongue between your teeth and blow. To feel the difference between unvoiced /p/ and voiced /b/ stick your finger on your voice box and feel the buzz come

and go. Lindamood and Lindamood (1997) suggest systematic ways of doing this.

3. Students need to be very familiar with the location of the phonemes on the THRASS chart if they are to locate them quickly enough to prevent frustration. It is, therefore, vital to work physically and kinesthetically with the chart. (This also has the effect of focusing attention and reinforcing the multi-sensory element of the activity.) The THRASS CD Rom also provides reinforcement.

These three strands must run concurrently. Ideally, students should have had the opportunity to try out this approach and become familiar with the support at the earliest possible time in secondary education if they are not to feel patronised. They should also be shown how it can be helpful in practice as soon as practicably possible. One suggested way is to:

1. Practise counting the phonemes in words right from the beginning, ensuring that the schwa is eliminated. Some individuals with dyslexia will find this very hard to start with but should improve with practice and encouragement.
2. As soon as the students are able to start to navigate the THRASS chart, provide them with regular practice with phonemic segmentation charts (see Figure 10.5). For this practice the students listen to a word and count the phonemes (a). They then use their THRASS chart to attempt the spelling, ensuring that they have the right number of phonemes (b). They then feed their attempt into some sort of spell checker and write the corrected response (c).
3. It is often really useful to provide a group with some carefully selected words to try out with spell checkers so that they can find out for themselves how much more likely a spell checker is to come up with the word

Word	Number of phonemes	Attempt	Checked
brick	4	b r i c	brick
catch	3	k a c h	catch

Figure 10.5 Phonemic segmentation chart.

they want once they have got their spelling attempt as close as possible to a phonic alternative

4. Encourage students to develop the habit of counting the phonemes in any words they need to spell. It can be useful to have a written task that needs proofreading on the go so that they can get used to the idea that, when they ask for help with a spelling, the teacher will not provide the spelling but support them through the process of phonemic segmentation and their building the word with the THRASS chart. Those who find this approach helpful will start to internalise the process for independent use. They may even encourage others who are slower to pick it up. Those who try valiantly and hate it are going to need a different strategy.

Developing phonological awareness is helpful for proofreading in three of the main approaches: either using a dictionary, computer or hand-held electronic spell checker.

Electronic spell checkers

Students are often really tempted to put their work through a computer spell checker before attempting to improve the accuracy of the spelling. They see this as a short cut to accuracy, despite advice to the contrary. A nasty but often effective way of proving the point is to allow some poor soul to put a piece of work through an automatic computer spell checker without improving the spelling attempts and then to read the perfectly spelled gibberish that the computer will offer (having kept a copy of the original, of course).

Here is the computer spell checker's version of a section of a piece of GCSE media coursework discussing the direction of a scene from a film version of *Romeo and Juliet*:

> *I wooed not have woolsack in the back grown. I wood still keep the heavy berthing. Romeo and Mercutio wood have a mainly huge and Tybalt's fruition that hey is gown to get bet so he grabs peas of glass and runs at him.*

Any coursework marker unfamiliar with dyslexic-style spelling would be likely to struggle to locate the ideas in this. It is often less confusing to deal with non-words than to be sent off down the wrong track by the meaning of substituted words. The text should have read:

> *I would not have music in the background. I would still keep the heavy breathing. Romeo and Mercutio would have a manly hug, and Tybalt's frightened that he is going to get beaten; so he grabs [a] piece of glass and runs at him.*

These points would gain marks; arguably the earlier version might not.

Electronic spell checks also vary in the extent to which they are dyslexia friendly. Initially all electronic spell checkers were programmed alphabetically so a student looking up *water* but spelling it phonetically as *worter* would be sent down the *worth*, *worthless*, *worthy* path to defeat. The spell check dictionaries then began to be programmed to respond to phonic alternatives but still very easily went off the track in response to dyslexic spelling. When buying a spell checker, do note the advice given by the BDA or on the Iansyst (www.iansyst.org) catalogue as they rate the extent to which all new spell checkers are dyslexia friendly. New models emerge all the time so any model recommended in this book would be likely to be superseded quickly. When using electronic spell checkers of any sort, being able to produce a readable, reasonably logical/phonic misspelling will reduce failure and frustration. It will not, of course, improve the spelling-age-related score in any official spelling test. There is, in fact, currently no test-related way of presenting evidence of improvement in readability of spelling, which is a shame, as it is a major achievement for many students with dyslexia. Attempts are ongoing to develop a measure by comparing the increase over time in incidents of phonetically acceptable elements in an incorrect spelling with these incidents at the start of a literacy programme (Litten, 2007, personal communication).

Dictionaries

Using a standard dictionary is often hard for students with dyslexia, even if they are fairly competent readers. A student with a poor visual memory for words will have trouble trying to find any word with ambiguous initial sounds. For example, *about* sounds as if it starts with *u* or *ur* and *prepare* sounds like *pri*-pare.

The standard alphabetic English dictionary is not organised on phonic lines, but there are alternative sound-based dictionaries, such as the Aurally Coded English or ACE dictionary (Moseley, 1996) or the less-common consonant sound-based dictionary (Morrison, 1987). In the ACE dictionary, words are grouped under sound categories into one-, two-, three- or more syllable-length columns. To be able to use this very helpful support, a writer must be able to isolate sounds.

Examination and revision techniques for verbalisers

> *My spelling and reading were so poor, my short-term memory appalling. So I listened in lessons and developed my memory instead of writing notes. I didn't write during my A levels. I dictated essays to a secretary. (Billy Broadbent, dyslexic student at Leeds Metropolitan University, cited in Williams, 1999)*

Using an amanuensis

The verbaliser is arguably better adapted to the exam situation than the imager who may well dry up in the face of an examination question. Candidates with dyslexia can apply for an amanuensis (see Backhouse et al., 2006, for details of procedures for examination arrangements), and this should be particularly helpful to verbalisers. They must be given the opportunity to practise, and they must be in the habit of using a plan to structure their answers. Chapter 8 explores working with amanuenses.

Examination language

Chapter 7 introduces the use of keywords for structuring examination answers.

Don't forget that many students, including some verbalisers, have difficulty with interpreting examination terminology. Working through definitions and practising a range of anticipated test terms for any subject area can be really helpful to students both with and without dyslexia. Obviously, it helps learners with dyslexia if these words are practised until they are part of their sight-reading vocabulary. The exam concessions offered to students with dyslexia can simply comprise 25% extra time so any way of speeding up their processing of exam tasks must be worthwhile. Here is a list of general test and examination vocabulary. It is obviously useful for individual subject areas to compile their own and to pass their lists on to the SENCO (Special Educational Needs Co-ordinator) in the school.

Below is a list of keywords for examination questions:

compare	contrast	criticise
define	describe	discuss
distinguish	differentiate	evaluate
explain	illustrate	interpret
justify	outline	relate
state	summarise	trace

Spelling techniques for verbalisers

A range of basic general points are made in Chapter 9, which briefly discusses:

- the nature of English spelling
- how much spelling is essential
- research support for matching learning style with spelling technique.

The main conclusion is that the most successful approach is to offer practice in a range of techniques and see what works best. Brooks and Weeks's (1999) DFEE research report provides a wide range of style-based methods and suggests weekly trials with each one to discover each child's most successful approach. Chapter 9 provided a range of proven techniques that seem to be more image based, with the most widely successful presented first. The current chapter focuses on the use of sound. Small whiteboards are highly recommended for use in working on spelling words.

Using THRASS to refine phonemic awareness

General practice with THRASS has already been described. It can, of course, be applied to learning lists of words. The students should follow the process described in this chapter:

1. count phonemes
2. use the THRASS chart to build the word
3. check the correct spelling and try to visualise the shape
4. use the phonemic knowledge to build the word each time they practise it.

Onset-rime technique

Spell out the word using plastic or wooden letters or letters written on cards. Break up the words into onset-rime, for example *plate* has the sounds /pl/-/ate/. Dentist has the sounds d-en/t-ist.

Move the letters as you spilt the word. Move them back together as you say the whole word. Students can also write the whole word as they say it.

Own-voice technique

The student writes the spelling list. Then using their own voice and, ideally, a high-quality tape recorder that has an echo-replay facility, the child records the whole word on tape, spells the individual letter names and then repeats the whole word:

plate - <u>p</u> <u>l</u> <u>a</u> <u>t</u> <u>e</u> – plate

The important aspect of this technique seems to be regular practice of the words so that the child can echo and re-echo the words, ideally writing the word after each repetition. Students with dyslexia should be given a copy of the word list and their own tape so that they can go through the words daily before the next test.

Simultaneous oral spelling (Bradley, 1994)

The student writes the spelling list. The teacher then writes each word correctly, saying the letter name as it is written. The student then writes the word saying each letter's name as it is written. The student then says the whole word and checks it is correct against the teacher's. This can obviously be practised at home with a family member or at school with a friend.

Using rhythm and music to help with spelling

Some students find that spelling words to song tunes is really useful. Commercially produced tapes for common sight words are available, but it is usually more effective for students to make their own in the privacy of their own homes.

