

# **Neurodiversity and Dyslexia: Compensatory strategies, or different approaches?**

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## **Introduction**

This paper seeks to describe a paradigm shift and articulate some of the implications for educationalists. Any paradigm shift will reframe what we think we 'know', providing new explanations for 'known' phenomena. The paper therefore begins by describing briefly what we think we 'know' about dyslexia, before relating this to the paradigm shift. This in turn leads to a brief exploration of the nature of different cognitive styles and how these relate to the experience of being 'dyslexic'. This brings us to a broader understanding of 'dyslexia' framed by 'neurodiversity' and the social model of 'disability' (Oliver 1990). Finally, this new understanding provides new directions in understanding, research and educational practice that reframes 'dyslexia' in terms of intellectual strengths and possibilities rather than simply as a set of 'difficulties'. This then questions the concept of 'compensatory strategies'.

## **What we think we 'know' about dyslexia.**

After 120 years of research and debate, we are no nearer agreeing on the 'causes' of dyslexia than we were 100 years ago (Rice & Brooks 2004). Nevertheless, there is considerable consensus about the features of dyslexia. For some, these are narrowly defined to specific auditory processing difficulties (Snowling, 1990), loosely described as phonological awareness, whereas others have a broader view of a range of processing difficulties (DfES & NIACE, 2004). In America, the difficulty of identifying underlying causes appears to have led to a utilitarian approach of referring to 'reading disabilities' while others would argue that many dyslexic readers have overcome their reading difficulties and, indeed, that some people with 'reading difficulties' are not 'dyslexic'. Nevertheless, there is agreement about the nature of the specific core difficulties associated with dyslexia. These are generally described as:

1. Underlying processing difficulties
2. Working memory difficulties

Both of which I shall briefly clarify before exploring the paradigm shift:

1. The underlying processing difficulties may include:
  - a) Auditory processing difficulties
  - b) Visual processing difficulties
  - c) Motor integration difficulties

1a) Auditory processing difficulties mean that an individual has a range of specific difficulties with processing sound. This may manifest itself as difficulty learning to associate sounds with letters, difficulties blending phonemes, difficulties with hearing 'separate' phonemes in complex sounds, difficulties processing the meaning of language at speed, or of multi tasking while trying to listen (e.g. when trying to take notes while listening) and so on.

1b) Visual processing difficulties manifest themselves by having difficulties with visual identification or recognition of flat sequences of symbols (such as writing), difficulty remembering the look of spelling, difficulties with tracking sequences in lines (such as text) and so on.

1c) Motor integration difficulties manifest themselves by having difficulty with recognising bio-feedback when coordinating actions, resulting in apparent clumsiness, unintended writing errors, poor fine-motor control, difficulty with catching balls, coordinating movement and so on.

People identified as dyslexic typically have difficulties with one or more of these processes. What all these processing difficulties have in common is difficulty with processing sequence. In this context, it may seem surprising that difficulties with time, particular its sequence, is rarely mentioned (Wolf & O'Brien, 2001), yet it is also an extremely common difficulty for people identified as dyslexic, and indeed all those identified as having a specific learning difficulty including, dyspraxia, AD(H)D, Aspergers, or indeed dyscalculia (Pollak, 2009). 2) Some psychologists argue that the real underlying difficulty is a problem with working memory (e.g. McLaughlin, Fitzgibbon & Young, 1994). This in turn leads to problems of processing sequences of information since working memory is required in their processing. Information needs to be remembered long enough until it becomes meaningful some moments later (such as early words in long sentences), or information needs to be manipulated in order to bring meaning to it. This in turn puts stress on the capacity to remember the information and its original sequence.

### **The Paradigm Shift**

At the heart of this paradigm shift is the replacement of 'deficit' with 'difference'. This may seem a small change, but it is profound. We can draw parallels with the Copernican revolution, where the earth was replaced at the centre of the model by the sun. Everything we thought we knew about causation (such as the retrograde movement of the planets) is transformed. If dyslexia is not a 'deficit', what is it?

To understand the implications of the paradigm shift it is important to recognise that a measurable 'deficit' does not mean that a 'deficit' exists, anymore than an observation

of the retrograde movement of the planets meant that their motion had gone into 'reverse'.

