DYSLEXIA AND LEARNING STYLE

A Practitioner's Handbook
Second Edition

Tilly Mortimore

John Wiley & Sons, Ltd

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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.