Using the computer

Computer systems using voice can be used in a range of ways too. The Units of Sound System is now on a program for PCs and Imacs, available from Dyslexia Action. Students can read, highlight, listen and write. They can highlight, listen and then write. Students can use any read-back program to type words in and listen to the outcome, repeating until the words are all accurate. Programs such as 'My Words' and 'Write Out Loud' are useful for this. There are some commercially produced programs that are useful, but few of these currently offer the leeway for students to compile their own lists.

The advantage of using tape recorders or computers is that students can work independently to reinforce their spellings after initial support from a teacher or classroom assistant. With all these techniques, it seems that, for spellers with dyslexia, much of the success lies in regular daily practice between tests. Topping (1992), the pioneer of the concept of paired-reading and other peer-tutoring practices, suggests that the idea of children supporting each other is well-suited to spelling. It also has extra social advantages, such as boosting self-esteem.

Here is Topping's nine-step process, a version of simultaneous oral spelling:

1. read word – together and alone
2. choose cues (visual or verbal) for the word
3. say cues together
4. speller says cues, helper writes the word
5. helper says cues, speller writes the word
6. speller says cues and writes word
7. speller writes word fast
8. speller reads word

9. at end of each session, speller writes all words fast and goes through the steps again for each error.

The following points seem to be very important:

- helper must cover each try
- speller checks own try
- if try is wrong, do previous step again
- helper must praise.

RECAP

Select the number and nature of words to be learnt carefully.

Students should try out different techniques and choose their own.

Verbal learners are likely to have more success with verbal or sound-based techniques, but this should not be taken for granted.

Any techniques must be reinforced daily.

Use friends, relatives, classmates, IT and tape recorders or a Walkman to reinforce.

I don't know why that Johnson bloke bothered to put his dictionary together. Making spelling wrong or right just caused trouble for people like Shakespeare or Shaspeyr or Shakespeare or me. No one got at Shakespeare's manuscripts and stuck red ink all over his spelling. We're just more creative spellers, him and me! (Jake, university student with dyslexia)

Chapter summary

There are a number of reasons why it is important to develop the verbal mode. A high proportion of teaching in secondary-school education tends to be verbal, and all students will benefit from verbal skill. Some students with dyslexia are articulate, natural verbalisers; others are forced to use this pathway by default, despite experiencing difficulty with word finding or phonology.

Verbalisers are likely to respond more strongly to words. Students with dyslexia need to be given ways to compensate for difficulties with reading, vocabulary or phonological processing.

To help verbalisers take information in, educators should:

- use text or verbal presentations, but provide ways to get around reading difficulties such as use of tape, IT and a range of oral work with other students
- encourage students to articulate as they work.

To help verbalisers process and store information, educators should:

- help students to use verbal concept maps
- use a range of methods to introduce and retain both general and subject-specific vocabulary
- use techniques such as semantic or content mapping to generate vocabulary and help students to structure verbal work.

To support verbalisers with written tasks, educators should:

- help students to use verbal writing frames and grids
- provide a range of connective vocabulary plus sentence starters to take writers with dyslexia from one stage of a text to another.

This chapter also examined the use and scope of speech-activated software and ways of helping students to develop phonological awareness to enhance their spelling and proofreading skills.

It provides a range of more sound-based techniques for learning spelling.

Chapter 11 examines some ways to help students remember what they have learnt.

PART SIX

WHAT WERE THOSE LAST 10 CHAPTERS ABOUT?

Chapter 11

HELPING STUDENTS TO REMEMBER

Introduction: Dyslexia and memory

It could be claimed that this whole book is about memory, as it aims to help all students to use their strongest channels to interact with and experience or internalise information at a deeper, often more emotional level. There are, of course, many different types of memory. The most vivid and long-lasting tend to be sensory:

- visual – pictures in the mind
- auditory – sounds: how about ‘our’ tune?
- kinesthetic – linked with movement or feeling: the ability to ride a bicycle
- tactile – physical sensations
- taste – flavours: the tastes of our childhood
- smell – a particular scent can transport us back to another moment in time.

Using these forms of memory should help any student, whatever the learning style preference.

Chapter 6 of this book provides a brief outline of current memory theory plus suggestions for further reading. It discusses the major difficulties experienced by students with dyslexia and suggests where support may be needed. To reiterate: students with dyslexia may well have difficulties in two areas of memory function: phonological processing and automatisation. There is further suggestion that there may be difficulties in the ‘organising’ department – the central executive – and some evidence of a lack of confidence in their ability to retain facts (Mortimore & Crozier, 2006). Current research suggests that the central executive area is crucial to everyday activity but in the absence to date of clear evidence, it still seems safe to focus on the phonological processing difficulties experienced by so many learners with dyslexia (Pickering, 2004).

They are likely, therefore, to need support in three fundamental areas:

- compensation for poor auditory or phonological skills
- the kind of support which will reduce the possibility of processing overload
- encouragement in the use of thinking strategies, such as:

  - monitoring
  - testing
  - revising
  - prediction
  - planning
  - evaluating.

The strategies suggested throughout this book aim to:

- set the preconditions for learning - low stress, high motivation
- reduce the load on memory through structuring, condensing and chunking
- encourage students to interact in a range of ways with the material that they are learning
- make information memorable – *see* it, *hear* it or *be* it
- move from the concrete to the abstract
- use the power of the sensory memory.

There is a range of books and computer programs available with the specific purpose of developing memory skills. Those included in the further reading section at the end of this book are highly recommended in that the activities outlined are both practical and fun.

Learning style and memory

The various strategies presented here and in the recommended sources are useful for all students, with or without dyslexia. However, some are more visually based; some are more verbal. Some seem to add more information to be memorised along with the target facts, which may simply overload the vulnerable learner who already has processing difficulties. It is important to develop the individual learner's awareness of style preferences and strengths to enable them to select the most comfortable methods.

As with other aspects of study, specific aims need to be clear. All methods can be tried out for different purposes, for example encouraging those with visual preferences to use verbal strategies to enrich their skills, allowing those who tend to think wholistically to develop their sequential abilities through the use of structured questioning techniques or giving those who tend to analyse sequentially practice in developing big-picture frameworks.

Memorising or learning does not take place at a steady rate. Research into learning physical skills, such as typewriting, seems to indicate a four-stage process:

1. The *introductory* stage: little progress seems to be made because the student is unfamiliar with the activity
2. the student starts to make *rapid* progress
3. despite effort, *no progress* seems to be made
   However, providing the student perseveres, this usually turns out to be a consolidating phase where, eventually:
4. progress again becomes rapid until a *peak* of expertise is reached.

The message that this sends is that very little can be memorised instantly. Initial acquaintance with any information places it purely into the short-term memory where it is likely to decay within less than half a minute, unless reinforced by the working memory. For example, pick a random number from a phone book, read it once trying consciously to remember it. Then write it down from memory. This may well be easy. However, now pick another number from the book; don't write it down, just leave it for five minutes and do something else. Will you then be able to remember either number? The answer is probably no. The first number had been processed sufficiently to stay in the working memory long enough to write it down. The second number then interfered with the traces of the first, eliminating it and, because nothing had been done to reinforce the second number, it had faded completely from the short-term memory by the time the number was needed. This example emphasises the two important features of memorising:

- process the information
- to shift it into the long-term store, reinforce the information at regular intervals to prevent it from decaying or being displaced.

It is also important to be aware of how the memory works so that reinforcement can be timed for maximum effect. Within 24 hours, 80% of the information learnt can be lost (Mitchell, 1994). To transfer information from short-term memory to automatic long-term memory it must be reviewed regularly starting, ideally, before students forget what they have learnt. Mitchell suggests six reviews at intervals of:

- 5 minutes
- one day
- one week
- one month
- three months
- six months, by which time it should be in long-term memory.

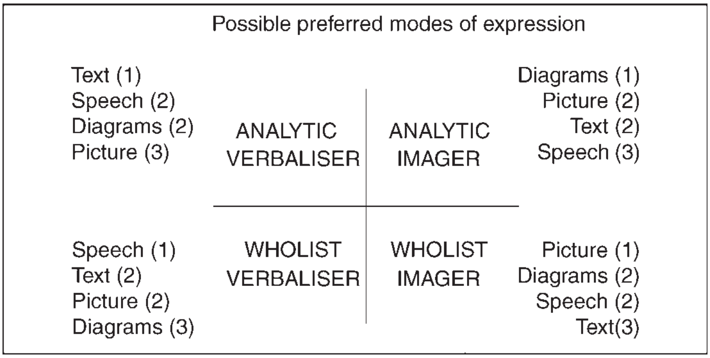


Figure 11.1 A memory-strategy preference graph adapted from Riding and Rayner (1998).

For students with memory difficulties, she suggests:

- 5 minutes
- one hour
- one day
- two days
- one week
- one month
- six months.

Figure 11.1 shows a memory-strategy preference graph. The keys to successful memorising seem to be *awareness* of style preferences, *timing* and *variation of strategy*.