We can use the analogy of laterality to explain this further. If very good fine motor control of our right hand was a highly valued element of education, we would recognise that some people appear to have difficulty with this. We would have ready explanations for some of the 'dysdextrics'- they may, for example, have suffered an injury preventing the control required. But for many, there would be no obvious explanation, although we could measure the nature and extent of the specific difficulties easily enough. We might also be tempted to 'explain' any difficulties as a result of some damage that we cannot perceive or measure. However, the real explanation for the 'difficulty' would simply be that some people are left handed.

This laterality preference would give the appearance of a 'deficit', but this would simply be a social artefact of a requirement to use the right hand. The new paradigm argues that this is precisely the nature of the problem for dyslexic learners. We are being expected to process information in ways that do not make sense to us, so appear to have a 'deficit' in information processing. Whereas if we were enabled to process information as we wish, there would be no 'deficit', simply a different set of abilities. This has profound implications for our education system, which is in effect disabling dyslexic learners by expecting us to process information like everyone else and creating a large and largely unnecessary problem in the process.

The paradigm shift therefore has three implications:

1. the value system of the new paradigm posits that there is nothing wrong with being 'dyslexic', but that we should be building on strengths rather than disabling people by attempting to 'remediate' perceived deficits; being dyslexic is merely a consequence of being different in a world intolerant to such differences.
2. The 'difficulties' experienced are real, but they are socially imposed, rather than individual 'deficits'. In other words, there are no 'medical causes'. The implication of this is that we should be seeking social and educational solutions to removing the barriers to learning, rather than 'remediation' to enable dyslexic people to 'cope' with a disabling system.
3. Instead of conceiving dyslexia as a set of specific learning difficulties, we should be identifying the nature of the core differences between those who are labelled as dyslexic and those who are not. In other words, at the centre of the 'medical model' of dyslexia is the nature of the 'deficit'; whereas at the centre of the social model is the nature of the 'difference'. In the new paradigm, 'difference' is not a euphemism for 'deficit', it is the underlying difference or differences that lead to the misperception of 'deficit' in our society.

The paradigm shift therefore provokes the question, what is the nature of these differences?

Attempting to answer this question led to the Bagatelle model of specific learning differences, which is addressed later in the paper. I begin here with the building blocks to understanding the nature of the differences.

### **Cognitive styles**

I have argued elsewhere that,

*“I am **not** someone **with** dyslexia. I **am** dyslexic. Were I not dyslexic, I would **not** be **me**.”* Cooper (2009)

This is because dyslexia is a label that results from how we process information. It is not something that happens to us, like losing an eye, or a leg. It is fundamental to who we are. Consequently, in seeking to identify fundamental core differences between those labelled as dyslexic and those who have not been, we need to start with how dyslexic people process information, recognising that we are also dealing with identity politics. For too long, non-dyslexic ‘experts’ have been pontificating on the nature of dyslexia with little understanding, or sometimes even empathy. It is time dyslexic people spoke up for ourselves.

How an individual processes information is known as ‘cognitive style’ and this also adapts in response to an individual’s perception of the nature of the information to be processed (in a similar way that individuals may choose to use their less preferred hand in particular circumstances). Visual and verbal thinking will be briefly explored before considering how meaning itself is processed. This will then lead into an analysis of the myth of ‘working memory deficits’.

A number of dyslexic theorists have argued that a strong preference for visual thinking is an intrinsic element of being dyslexic (West, 1991, Davies, 1994, Cooper, 2006a) and also argued that visual thinking intrinsically affords typical dyslexic creative strengths as well as typical sequential ‘weaknesses’. My own research took an empirical approach and explored how individuals problem-solve by providing problems to be solved and then asking how individuals attempted their solutions (Cooper, 1997). When preferences for visual or verbal approaches were described, the individuals were then asked to attempt solutions using the different approach (visual for verbal, or verbal for visual) to gauge the strength of their preference.