Making things easier to remember – key memory aids

Key memory aids

> *I am a theatre reviewer these days so often have to order what I have seen and heard. Years of being dyslexic have developed a good memory for what I see and hear. I take some notes during the performance. Interestingly, I have bad short-term memory problems – i.e. I can't remember what I have just done, but I have good medium- and long-term memory. I have developed a skill as a minute writer over the years using my memory. (Thelma Good, theatre critic)*

Many students with dyslexia feel that they have lousy memories and fear that they will be unable to remember important information (Klein, 1995). They often do not realise that knowledgeable people do not necessarily need to have good memories. These people use sources when they need to find information and often keep references and notes. This, of course, presupposes motivation and the ability to organise. Only essential key points really need memorising. It is, however, true that some things seem much harder to remember than others. There are two important questions to answer here. What is it that makes some things easier to remember? How can we use this to make the hard things easier?

What is it that makes some things easier to remember? Think of something that you find easy to assimilate and recall. You will usually find that it scores high on the following four factors:

- *understanding* – you are really on top of it or it is closely linked with real experience
- *relaxation* – you don't feel threatened by it - you are relaxed about it
- *motivation* – you want to remember it because you will use it
- *fun* – you enjoy learning about it.

Whether it's learning to rock and roll or finding out about Formula One racing, these types of things seem to go in quickly and stay in place. How can this be used to make the hard things easier? The obvious answer is to take a more difficult area and find ways of increasing the score on these four factors. The first one, *understanding*, is arguably the most crucial. If you understand something, you immediately become more *relaxed* about it and can look around for ways of making it more *fun* or, at least, more distinctive – even if only through pairing up with a friend to keep each other awake. *Motivation* is a trickier one. It can be hard to get keen on a minor member of the nine or more examination subjects a 16-year-old student feels compelled to take. It is perhaps important at this point either to see it as part of a long-term goal to get on to a particular course or to attempt to imagine some situation where it might become crucial – impressing your new, glamorous French neighbour with your fluency in the language, perhaps.

Establishing understanding

Students must *reconstruct* information in order to understand it better. This is emphasised constantly throughout this book, and a range of cross-modal strategies is provided. Ways of linking information, either to a student's experience or to past knowledge, are also suggested. For example, you could link to real life by finding an example from experience of each point studied: in geology, where have you seen that rock formation? In English Literature, who does that character remind you of? Link to past knowledge by making a map of everything you can remember about the topic then add in the new information.

Topics should be linked and mapped and all inessential material should be cut out. For people with dyslexia in particular, it is vital to avoid overload and to provide them with clear, uncluttered material from which they can revise.

What makes material memorable?

Many study-skills books have used this activity, but it is well worth revisiting.

A list of 20 words follows. Time yourself; you have one minute to memorise as many as you can:

father
banana
Marilyn Monroe
tree
aluminium
and
ball
sex
because
violin
terrapin
ball
dangerous
fan
pencil
west
pillow
ball
blue
jellyfish

Now write down as many as you can. The order doesn't matter. Compare your list with the original. It is likely that it will contain the words 'sex' and 'Marilyn Monroe'.

Why? Because they stick out from the others as being different. For the same reason you may have 'jellyfish' or 'aluminium'. You may also have 'ball'. Why? Because it occurred three times. Your other words are likely to be from the first or last five words in the group. Bland little words from the middle like 'and' or 'because' are likely to have been overlooked. This gives a good idea as to what makes things memorable. Things need to:

- *stand out*- either because they are different or attention grabbing
- be *repeated*
- come from the *beginning* or the *end*.

There are some simple ways of helping this process.

To make things *stand out*, we can use association to create memorable cues. There are two ways of doing this: one is a very verbal strategy and will be dealt with in the section; the other is more simple, multi-sensory and direct. Take a word like ‘fan’. What do you think of? Do you think of a Japanese geisha with a beautiful fan? Do you think of a Manchester United supporter with a scarf? Do you think of a pop fan? Make a link with the strongest association and make it as visual or experiential as you can.

The images should be as dramatic, funny or disturbing as possible. Tulving, one of the pioneers of memory research, suggests that we reconstruct our life memories through a complex network of images, sensations and feelings which are all held together by our sense of a continuous self. Robertson (2002) suggests that we remember most when the frontal lobes of our brain, which control attention, are all firing and creating connections at once. They will activate the memories stored in the different systems. The senses are absolutely crucial to us here. If you make use of both the visual and verbal systems, you will have two systems firing simultaneously. Another pattern of brain-cells is involved in storing contextual memory; senses such as touch and emotion are involved. Add this together and you will have a huge pulse of activity that will trigger your attention and allow the brain to connect all these types of memories into one surge, which is likely to fire in tandem in the future. We all remember the emotional and the unexpected. Literature students were each presented with an onion while trying to understand why the onion should be a metaphor for love. They discovered, among other things, that, like love, it will make you cry and that the memory (in this case the smell) lingers long after it has been taken away or lost. They also remember the shock on the faces of the unexpected visitors who found the classroom covered in onion skins and stinking of onion! These students now only have to conjure up the smell of an onion and they know exactly what to write in an exam question about the use of unexpected metaphors.

It is easy to make a habit of *repeating* things. It is also easy to create more *beginnings* and *endings*. If the original 20 words had been chunked into groups of four, it is likely that more would have been remembered. This reminds us that not only does information need to be divided into bite-sized chunks but also study time benefits from being divided into manageable units with set targets for each section. Thirty minutes is probably long enough for most adults to be able to concentrate on revision. After that they need a break, probably to move about. Then they will be able to come back, *review what they learnt over the past half-hour session* and get started again; this creates more beginnings and endings.

Another advantage of chunking items into groups is that it encourages a learner to make *associations* between things. Take ‘father’, ‘banana’, ‘Marilyn Monroe’ and ‘tree’. People who deal in images can create all sorts of interesting pictures linking these items together! Verbalisers may find a quick anecdote springs to mind. Notice that one of the words is a *stand out* word. It often helps to have one of these as the focus for the others. There will be more suggestions as to the practical use of associations in the 'useful techniques' section.

Lists are, of course, not the only type of information that needs to be memorised. Topics need to be internalised by interaction in the ways that are suggested in previous chapters. The memory rules described above obviously apply to learning lists but also have some use in topics. For example, topics can be divided up into subsections to provide more beginnings and endings. The student should focus on each subsection as though it is all that has to be learnt. Then, when confident, they should look back for links to previous sections and forward to the next. The final sections of both Chapters 7 and 8 offer suggestions as to how students can personalise topic sections and strategies for learning them.

Obviously, at some point in exam preparation, students with dyslexia will come up against the kind of learning they find hardest – a list of some sort that has to be memorised. It could be the four factors that speed up an electric motor, the seven main parties in the Weimar Republic or the order in which Shakespeare wrote his plays. This is where these memorable features and the techniques described next can be really helpful.

RECAP

For students with dyslexia, the aim is to reduce the load that will need processing and to allow individuals to select from a range of approaches the one that suits them best.

Remember:

- *understanding*
- *relaxation*
- *motivation*
- *fun.*

Use: repetition, beginnings and endings, associations and the unexpected.

Useful techniques

None of these strategies is new. Many of the most creative were invented thousands of years ago by the Greeks and have passed the test of time. The fact that many of the suggestions are now validated by contemporary psychology is a testament to the insight of these thinkers. When using any of these techniques with students with dyslexia, remember to use all the senses simultaneously, if possible. For example, a student learning the symbols for elements on the periodic table was struggling to retain *fe* for *iron*. He came up with the key word *feather* and drew a picture on one side of a memory card of an iron feather with *iron/fe* on the reverse. As he did so, he imagined graphically the weight of it and how it would feel in his hands. The discrepancy between the lightness of a feather and the heaviness and hardness of iron helped to reinforce the links.

The main thrust of the following techniques is to attempt to impose some type of linking structure on the target items, or facts to be remembered, through the use of a range of types of association. Thus the student can learn a smaller number of more densely packed units. It is rather like providing a shopping basket for the brain's retrieval department. For students with dyslexia, a principal aim must be to reduce the load on the memory, therefore any technique that seems to be suggesting they learn even more in the way of memory cues will be regarded with deep suspicion. Consequently, any such techniques have not been included unless proved valuable by experience.

Two main types of techniques are described: rules and structures. The first type of association involves developing an unchanging rule system that can then be linked imaginatively with the target information. The other type involves creating structures around the items to be remembered.

It is hard to know which system reflects analytic or wholistic traits. Arguably, a system involving logical sequences should appeal more to learners who work analytically, while a rule system building structures around a central point maybe more wholistic. As always, the only answer is to try both.

Similarly, while inferring that imagers are more likely to relate to visual techniques and that verbalisers are more likely to respond to words, it is not always easy to spot which technique appeals predominantly to one mode or the other, for two reasons. First of all, as explained in Chapter 6, it is hard to pinpoint exactly what form of processing is involved in a complex task, such as memorising. It is more likely that all systems are firing and they should certainly be encouraged to do so. Even if a student is creating verbal associations, there is no proof that the visualising process is not equally strongly involved and vice versa. Secondly, the aim of any memorising technique is usually to process the information as thoroughly as possible, therefore students will be encouraged to engage all forms of sensory memory. However, certain students will be drawn more to one type of technique than another, and, arguably, this may be connected to their preferred learning style. It seems over-simplistic, therefore, to attempt to group the types of technique under umbrella terms such as 'verbal' or 'visual', although some attempt to distinguish between them has been made.

Rule systems

These types of systems attempt to set up an unchanging framework into which new target items can be slotted. The target items are linked with the unchanging frame through visual or verbal association in as striking a way as possible. It is essential that students should be practised in creating associations. Some verbalising and visualising techniques are outlined in Chapters 9 and 10. Two methods are described here. The first seems more verbal:

The number/rhyme system

This system uses the numbers one to ten as the unchanging frame but replaces the numbers with concrete objects, chosen by the student, that rhyme with the number. For example:

1.	one	gun
2.	two	blue
3.	three	tree
4.	our	door
5.	five	hive
6.	six	bricks
7.	seven	heaven
8.	eight	plate
9.	nine	wine
10.	ten	men

So, if students have to remember three crops: rice, corn and apples, they start with the word gun and the word rice and combine it in as pictorial, absurd or rude way possible to create a vivid image. Maybe they think of a gun firing rice puddings and then move on to 'blue' corn and apple 'tree'. Some learners are likely to find creating a picture and freezing it in the memory more successful. Those who are more verbal may find a more anecdotal or word based approach more helpful. Try this out with a group with any list of words. Ask them to try to remember the words without cues as a first timed trial then provide cues and see if this improves memory. It usually does, which will give the students an incentive to try it out for themselves.

The loci or place method

This was invented by the Greeks. It is a more visual, experiential method. To use it the students need to think of a preferably unchanging place or route that they know inside out. It could be their room or the walk to school. They need first of all to take themselves around this route seeing everything very clearly. They then need to choose 10 clear objects from the route and write them down, numbering them from one to 10. These objects/places need to be very clear in the mind's eye. The target items need to be associated with these things in a similar way as with the number/rhyme method. This needs to be done in the mind's eye, either through purely visualising these items in the places or on the objects or else through using absurd combinations. The key to success is, firstly, that the chosen objects are really firmly in the memory and, secondly, that the associated image is really vivid. This is an inventive method that often really appeals to students with dyslexia whose imaginations are frequently wonderfully offbeat! It also uses long-term memory of a familiar environment rather than a list of cue words.

Creating structures around the target items

This approach takes the target items as the starting point and then builds them into an associative structure. Here are two methods: chains of association and using acronyms.

Creating a chain of association

This is a sequential method that can be adapted to suit both visual and verbal preferences. The aim is to create links between each item starting with the first in the list. It works best if the links are as absurd or as visual as possible. So, if students have to remember a list of 15 vital survival items to take on an expedition starting with a knife, a compass and a pair of walking boots, they could imagine the knife cutting into a cake-sized compass with one slice marching off on little legs in a pair of walking boots. The rest can be built up in as surreal a way as possible and run through the mind several times.

Often it helps if the images can be built up into an actual story. Many science teachers have used this method to help students remember the order of the planets.

It is also possible to 'translate' more abstract ideas into physical events. For example, if a student was trying to remember the abstract themes contained within a novel – for example loneliness, power struggles, jealousy – these could be built into a short scenario.

Bartlett and Moody (2000) give a lovely example of the way to remember memory techniques such as *highlighting* keywords, using *spider diagrams* or making *associations*. They imagine an artist looking out on the neon-signs (*highlights*) of the city. He sees a *spider* drop on to his painting and *remembers* (associations) a film he had seen about tarantulas.

Students with preferences for images or words will obviously find the most comfortable way to do this. Wholists may prefer the neatness of a story to a chain of association.

Using acronyms

These methods take the first letter of each target item and use it to make silly sentences. For example, to remember the colours of the spectrum – red, orange, yellow, green, blue, indigo and violet – one student made up the following sentence after going to watch a foot-ball match:

really 'orrible yobs get bundled into vans

complete with a mind's eye cartoon of a van with a rainbow on the side.

Using a word is great if the items make a useful word, particularly if the students can then use association to link it with the topic. Nonsense words aren't quite so helpful, particularly for dyslexic students with phonological processing problems. It is probably better to go for the silly sentence.

Any of these techniques should be used selectively for really crucial items. In some ways a student is being asked to memorise more. It is only going to be helpful for those who find the time taken to create imaginative and visual structures for memorising is repaid by the success of the method.

Chapter summary

For students with dyslexia, it is crucial to:

- reduce overload
- interact with the material
- use the creative power of the imagination
- create structures or rules to organise the information to be memorised.

LAST WORDS: A CAUTION

Nothing is as simple as it seems. Since the Coffield review, the jury remains out over issues as basic as whether there is a place for style theory in education and further research into the validity and reliability of constructs, assessment methods and evidence for the impact of using style in teaching and learning is vital. However, in the meantime, despite the negativity associated with labelling and neuromyths, the focus on style over the past few years has had the following positive impact, particularly for mainstream teachers at secondary level where pressure of class size, league tables and public examination criteria often eat up the time available to consider individual learners.

- It has focused attention on the individuality of learners and their particular diverse needs and fostered a better understanding among teachers of the factors that influence students' learning and of ways in which to adjust pedagogic strategies.
- It has highlighted, the barriers to learning that, unbeknown to teachers, existed in many secondary school classrooms and post-16 institutions where a preference for verbal modes of teaching still predominated.
- It has brought multi-modal, if not multi-sensory, ways of teaching, previously the province of the 'special needs' or primary classroom, into mainstream secondary and further education contexts for all learners. This has resulted in practice becoming more flexible and diversity being acknowledged.
- It has emphasised the importance of metacognitive processes in encouraging learners to take active responsibility for the ways in which they learn. A long tradition of research suggests that students should be encouraged to examine the ways in which they learn best. It seems no coincidence that style theory should have become current alongside the growing interest in personalised learning or 'Better-Fit Pedagogy' explored through constructs such as Learning Dimensions by researchers such as Claxton (2006) and Deakin Crick (2006).
- It has provided a language and metaphors to establish dialogues between teachers and learners about their learning processes.

My experience, but little hard empirical evidence, indicates that the learning style approach seems to offer to all students a chance to consider how they learn and, to vulnerable students, respect for their particular ways of dealing with a learning task and a chance to rebuild confidence and to enhance their relationships with their teachers. There is a serious need for theoretical development and research but, as a practitioner, I would be unhappy, in the meantime to lose the style baby with the bathwater.

Practice testifies to the success that students have gained through using the types of strategies explored in this book. The following questions, however, still remains unanswered. Is learning style fixed or flexible, subject specific or universal? Identifying a learning style preference does not necessarily mean that a particular student will automatically operate in this way across all areas of learning. Another question – are dyslexic students likely to favour a visual style of learning? Research evidence is still inconclusive and labelling can prove a strait jacket.

The existence of these uncertainties means that it is probably unwise to attempt purely to cherry-pick the sections of this book that relate to the learning style which interests you. Learning is a fiercely complex process. Experience and research both dictate that the most successful approach for learners with dyslexia is the multi-sensory route. Evidence for the existence of learning style preferences must suggest that multi-sensory approaches may also work for mainstream learners and that an over-concentration on talking and listening may be hampering their learning too. The techniques described should not be used exclusively with dyslexic students. Three main priorities are emphasised throughout:

1. Learners need to be given the chance to develop awareness of their own learning strengths and the encouragement to take responsibility for using them.
2. Educators need to be aware of their priorities when presenting information. Are they aiming to teach subject material or to develop learning strategies? If the first, students should be encouraged to use the most comfortable mode. If the second, those who prefer a verbal approach should be encouraged to use the visual mode to activate the areas of the brain that generate images; wholists should be guided through more analytical procedures and so on. However, it is worth remembering that some dyslexic learners, contrary to expectation, feel overloaded by multi-sensory presentation.
3. Sensitivity to the individual student's needs has to be the key.

Researchers suggest that the more we expand our repertoire of learning skills, the more able we become to absorb and retain information. They warn us to 'use it or lose it'. Students of all types can only benefit from being shown how.

Appendix 1
ASSESSING THE READING LEVEL OF TEXTS

The fog index of readability

Devised for journalists by Robert Gunning of the Robert Gunning Clear Writing Institute of Santa Barbara, California.

1. Take a sample piece of writing of about 150 words long.
2. Calculate the average number of words per sentence (e.g. 12)
3. Count the number of words of three or more syllables (e.g. 15)
4. Express this as a percentage of the whole 10%
5. Add average word number and percentage together 12 + 10 = 22
6. Divide by 2.5 = 8.8
7. So reading age = roughly 9 years.

This is obviously quite laborious. A search on Google for the Gunning Fog Index also provides an electronic means of scanning a text and calculating a reading its reading level. *The Guardian* and *The Times* are aimed at around 11 to 12. The Daily Mail is around 10. Remember the impact of sentence length on comprehension. Research shows that 50% of readers get lost if a sentence exceeds 14 words (Rose, 1993), and 80% lose it after 20 words.

Appendix 2

STRATEGIES FOR KINESTHETIC LEARNERS

It should be clear from all the teaching described in this book that multi-modal and multi-sensory strategies should be provided to enable a choice for vulnerable learners. However, there are some students for whom they are essential. These are those students who relate most strongly to the subject and learn most successfully when learning through experience or touch. A recent history trip to the World War I Battlefields with a group containing some volatile and vulnerable boys exemplified this. The accompanying work booklet froze them with fright and generated clenched fists and grumpiness until they realised that they could simply talk about what they had noticed from the gravestones, what they had found in the mud and what it all meant to them.