Those identified as dyslexic are almost 7 times more likely to have an extreme preference for thinking visually (they think visually and never verbally), compared to non-dyslexic people (Cooper, 2006a); the sub-group with this extreme preference is almost one third of the dyslexic group. Overall, 80% of those diagnosed as dyslexic

prefer to think visually (compared to 65% of the non-dyslexic group). It is therefore clear that visual thinking is surprisingly common and not a defining characteristic of being dyslexic, but dyslexic people are far more likely to have a strong preference for visual rather than verbal thinking. It should also be noted that where the preference is extreme, they cannot use alternative ways of thinking.

Thinking visually or verbally have specific advantages and disadvantages. Thinking verbally, for example is an advantage when being analytical, critical and logical. It lends itself to abstractions, deduction and attention to detail. In contrast, visual thinking is much faster, and lends itself to lateral thinking, inductive logic, overviews and being imaginative. It is an advantage when thinking symbolically, analysing patterns and inter-relationships (Cooper, 1997).

In short, verbal thinking is an advantage when dealing with sequences, and visual thinking is an advantage when processing information holistically. However, it is possible to use verbal thinking holistically (such as in poetry and verbal imagery and visual thinking sequentially (such as in storyboards)

### **The Myth of 'Working Memory Deficit'**

Education appears to place a surprising degree of value on memory of all kinds, when it is increasingly easy to look up information and detail, if you understand what to look for. Working memory is the process through which a learner holds on to meaningless information long enough to use (like a telephone number) or to make it meaningful. Having difficulty holding on to spoken instructions for long enough to bring meaning to them and follow the instruction is taken for granted. Finding this difficult is often used as an indicator of 'stupidity' (like being unable to spell, or struggling to learn to read). These experiences can then become defining in individuals' lives (Morgan & Klein, 2000). Holistic thinkers rely on meaning to remember something rather than working memory.

Attempts to remediate this 'working memory deficit' often focus around multisensory teaching or approaches to remembering information, recognising that the more senses involved in memory, the more mutually supportive the sensory experience becomes, improving a 'poor memory' (Carter, R., 1996). However, if you ask a dyslexic learner what they do when they need to remember something (Krupska and Klein, 1995, Morgan & Klein, 2000), they will usually describe an often convoluted approach to making the information meaningful (often through personal association). This is

because meaning is the real key to memory, not multisensory approaches, which can only approximate the skills of someone with a 'good memory'.

The reason this is important, is that if we think in terms of 'remediation' or even 'compensatory strategies', we are always expecting to approximate the skills of non-dyslexic people, rather than build more systematically on the strengths of the individual to enable them to excel.

Meaning can be processed either sequentially, or holistically, but not at the same time. You must choose one or the other at any given moment. The fundamental difference in the way that dyslexic people process information is that they need to do this holistically, rather than sequentially. If you process information holistically, it relies on imagination in order to make connections and see meaning in the whole pattern, and very little on working memory. In other words, a strong preference for processing information holistically goes hand-in-hand with little facility for working memory. In contrast to this, if you process information sequentially, it relies heavily on working memory and very little on imagination. This difference is the key to understanding why dyslexic people appear to have difficulties with 'working memory', and conversely, why so many non-dyslexic people appear to have difficulty with 'imagination'. Fortunately for 'non-dyslexic' learners, a lack of imagination is rarely perceived as a specific learning difficulty or an indicator of 'stupidity'.

To use a computer analogy, whether information is processed holistically or sequentially can be imagined as the machine code. Most people are unaware of how they do this, it is so ingrained that it is almost entirely taken-for-granted. It usually remains invisible in interactions. In contrast, visual or verbal thinking can be imagined as the software that allows meaning to be manipulated and communicated. We tend to be more aware of how we do this and it is more accessible to self-reflection. But thinking visually and verbally can also be bent towards either sequential or holistic purposes when necessary. A preference for visual or verbal thinking can therefore be an indicator of a fundamental difference in how information is processed, but it is not, in itself, the fundamental difference. For example, some holistic thinkers, particularly those who taught themselves to read before going to school (by taking a thoroughly holistic approach) usually think verbally (Cooper, unpublished research).