Arguably, any younger child whose understanding of abstract concepts is still underdeveloped is also going to appreciate the chance to learn in this way along with the other strategies that have been introduced. Some older dyslexic students also benefit from this, as Alex explains:

> *I gave a presentation on dyslexia as I wanted to give people an understanding of what dyslexia is and how it affects the child and their family. After the presentation, I was given feedback. I was asked why I use my hands when speaking and if I had been taught any sign language to aid my difficulty. The hand movement that is used seems to be a way of expressing my point of view and also helps me with my thought process. It seems that dyslexics could be using their hands as a compensatory adaptive strategy. A difficulty that some dyslexics have is with homophones. When looking at the signs for some of the homophones, we found that there was a difference between the signs and homophones. This meant that there was more of a distinction between the signs for `there' and `their'. I found that the signs have helped me focus on the individual words and helped me understand the meaning of the words. (Alexander Hawthorne, dyslexic research student who is hoping to carry out a research project into this area)*

The work of Andrew Stetkevich (2004) shows how tactile-kinesthetic techniques can be used successfully in teaching a range of skills, including vocabulary and comprehension development, through the use of body vocabulary, role play for sequencing and games for understanding morphology. He shows how comprehension and memory can be developed through interactive story telling, acting out and interrelating key vocabulary terms, small group work with cards and physical actions, simulations and role play. These may perhaps be common in content subjects such as history or sciences but he suggests ways to apply these to more generic language skills including vocabulary development, the knowledge of structure of language and classification of factual information. Anyone who works with language disordered children should be familiar with the use of these strategies to build and reinforce language skills but may not have considered how these might help students who are not necessarily assessed as having difficulties with language, although many vulnerable students do.

So what do kinesthetic learners prefer? The key to all Stetkevich's activities is movement, physical activity, interaction with others and underpinning the abstract with concrete foundations. These techniques are also described by Moats and Farrell (2005). Kinesthetic learners like:

- To learn through hands and touch. The feel of wooden letters in a velvet bag may help them learn sounds/symbol links more effectively.
- Concrete action – let's build it first and then explain how. *Do* the experiment in science.
- Drama – use role play and improvisation to understand characters and situations in humanities.
- Some may find using their hands to sign helps them retain information.
- Tactile-kinesthetic techniques can help learners to make the associations which help to retrieve concepts and ideas from memory.

The following sources are recommended by Stetkevich. His work is cited in Richards (2001).

Beck, I., McKeown, M.G. & Kucan, L. (2002) *Bringing Words to Life: Robust Vocabulary Instruction* www.guilford.com

Hall, S. &. Moats, L.C. (1998) *Straight Talk About Reading*. Available from Amazon www.amazon.com.

Jensen, E. (1998) *Teaching with the Brain in Mind*. Alexandria, VA: Association for Supervision and Curriculum Development.

Marzano, R.J., Pickering, D.J., Pollock, J.E. (2001) *Classroom Instruction that Works*. Alexandria, VA: Association for Supervision and Curriculum Development.

Richards, R. (2001) *Sourcebook for Dyslexia and Dysgraphia*. Linguisystems Co. Language Circle, www.linguiSystems.com, accessed 3 October 2007.

Saphier, J. & Gower, R. (1997) *The Skillful Teacher*. Acton, MA: Research for Better Teaching www.stenhouse.com

Allkindsofminds.com (These sites contain many good sources)

Appendix 3

VISUAL PROCESSING DEFICIT CHECKLIST

Some types of dyslexia are more related to visual processing problems than phonological processing. Others combine the two. These are not the type of visual difficulties that are always picked up by routine eye tests. It is always worth discussing the possibility of visual processing difficulties with students. This checklist was devised by Melanie Jameson, quoted by Bartlett and Moody (2000), and has much in common with checklists provided by Holland for use by classroom teachers to establish if there might be a need for more in-depth screening.

See the website: wwwessex.ac.uk/psychology/overlays.

1. Have you been prescribed glasses?
2. Does reading make you tired?
3. Do you often lose your place when reading?
4. Do you reread or skip lines when reading?
5. Do you ever read words/numbers back to front?
6. Do you miss out words when reading?
7. Do you tend to misread words?
8. Do you use a marker or your finger to keep the place?
9. Are you easily distracted when reading?
10. Do you read for pleasure?
11. Do you get headaches when you read?
12. Do your eyes become sore or water?
13. Do you screw your eyes up when reading?
14. Do you read close to the page?
15. Do you push the page away?
16. Do you prefer dim light to bright light for reading?
17. Does white paper (or a whiteboard) seem to glare?
18. Does it all become harder the longer you read?
19. Does print become distorted as you read?

Appendix 4

A COMMON SIGHT WORD LIST

a
about
after
again
all
always
am
an
and
any
are
around
as
ask
at
ate
away

be
because
been
before
best
better
big
black
blue
both
boy
bring
brown
but
by

call
came
can
carry
clean
cold
come
could
cut

did
do
does
done
don’t
down
draw
drink

eat
eight
every
exit

fall
far
fast
find
first
five
fly
for
found
four
from
full
funny

gave
get
give
go
goes
going
good
got
green
grow

had
has
have
he
help
her
here
him
his
hold
hot
how
hurt

I
i f
in
into
is
its
it’s

jump
just

keep
kind
know

let
light
like
little
live
long
look

made
make
many
may
me
men
much
must
my
myself

never
new
no
not
now

of
off
old
on
once
one
only
open
or
our
over
own

pick
play
please
pretty
pull
put

ran
read
red
ride
right
round
run

said
saw
say
see
seven
shall
she
show
sing
sit
six
sleep
small
so
some
soon
start
stop

take
tell
ten
thank
that
the
their
them
then
there
these
they
think
this
those
three
to
today
too
try
two

under
up
upon
us

use	warm	were	who	would	your
	was	what	why	write	
very	wash	when	will		
	we	where	wish	yellow	
walk	well	which	with	yes	
want	went	white	work	you	

Appendix 5
CASE STUDIES

Jack and David

(Names have been changed)

Jack

Jack was introduced at the start of Chapter 1. Observing his behaviour and his pattern of strengths and weaknesses, it seemed clear that he preferred to work with images rather than words, despite having no language problems and expressing himself well orally. He also seemed to be more of a wholistic than analytic learner. Subsequently, his scores on the CSA revealed that he was indeed a wholistic imager. How does this tie in with his relative strengths and weaknesses?

His strengths are his active practical mind; his inventiveness; his ability to visualise and to create visual representations; his ability to remember detail when really engaged; and his willingness to experiment with ways of working in order to take responsibility for himself.

His weaknesses are his unwillingness to verbalise or experiment with words, his inability to remember detail when reading or otherwise disengaged, his lack of confidence in his ability to write at any length and, obviously, his struggles with literacy and the effort he has to expend in this area.

What approaches have helped Jack?

It was clear that he needed ways to store information, particularly once he started being able to cope with longer texts. He also needed support with planning his writing to encourage him to keep going. He found the following approaches effective.

1. He was taken through the Levy techniques (described in Chapter 7) of selecting the main facts in any text or watched programme and mapping them. He then watched videos and used a whiteboard to create a brain-image. Spontaneously, he used the standard Buzan-style mind-map format and created icons and drawings to represent key points. Others in the group were very impressed with his maps. Next, he practised the same

techniques while listening to information, following progressively more difficult and longer texts. He was consistently encouraged to visualise all information, preferably experiencing it. Success with this began to make him realise that his memory wasn't that bad after all when given the right props. This reduction in anxiety in its turn improved his recall. He was happy to apply this same technique to reading texts, taking a whiteboard or rough paper and stopping at frequent intervals to create a mind map. He then used his own 'notes' to confirm answers to comprehension questions, which meant that he seldom had to reread. If he did have to do so, his mind map gave him an idea of whereabouts in the text he might search.

2. He had no confidence in his ability to write. The first time he completed a 200-word story he was thrilled and disbelieving. He was shown the brainstorming techniques, which are summarised in Chapter 7, but did not particularly warm to them. He also found the story chains unhelpful. He did, however, really take to Wray's writing frames and found that, once he had a basic set of paragraph headings, he was able to keep going and flesh out the paragraphs. Understandably, he didn't like working from a page with a lot of words on it. He preferred to have simple headings and generate his own information. Sometimes he prepared his writing frames on paper, sometime on the computer, leaving spaces to fill in with information. He always worked on computer, finding the word-prediction software 'Co-Writer' particularly helpful and using 'My Words' or 'Write Out Loud' to read his written text to him. He continued to work to develop his use of vocabulary and became willing to attempt more complex words, particularly to describe activities or processes. He began reluctantly to discover that he could play with words.
3. The next was the use of voice-recognition software to enable him to use some of the more complex vocabulary that he knew. He did not find this as liberating as some learners as he was inhibited by the need to speak the text. However, he combined it with writing frames to produce more sophisticated work and he developed an effective way of combining the voice recognition software with sections of his own writing which he would then read into the computer to proofread.
4. In time, he began to feel more comfortable with some of the approaches that he initially rejected. He started to use the brainstorming technique but tended to like a more structured frame for this.

Jack has been rewarded with real success. He spontaneously made use of these techniques throughout his schoolwork and continued to do so beyond school when he went on to study for NVQs. Reading remained difficult for him; so he tended in school to use the talking books and click readers on the computer when he wanted to enjoy a book and read a wide range this way.