The working memory 'deficits' (which are undeniably measurable, and can cause great difficulties when the ability is taken for granted) are simply an artefact of differences in the way information is processed. It can be argued that all processing difficulties of sequential information (visual, auditory and motor) are underpinned by working memory difficulties (McLaughlin, Fitzgibbon & Young, 1994). The largely anecdotal dyslexic 'strengths' such as creativity, 3D modelling, and lateral thinking are simply by-products of holistic processing of information.

## **Neurodiversity**

The term 'neurodiversity' was coined by Judy Singer (cited in Blume, 1998). It argues that we are entitled to be different and learn differently. It was coined in outraged response to eugenic plans which assumed that if we cannot cure 'autism' then we could prevent it through genetic screening of foetuses. In other words some medical professional or academic felt entitled to assume that this difference was 'deficit', and from that render the person unworthy of life.

Recognising that a number of specific learning 'difficulties' tend to overlap the neurodiversity perspective talks of 'overlapping conditions', in contrast to the deficit focused medical model which uses the unpleasant term of 'comorbidity'. A closer examination of these 'overlapping conditions' gave rise to the Bagatelle model.

### **The Bagatelle Model**

The overlapping conditions include a range of 'specific learning differences' including dyslexia, AD(H)D, dyspraxia, dyscalculia and Aspergers syndrome. They are all defined (or more accurately, described) by their unique set of 'symptoms', 'deficits', or 'difficulties'. However, the overlapping conditions are so closely aligned that if an individual is diagnosed with one, then they are more likely to have a second than not (Pollak, 2009). For example, 50% of those diagnosed as AD(H)D are also diagnosed as dyslexic, an overlapping 50% are diagnosed as dyspraxic. 26% are diagnosed as having Aspergers. Similarly, 50% of those diagnosed as dyspraxic are also diagnosed as dyslexic (reported in Colley, 2009).

Clearly, these are not slightly overlapping, but significantly so. If we ask what this range of people has in common, we find two things (Pollak, 2009):

1. A preference for processing information holistically
2. Working memory difficulties

This paper has argued that these only appear to be two things, whereas they are two sides of a single coin. If this is the case, we need to explain how unique and sometimes conflicting 'symptoms' or 'difficulties' arise. The Bagatelle model attempts to do this. Let us imagine that we start life with a set of more or less unique ball-bearings to represent our innate differences and that these are fired into the Bagatelle of life. (The Bagatelle will, of course, vary according to our individual social circumstances). We bounce around the board reacting to the sometimes painful experience of the pins (or social expectations and interactions). Balls become trapped in different places and eventually land into a series of slots. Particular differences in the size and weight of

ball-bearings predispose, but do not predetermine, which slots the ball-bearings end up in. The labels of dyslexia, dyscalculia, dyspraxia etc are determined by the unique slots that the balls end up in, rather than by the intrinsic differences of the people labelled. For example, if the difficulties with sequencing appear to affect sound processing, then that is diagnosed as 'dyslexia'; if they appear to affect muscular control, then that is diagnosed as 'dyspraxia', and so on. We are vulnerable, in a social and educational world that requires efficient working memory and processing of sequence, to a range of apparent sequencing difficulties.

Providing labels at the end of the educational and social journey is misleading, because it gives the false impression that each of these difficulties (or 'deficits') is a separate problem with unique causes. In contrast, the Bagatelle model articulates how a single difference in how information is processed can lead to a wide range of apparent 'deficits'.

The dyslexic world has been quite rightly at pains to insist that being 'dyslexic' is not a 'psychological' problem, that the difficulties are real (Miles, 2003). However, in doing so, we have underestimated the significance of the emotional and psychological impact of day-by-day interactions which have also shaped our skills, difficulties and self-perceptions.

Differences in how we process information are largely hidden. Difficulties we have with tasks in education are public and often humiliating. They are closely associated with significant others telling us what the difficulties mean ('stupid', 'kack-handed', 'dreamer', 'rubbish at maths', etc.), and our own interpretations of what this may mean- what we feel able to dismiss, acknowledge, avoid, and master. These are powerful experiences that can have an indelible affect on one's self perception and life's journey. They lead to a range of difficulties that are variously described and labelled, but they share the same core difference.

The model also explains how, for example, someone diagnosed as 'dyspraxic' because of identifiable muscular coordination difficulties can also excel at dance or sport. They can because they do these holistically, by feel, rather than in a step-by-step way. This is therefore also the key to transforming a difficulty into a skill; doing things 'differently' often includes specific advantages.

### **Educational responses**

In a world where the most common and persistent response to the difficulties and barriers imposed on people with specific learning differences is to ignore them and assume that the difficulties experienced are a product of the individual's 'inability', the medical model can be seen as benevolent, if patronising. It recognises that the difficulties experienced are not the fault of the individual, even if they are believed to be

a 'fault' intrinsic to them, and argues for resources to help remediate the 'deficits'. However, the implication of the social model is that remediating 'deficits' is focusing on the wrong thing. Remediation, and the development of 'compensatory strategies', will help to approximate the skills of those perceived as 'normal'. But in contrast to this, the reality is that people with specific learning differences frequently and persistently exceed the abilities of 'normal' people. This 'ability' is writ large in the history of science (e.g. Newton, Faraday, Edison, Bell, Einstein, Lovelock,), sport (e.g. Jackie Stewart, Denis Berkamp, Steve Redgrave, 'Magic' Johnson, Mohammed Ali), leadership (e.g. Winston Churchill, General Patton, JF Kennedy, Woodrow Wilson), art (e.g. Leonardo de Vinci, Michelangelo, August Rodin, Pablo Picasso, Andy Warhol), architecture (e.g. Antoni Gaudi, Richard Rogers, Norman Foster), acting (e.g. Marlon Brando, Dustin Hoffman, Tom Cruise, Danny Glover), film directors (e.g. Walt Disney, Spielberg, Tarantino), writers (e.g. Agatha Christie, John Irvin, Linda La Plante, Hans Christian Anderson, Yeats, F. Scott Fitzgerald), chefs (Jamie Oliver, Marco White), comedians (e.g. Ben Elton, Whoopie Goldberg, Eddie Izzard, John Bishop), musicians/songwriters (e.g. Neil Kennedy, John Lennon, Noel Gallagher), and entrepreneurial endeavour (e.g., Branson, Gates, Jobs, Allen Sugar) even if many of us are comprehensively disabled by our educational and social experiences.

A better educational response is to systematically eliminate unnecessary and arbitrary barriers to learning and achievement. A more enlightened response would be directly linked to building on the strengths of holistic thinking. Many lecturers bemoan the rote learning attempted by their students, who have learned this strategy 'works' for them during most of their education (Kinchin et al, 2008). In contrast, holistic learners rely on understanding a subject in order to remember the detail of it. In this respect, we could be considered perfect students.

Paradoxically, for many people who learn best sequentially, a holistic understanding is seen as the apex of educational achievement. Sadly, this is misconceived as necessarily a product of a slow step-by-step process. Most of us with specific learning differences find the more 'advanced' ideas simple, and the apparently 'easy' concepts or tasks difficult (West, 1991), because there is little there to understand. This represents a significant barrier to people with specific learning differences and we are often disallowed from studying at more 'advanced' levels because of our difficulties with the 'lower' levels. While we continue to be disabled in this way, it is a minimum requirement that additional resources are provided to help to create a level playing field. Without it, huge educational and social potential is lost. However, to respond adequately to holistic learners, a better understanding of the nature of holistic thinking is required.

### **The value of holistic thinking**

Holistic thinking has a great deal to offer teaching and learning and involves a range of processes including random association, pattern appreciation or analysis, and inductive logic. Most learners use these processes at times, but holistic learners rely on them, often entirely.

Random association is often dismissed as 'dreaming', but the importance to holistic thinking is extremely undervalued in the classroom. Random association is the underpinning of lateral thinking. It is also an important feature of mind- or concept-mapping. Random association allows us to rethink what the organising principle of the information needs to be to suit the current purpose.