The techniques that have worked for him do seem to match his learning style in that he uses frames to provide structure both for writing and for recalling the

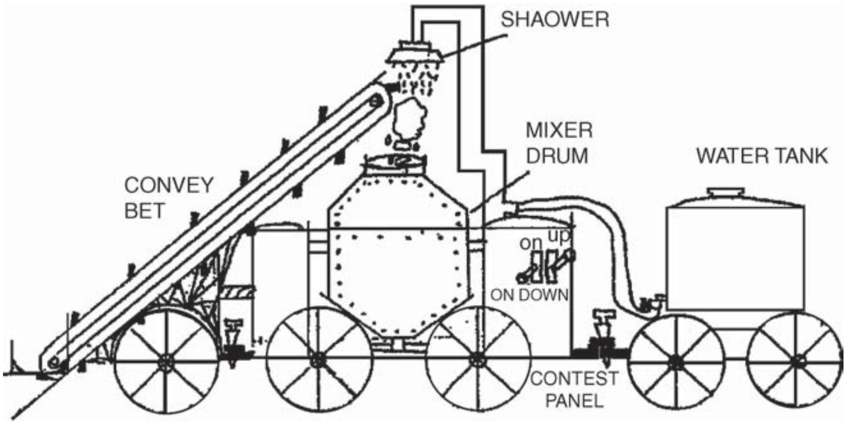


Figure A 5.1 The lazy mixer.

content of texts. He also gravitates towards the visual mode. He is, however, a good oral presenter and will, no doubt, be a successful salesman of anything, such as the lazy mixer (Figure A 5.1), that he invents.

David

David's difficulties were rather different from Jack's. The highly articulate and intelligent son of a family of barristers, he had muddled through a couple of preparatory schools with literacy skills well below his potential, until at 12, the family realised that there really was something wrong with his ability to learn in the conventional way and that, if he were not to spend a good proportion of his school career outside the classroom for cheeking the teachers and setting himself up as student union representative, something radical had to be attempted. He was thus enrolled in a specialist college for students with dyslexia. At the age of 12, his reading age was about 9, which meant that the stories he enjoyed were too difficult for him to read independently. His previous teachers had also been consistently disappointed by the thinness of his written work. Few of his original ideas and none of the sophisticated vocabulary he had used to express them seemed to survive the writing process.

What was David's cognitive style?

Again, initially there were no formal diagnostic tools available; so an estimation of David's learning style was arrived at by observing his strengths and weaknesses. He was obviously highly verbal, scoring off the top of the scale on the British Picture Vocabulary Test and using complex structures and vocabulary in his spoken language. He played with words both with wit and also in writing poetry, which gave him real pleasure.

His listening skills were excellent, and he not only picked up the outline of topics but also remembered detail. However, this was not the case when reading, where he frequently would misread longer words, guess them and end up well away from the intended meaning. This was obviously beginning to cause him real frustration.

When storing information, he would always try to use words and was a great 'list' man. Unfortunately, his struggles with spelling meant that he would forget a lot of information while trying to spell. He was extremely scathing abut mind-map techniques when they were first introduced to him and obviously far preferred to arrange things in hierarchies or chains.

The overall picture was of a strong verbaliser with analytic rather than wholistic strengths. However, his intelligence meant that he was quite capable of seeing those links and connections that some analytics find hard to identify. When he was eventually assessed on the CSA, he did score as an analytic verbaliser but was not particularly far down the analytic scale.

What are David's relative strengths and weaknesses?

David's strengths are clear. He is a very bright boy with a real gift for and love of language. He is a talented drama student with a fund of ideas. He is also determined and motivated with a real understanding of the nature of his difficulties. His weaknesses stem from the discrepancy between his verbal abilities and his literacy – both reading and spelling. He was also attempting to use verbal and analytic structures to organise and store information and was coming up against problems caused by this discrepancy between speaking and writing. It has also been suggested that using this verbal sequential mode places a greater strain on memory. Add to this the fact that his reading skills were yet to become automatic and it is not surprising that the resulting overloads caused him to lose many of his ideas between his head and the paper. He needed to find ways to:

- improve his ability to store information
- plan work more effectively
- use more ambitious vocabulary in written work.

How was his learning managed?

Like Jack, David's school offered a mixture of individualised multi-sensory and group strategies to develop reading – both decoding and comprehension skills. He spent some time focusing on the use of syllable division to help him decode the complex keywords in a factual text that might send him off down the wrong track. By 16, he was reading fluently, although still needing time to focus and absorb complex factual or technical material. He also chose to use computers and became a fast typist. He tried a range of computer programs but tended simply to stick to Microsoft Word, although using text-to-speech software for proofreading.

Initially, David was resistant to the use of any form of mind map, clearly stating his preference for lists. However, he was aware that his strategy was not producing the results he wanted. He agreed to experiment but, presumably influenced by his style profile, kept returning to his earlier strategy claiming loudly that nothing else worked. By this stage the rest of his teaching group were, automatically and happily, using concept maps; so the teacher was also tending to use them for presenting material and storing ideas while acknowledging to David that it was up to him to use the strategies that suited him best.

The breakthrough came when David started to practise using an amanuensis for exams and was encouraged to create a plan before starting to dictate. At this stage, with the pressure of exams on him, he finally began to find that a mind map allowed him to use association techniques and juggle information more effectively. He did, however, always stick to verbal labels. During the pre-GCSE revision phase, he was caught using this so-called wholistic technique consistently and, as in the manner of the soap commercials, was not prepared to exchange them for his old soap powder. This shows that learners really do need to experiment with techniques.

Enabling David to use the full scope of his vocabulary remains problematic. A couple of strategies have been helpful. He is a good poet; so one approach has been for him to plan descriptive pieces by condensing the language as though he were drafting a poem. He then expands it into continuous prose when writing his piece. He has also found the senses frame (which is described in Chapter 9) helpful for capturing images. With more factual work, he has started to use voice-recognition software so that he can dictate his ideas. He does, however, find the slow pace of this frustrating. Another approach he has tried is taping his ideas and then using the tape to make a transcript. This is not particularly easy but, for pieces of untimed coursework where he is highly motivated to get a mark that reflects his ability, it has been successful. The focus has consistently been on using words rather than images, and, for someone as articulate as David, this has been the obvious route.

His reading has improved considerably, but it is still not easy enough for him to be able to lose himself in a demanding book. He has made much use of taped books and also used books that have been scanned onto the computer or CD. For exam revision, again he has used tapes and CDs and made use of revision sites on the internet. He learns well by ear but has made considerable use of concept maps to process the information and commit it to memory.

Outcomes

David is now on course for higher education, with a stronger awareness of how to also manage his study and written expression and avoid the areas where he is weak. He makes very good use of any form of amanuensis and will have no problems using the right kind of dyslexia support in higher education. He will, no doubt, continue to make the best use of his superior verbal skills and has managed to move away from the rigid analytical approach that he was attempting to use towards a far more flexible approach to planning texts and storing information. It has, in fact, paid David to experiment with approaches that were not his first, instinctive choice.

Appendix 6

THE THIRTEEN STYLE CONSTRUCTS EXPLORED BY THE REPORT OF COFFIELD AND HIS TEAM (2004)

Allinson and Hayes's Cognitive Styles Index (CSI)

Apter's Motivational Style Profile (MSP)

Dunn and Dunn's model and instruments of learning styles

Entwistle's Approaches and Study Skills Inventory for Students (ASSIST)

Gregorc's Style Delineator (GSD) www.indiana.edu/~505a/learningstyles.html

Hermann's Brain Dominance Instrument (HBDI)

Honey and Mumford's Learning Styles Questionnaire (LSQ)

Jackson's Learning Styles Profiler (LSP)

Kolb's Learning Style Inventory (LSI) www.infed.org/biblio/b-explrn.htm

Myers-Briggs Type Indicator (MBTI) www.myersbriggs.org

Riding's Cognitive Styles Analysis (CSA)

Sternberg's Thinking Styles Inventory TSI)

Vermunt's Inventory of Learning Styles (ILS)

Coffield et al. (2004) recommend the use of the Vermunt Inventory for students in Higher Education. This inventory looks at levels of learning rather than processing style.

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FURTHER READING

A non-exhaustive list of useful references

Areas of interest

1. **Dyslexia: background and research**
2. **Dyslexia: practical support and strategies** (this does not include specific literacy programmes, which are well documented in 2003)
3. **Dyslexia and stress**
4. **Other syndromes sometimes co-existing with dyslexia:**
   a. ADHD
   b. Dyspraxia
   c. Speech and language difficulties
5. **IT**
   a. Dyslexia – websites and software
   b. Learning styles
6. **Learning Style**
   c. Research background
   d. Using style
   e. Practical strategies
7. **Accelerated learning and related approaches**
8. **Memory**
9. **Mathematics**
10. **Study skills**
11. **Dictionaries**
12. **Schema theory, memory and metacognition**

1. Dyslexia: background and research

There is now a very wide range of books available. The following can provide an introduction. Some combine research background with teaching suggestions (*).

*Ott, P. (1997) *How to Detect and Manage Dyslexia: A Reference and Resource Manual*. Oxford: Heinemann.