Holistic thinkers are fascinated by patterns. For us, the analysis of patterns is the analysis of meaning. Patterns that are apparently meaningless are fascinating because they are a puzzle inviting us to 'see' the hidden meaning. Learning for a holistic learner is characterised by 'eureka moments' when the pattern 'falls into place'. Abstract, theoretical thinking is the construction and manipulation of symbolic patterns (or models). For those of us who think visually, these patterns and models are often constructed in three or more dimensions, colour coded and textured. Exploring them (also often mislabelled as 'dreaming') can be intensely pleasurable. Playing with patterns can lead to being visionary and finding new ways of seeing the world and is essentially problem-solving and constructive, rather than critical.

The advantage of visual displays and manipulation of meaning is becoming increasingly commonplace through computer simulations, graphic analysis and displays. What was once seen merely as a method of displaying information, is increasingly recognised as a means to manipulate and reinterpret meaning (Kress and Van Leeuwen, 2006). It allows the researcher to consider multiple factors at once in an intuitive way. This is second nature to holistic, visual thinkers (West, 1991).

Holistic thinking often invites 'what if' scenarios, so that we can play with possibilities. We image ourselves within multi-sensory realities so that inductive logic (spinning principles and effective strategies out of imagined specific experiences) can create new ways of understanding the world and new ways of solving problems. It avoids reproducing 'known' solutions which can often duplicate the same set of problems or limitations. This is important for original thinking of all kinds.

Inductive logic allows us to learn from our experiences in ways that deductive logic finds more difficult, because when using deductive logic the temptation is to try to impose the principles on the experience, or at its worst even deny the experience (Frazer, 2006, Cooper, 2006b). Inductive logic has its own limitations, but has the advantage of

building on experience and therefore tending to be solution focused, rather than merely critical. It involves an integration of theory with practice.

Although holistic thinking can mean that sensory information is ignored while information is processed internally, the interconnectedness of information is an important element in bringing meaning to it. Consequently, it is important to stay open to new possibilities and favours reinterpretation and new ways of seeing patterns. Holistic learners are usually also tuned in to a wider spectrum of experiences since everything can seem interconnected. This can result in good 'people skills' and using interaction with others to trigger new perspectives and the possibility of reforming patterns and meaning.

Perceiving meaning as interconnected drives the desire to seek out connections between silos of information, synthesising ideas and developing new paradigms and elegant patterns in the information.

Holistic skills and abilities could be seen as of great value to the education process, and to society at large. Sadly, only a small minority of people with specific learning differences survive the educational experience to get to the point where their ideas, perception, skills and abilities can be valued. A far greater proportion end up incarcerated in our prisons (various studies have indicated that dyslexic people make up 20 to 40% of the prison population- Kirk & Reid 2001)

## **Conclusions**

The social model of disability is a competing paradigm with the medical model, and is slowly displacing it both academically and in legislation in the UK (e.g. Disability Equality Duty, 2006). It is based on different values; that being 'different' can be beneficial, rather than requires 'remediation'. The apparent 'deficits' of being dyslexic are explained as merely artefacts of inappropriate social and educational expectations. We have become accustomed to labelling people through the identification of the difficulties that have been imposed by social and educational barriers (assumptions, systems and expectations) mediated through social interactions. People who have specific learning differences are in effect disabled by society, and this requires more sociological analysis than psychological, even if the psychological consequences, and indeed damage, can be extreme (Edwards, 1994, Miles & Varma, 1995). The difficulties experienced are the result of complex social interactions that impact on self-perception and social expectations. The difficulties that remain are not the 'differences', but the

consequences of the disabling effect because of the differences. A sociology of dyslexia is needed to explore and elaborate the process further.

The core difference of those with specific learning differences share is a strong preference for holistic processing of information with an associated difficulty with working memory. A rational educational response to this is to recognise the value of this difference and enable people to excel at how they learn best.

The advantages of holistic thinking already provide great success in key areas of human endeavour; science, art, sport, leadership, and entrepreneurial activity. This is despite the social maintenance of real and significant barriers to learning and achievement. Notwithstanding these barriers, and because of the specific learning differences, excellence of achievement is dominated by people with specific learning differences. Educators need to begin to recognise that learning holistically is at least as fruitful as learning in a sequential, linear way, and deserves to be supported rather than disabled.

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