*Ott, P. (2007) *Teaching Children with Dyslexia. A practical guide*. London: Routledge.
Reid, G. & Wearmouth, J. (2002) *Dyslexia and Literacy. Theory and Practice*. Chichester: Wiley. Wide range of contributions from major theorists.
*Reid, G. (2003) *Dyslexia: A Practitioner's Handbook, 3rd edn*. Chichester: Wiley. An excellent and wide-ranging introduction to the area including detailed reference lists of practical teaching programmes
Snowling, M. (2000) *Dyslexia, 2nd edn*. Oxford: Blackwell Publishers.
Snowling, M. & Stackhouse, J. (2005) *Dyslexia, Speech and Language. A Practitioner's Handbook, 2nd edn*. London: Whurr.
Snowling, M. & Stackhouse, J. (Eds) (2006) *Dyslexia, Speech and Language: A Practitioner's Handbook*. London: Whurr.
Thomson, M. (2001) *The Psychology of Dyslexia: A Handbook for Teachers*. London: Whurr. A very clear introduction to the psychology underpinning the identification and support of learners with dyslexia

2. Dyslexia: practical support and strategies

Membership of the British Dyslexia Association brings many benefits both to teachers, parents and learners with dyslexia, among which is the excellent and upbeat official magazine *Dyslexia Contact*. The Dyslexia Institute – now Dyslexia Action – provides a website with a wealth of resources, many of which are downloadable.

Bartlett, D. & Moody, S. (2000) *Dyslexia in the Workplace*. London: Whurr. A practical guide to help dyslexic adults compensate for dyslexic difficulties in a range of workplaces. Also provides a list of consultants.
Goodwin, V. & Thomson, B. (2004) *Making Dyslexia Work for You. A Self-Help Guide*. London: David Fulton. A useful thoughtfully written book with CD rom for students in FE and HE.
Holloway, J. (1995) *Specials! Study Skills*. Folens. Excellent; photocopiable and practical.
Hargreaves, S. (2007) *Study Skills for Dyslexic Students*. London: Sage.
Holloway, J. (2000) *Dyslexia in Focus at Sixteen Plus: an Inclusive Teaching Approach*. Tamworth: NASEN. Informal learning style checklists for use with students, plus a range of excellent strategies, including study skills, to help older students.
McLean, B. *Study Skills*. Farnham: Helen Arkell Dyslexia Centre. www.Arkellcentre.org.uk, accessed 3 October 2007 The Helen Arkell Centre publish a range of practical and useful books.
Moody, S. (2004) *Dyslexia: A Teenager's Guide*. London: Vermilion.
Muter, V. (2005) *Early Reading Development and Dyslexia*. London: Whurr. A useful and practical overview of early identification and support for children at risk.

Pollock, J., Waller, E. & Politt, R. (2004) *Day to Day Dyslexia in the Classroom, 2nd edn*. London: Routledge/Falmer.

Price, G. & Skinner, J. (2007) *Support for Learning Differences in Higher Education: the essential practitioner's manual*. Stoke on Trent: Trentham.

3. Dyslexia and stress

Miles, T.R. & Varma, V. (1995) *Dyslexia and Stress*. London: Whurr.

Peer, L. (1997) *A Young Person's Guide to Dyslexia*. London: BDA.

Peer, L. (1997) *Your Personal Survival Kit, Preventing Parental Burn-Out*. London: BDA.

Peer, L. (2000) *The Survival Kit, Initiated by Young Dyslexics for Other Young Dyslexics*. London: BDA.

Scott, R. (2003) *Dyslexia and Counselling*. London Whurr.

4. Other syndromes sometimes co-existing with dyslexia

ADHD

Cooper, P. & O'Regan, F. (2000) *A Teacher's Guide to the Management of AD/HD*. London: Routledge.

Cooper, P. & Ideus, K. (1996) *Attention Deficit/Hyperactivity Disorder A Practical Guide for Teachers*. London: David Fulton.

Gordon, M. (1991) *AD/HD: A Consumer's Guide*. New York: GSI.

Dyspraxia

Portwood, M. (1999) *Developmental Dyspraxia – Identification and Intervention A Manual for Parents and Professionals*. London: David Fulton.

Portwood, M. (2000) *Understanding Developmental Dyspraxia - A Textbook for Students and Professionals*. London: David Fulton. An authoritative review of dyspraxia

Speech and language difficulties

Brent, M., Gough, F. & Robinson, S. (2001) *Working with Secondary Students with Language Difficulties*. London: David Fulton.

Daines, B., Fleming, P. & Miller, C. (1996) *Speech and Language Difficulties*. Tamworth: NASEN.

Hartas, D. (2005) *Language and Communication Difficulties*. London: Continuum.

Davenport, M. & Hall, P. (2004) *Target: Listening and Understanding in Secondary Schools Essential reading for Effective Learning*. Edinburgh: Barrington Stoke. For a general introduction with very practical suggestions for helping students in secondary mainstream settings.

Healy, J. (1992) *How to have Intelligent and Creative Conversations with your Kids*. New York: Doubleday. Useful conversation openers.

Marks, A. (1998) *Supporting Young People with Language Impairments in Secondary Mainstream Schools – a practical guide*. Worthing: Priority Care NHS Trust, available from Trust Headquarters, Arundel Road, Worthing, West Sussex BN13 3EP.

Martin, D. & Miller, C. (1996) *Speech and Language Difficulties in the Classroom*. London: David Fulton. A readable and accessible introduction to this area.

Reilly, J. & Murray, S. (2004) *Listening and Understanding in Primary Schools*. Edinburgh: Barrington Stoke.

Reilly, J. & Murray, S. (2005) *Thinking and Speaking in Primary Schools*. Edinburgh: Barrington Stoke. An excellent *pair* of books full of practical strategies for immediate use underpinned with clear explanation of the theories underpinning the suggestions.

Tod, J. & Blamires, M. (1999) *Speech and Language. Individual Education Plans*. London: David Fulton.

Wilson, A. (2004) *Supporting Speaking and Listening*. London: David Fulton.

Stackhouse. J. & Wells, B. (1997) Children's Speech and Literacy Difficulties: A Psycholinguistic Framework. London: Whurr. For a more in-depth analysis linking in with dyslexic difficulties.

For information about the social use of language or pragmatics see:

Andersen-Wood, L. & Smith, B.R. (1997) *Working with Pragmatics*. Bicester: Winslow.

Rinaldi, W. (Ed.) (2000) *Language Difficulties in an Educational Context*. London: Whurr.

Watson, J. (Ed.) (1998) *Working with Communication Difficulties*. Edinburgh: Moray House.

There are a number of *programmes* for developing the social use of language, including:

Locke, A. & Beech, M. (1991) *Teaching Talking: A Screening and Intervention Programme*. Windsor: NFER Nelson.

Rinaldi, W. (1992) *The Social Use of Language Programme*. Windsor: NFER Nelson. But these tend to be targeted at primary school children.

For adolescents see:

Csoti, M. (2001) *Social Awareness Skills for Children*. London: Jessica Kingsley. Although aimed at younger children, this is very adaptable.

5. Dyslexia – websites and software

These websites, hardware and software change frequently. Hence ideas as to the types of device available have been provided but details as to manufacturers and models have mostly not been included. www.iansyst.org has advice and links to follow.

Websites
Source of experts and expertise on dyslexia: www.DyslexiaA2Z.com

Software
Advice on downloading from a whiteboard or flip chart to laptop or electronic copy board:

Sahara Presentation Systems PLC (0208 319 7700) or http://www.sahara-products.com

Hardware to aid with note taking

- Digital Palmcorder Camcorder (eg NV-DS33 (Panasonic 0870157 8 577) will record an entire lecture and download it onto a computer.
- Interactive software to change a whiteboard into a computer screen
- Listening to scanned text away from the computer: The Road Runner from Ostrich Software can store 2000 pages of text in a 120 gms box running on two small AA batteries (Omnysys Ltd. 01522 685050)
- Mini-recorder that will play though a coupler
- Predictive software to use with with speech e.g. Co-writer
- Text-to-speech software: textHELP - scan, speak, spell, predict, pronounce, perceive: from textHELP Systems Ltds, Enkalon Business Centre, 25 Randalstown Road, Antrim, N. Ireland or telephone 0800 328 7910 or www.texthell).com
- A fully portable electronic dictionary that scans words and pronounces them aloud e.g. Readingpen II ianSYST Ltd 01223 426644 sales@dyslexic.com or The White House, 72 Fen Road, Cambridge, CB4 IUN www.dyslexic.com
- Voice-recognition software
- Dictation Software: www.dyslexic.com/dictcoml.htm: Iansyst (01223 420101) http://www.dyslexic.com/dicnload.htm
- Programmes designed for dyslexic undergraduates to develop a variety of skills available from Alphabetics Ltd, 43 Northolme Road, London N5 2UX tele-phone: (020) 7359 1565, website: www.wordswork.co.uk or email: wordswork99@yahoo.com

There are a huge number of learning style websites, some of which provide useful activities.

6. Miscellaneous Style Based Materials

a. Research background

Riding, R. and Rayner, S. (1998) *Cognitive Styles and Learning Strategies*. London: David Fulton provides a sound overview *b. Using style- practical strategies*

Bell, N. (2005) *Visualizing and Verbalizing for Language Comprehension and Thinking*. Academy of Reading Publications (Taskmaster). ISBN 0-945-856-01-6 www.psllcnj.com/visualizing_and_verbalizing.htm

Cooke, G., Came, F. & Brough, B. (2002) *Learning Styles. A new look at differentiation*. Marlborough Learning Works International

Ginnis. (2002) The Teacher's Toolkit. *Raising Classroom Achievement with Strategies for Every Classroom*. Camarthen: Crown House Publishing.

Given, B. & Reid, G. (1999) *Learning Styles, a guide for teachers and parents*. Red Rose Publications. Lots of good ideas, including detailed descriptions of Circle of Knowledge and team learning. Also contains a wide list of other books on learning style plus brief critiques.

Naughton, K. & White, A. (2003) *How Dyslexics Learn: Grasping the Nettle*. Lots of excellent ideas but many learners with dyslexia will not necessarily learn in this way.

Reid, G. (2005) *Learning Styles and Inclusion*. London: Paul Chapman Full of practical suggestions underpinned by research. An excellent source of resources.

Riding, R. (2002) *School Learning and Cognitive Styles*. London: David Fulton

Riding, R. and Rayner, S. J. (1995) *Personal Style and Effective Teaching*. Birmingham Learning and Training Technology

Mind Mapping

Mind mapping: Resources available from Buzan Centres Ltd., 54 Parkstone Road, Poole, Dorset BH 15 2PG or email: Buzan@Mind-Map.com

Electronic mind mapping tools: for example Inspiration www.inspiration.com

7. Accelerated learning and related approaches

Accelerated learning

The following two books are available from The Accelerated Learning Centre

Crown Buildings, Bancyfelin, Carmarthen SA33 5ND or telephone: (01267) 211880/211886 or visit their website at: www.accelerated-learning.co.uk or email learn@accelerated-learning.co.uk

Smith, A. (1996) *Accelerated Learning in the Classroom*: Network Educational Press. The first book in the UK to apply new knowledge about the brain to classroom practice. Many practical ideas but it is not, however, specifically research based.

Smith, A. (1997) *Accelerated Learning in Practice*. Network Educational Press Contains over 100 tools to help students accelerate their own learning.

Related approaches

Chris Gamble's work for Mind Kind Educational Ltd. is interesting.

Dickinson, C. (1988) *Effective Learning Activities*. Network Educational Press Practical activities to improve learning in the secondary school.

Hughes, M. (1999) *Closing the Learning Gap*. Network Educational Press Ltd. Introduces information about how the brain learns best based on recent research. Applies this to teaching practice, gives many practical suggestions and requires teacher-readers to examine and evaluate the effectiveness of their own styles of teaching.

Rose, C. and Goll, L. (1992) *Accelerate Your Learning: The Super Skills Supplement*. Contains six 'super skills' including lots of ideas for learning through imagery and co-operative group learning. Available from Accelerated Learning Systems Ltd. at 50 Aylesbury Road, Aston Clinton, Aylesbury, Buckinghamshire, England.

Shaw, S. and Hawes, T. (1997) *Effective Teaching and Learning in the Primary Classroom A practical guide to brain compatible learning*: Network Educational Press.

Dennison, P. E. and Dennison, G. E. (1989) *Brain Gym: Teacher's edition revised*. Ventura, CA: Edu-Kinesthetics, Inc.

Activities to help develop skills associated with both hemispheres of the brain. Again, this needs to be evidenced by research.

8. Memory

(See also accelerated learning and study skills sources)

Blagg, N., Ballinger, M. and Gardner, R. (1988) *Somerset Thinking Skills Course: Module 7 Organising and Memorising*: Simon and Schuster Education in association with Somerset County Council.

Bristow, J., Cowley, P. and Danes, B. (1999) *Memory and Learning, A Practical Guide for Teachers*, David Fulton Publishers

Gathercole, S. and Baddeley, A. (1993) *Working Memory and Language*. Hove: Lawrwnce Edbaum Associates

Materials from the Communication and Learning Skills Centre (CALSC), 131, Homefield Park, Sutton, Surrey SM1 2DY or telephone: (020) 8642 4663 or at info@calsc.co.uk or www.caslc.co.uk.

Includes *Mastering Memory, to improve visual and auditory short-term memory. Time to Revise, KS 1-3; Timely Reminders, KS4 and adults*; to improve revision and recall.

Memory Booster: A CD Rom designed by researchers from Hull university for boosting memory, available from http://www.memory-booster.com/

Mastering Memory: from CALSC: another good PC resource from http://www.masteringmemory.co.uk/

Robertson, I. (2002) *The Mind's Eye*. London: Bantam. Underpins practical suggestions as to how to develop memory and visualisation skills with accessible and fascinating information about the neuroscientific theory underpinning the strategies.

Rose, S.P.R. (1993) *The Making ofMemory*. London: Bantum. Another fascinating read

9. Mathematics

Butterworth, B. & Yeo, D. (2004) *Dyscalculia Guidance*. London, NFER/ Nelson

Chinn, S.J. (2004) *The Trouble with Maths*. London;Routledge

Chinn, S.J. & Ashcroft, R. (2006) *Mathematics for Dyslexics: Including Dyscalculia. 3rd Edition*. London: Wiley

Clausen-May, T. (2005) *Teaching Maths to Pupils with Different Learning Styles*. London: Paul Chapman

Henderson, A. & Miles, T. (2001). *Basic topics in Mathematics for Dyslexics*. London: Whurr.

Kay, J. & Yeo, D. (2003)*Dyslexia and Maths*. London: David Fulton

Yeo, D. (2002). *Dyslexia, Dyspraxia and Mathematics*. London. Whurr

David Sharpe: Power of 2 materials available from Powerof2.co.uk

10. Study skills

General learning and study skills

Cotterell, S. (2003) *The Study Skills Handbook*. 2nd Edition. Hampshire: Palgrave MacMillan

Dupree, J. (2005) *Help Students Improve Their Study Skills*. London: David Fulton Highly recommended.

Graham, K. G. and Robinson, H. A. (1989) *Study Skills Handbook*. Delaware: International Reading Association Clearly presents theory behind range of study skills plus practical suggestions; targets teachers of older secondary-school students

Harman, C. A. and Freeman, R. (1984) *How to Study Effectively: Self-help Series*. National Extension College 18, Brooklands Avenue, Cambridge CB2 2HN.

This is aimed at further and higher-education students and can also be followed through a correspondence course guided by an experienced tutor. It has some excellent ideas, particularly for preparing for exams, but has a lot of text and could be rather daunting for an unsupported dyslexic student. Useful as a source for ideas for someone supporting a dyslexic student.

Hart, S., Dixon, A., Drummond, M.J. & McIntyre, D. (2004) *Learning without Limits*. Buckingham.: Open University Press

Heimlich, J. E. and Pittelman, S. D. (1986) *Semantic Mapping: Classroom Applications*. International Reading Association. Newark: Delaware Ways of developing curriculum-based concept maps and developing vocabulary

Holloway, J. (1999) *The Learning Kit: an Inclusive Approach to Studying* (Photocopiable resource book for study skills) Connect Publications, telephone (01273) 400118. Very useful.

JOB (2001) *The Great Little Book of Brainpower. A Lightning Learning and Brain training Self-Development Book*. Chichester: Quantum Group Lots of good tips but the neuro-science should not be taken literally.

Ostler, C. and Ward, F. (2001) *Advanced Study Skills* from SEN Marketing at 618, Leeds Road, Outwood, Wakefield, telephone: (01924) 871697 or email: sen.market-ing@ukonline.co.uk

See also the section on mind mapping and the Ostler books described under the dyslexia section (2).

Svantesson, I. (1998) *Learning Maps and Memory Skills* (second edition). London: Kogan Page Very clearly explained and demonstrated with some interesting background. Targets secondary-aged and older students.

The website for the Counselling and Psychological Services (CAPS) describes the Ten Study Traps and offers advice on how to avoid them. www.unc.edu/depts/unc caps/TenTral)s.html

See also www.cuttingedgepublications.com for highly accessible support materials for teaching English texts using multi-modal approaches.

11. Dictionaries

Phonetically based dictionary

Moseley, D. (1996) *The ACE Spelling Dictionary*. Cambridge: LDA. Dictionary using only consonant sounds, e.g. ‘n d p n d n t’= ‘independent’.

Word Finder, Morrison, M. L: Pilot Light, PO Box 305, Stone Mountain, Georgia, US. Commercially produced tapes for learning the spelling of common sight words.

12. Schema theory, metacognition and critical thinking skills

Caverley, D. C. (eds) *Teaching reading and study strategies at the college level*. Newark: IRA

Lewis, M. and Wray, D. (1995) *Developing children’s non-fiction writing*. Leamington Spa: Scholastic

Essential for introducing and practising non-fiction writing. See also David Wray's website www.warwick.ac.uk/D.J.Wray/ideas/frames.html

Mason, M. (1990) *Illuminating English, Book 3, Writing for Learning.* Wigan: Training Research Agency Consultancy Enterprises Ltd.
Fisher, R. (1995) *Teaching Children to Think*. London: Stanley Thornes

A useful introduction to creative thinking, critical thinking and problem-solving.

INDEX