

The role of the optometrist in dyslexia

Part 1 Specific learning difficulties

This is the first in a new three-part CPD series providing an update on the role of the eyecare practitioner in dyslexia. The articles are based on a recent book by the author¹.



ABDO has awarded this article
2 CET credits (GD).

This first article provides an overview of the specific learning difficulties, diagnosis of dyslexia, terminology, aetiology, types of dyslexia, non-specific learning difficulties, the role of visual symptoms and the evidence-based approach. Part 2 will outline common optometric findings in dyslexia (binocular instability and accommodative insufficiency), the magnocellular deficit, the Dunlop test, behavioural optometry, and version eye movements and tracking. The final part will cover coloured filter treatments including syntonix phototherapy, Meares-Irlen syndrome, the Intuitive Colorimeter, mechanism for the benefit from colour, clinical protocol, and a comparison of available systems. Finally, some conclusions will be drawn on the role of the optometrist in dyslexia.

What is dyslexia?

We all have strengths and weaknesses and, at its simplest level, dyslexia can be described as a condition in which people have specific difficulties with reading and spelling. Unfortunately, in education and life in general, reading is a key which is needed to unlock a great many doors. If a child has a specific difficulty with, for example, learning music or learning to draw, then they can survive at school with their academic performance relatively unaffected. But, if their specific learning difficulty is with reading, then their schooling will be greatly affected, even if they are highly intelligent and articulate.

Using a simple lay definition of dyslexia as a specific difficulty with reading and spelling, it is implausible to argue that dyslexia does not exist. A slightly more detailed definition is, "Dyslexia is evident when accurate and fluent word reading and/or spelling develops very incompletely or with great difficulty"².

Dyslexia is a lifelong condition. As children age, the reading problem in some cases becomes less apparent, but a spelling difficulty usually persists throughout life. The visual correlates, described in the next two articles in this series, can affect adults as well as children. Optometrists who specialise in investigating the visual correlates of dyslexia should be as prepared to look for these correlates in adults as in children.

Diagnosis of dyslexia

Accurate diagnosis of dyslexia is not the role of the optometrist, but is usually carried out by an educational psychologist. In their

assessment, psychologists typically measure the intelligence quotient (IQ) and various aspects of reading performance, spelling, mathematics, sequential memory and other aspects of cognitive and emotional development. A report from such a psychometric assessment would outline the precise nature of any (specific) learning difficulties, and make appropriate recommendations for the extra help which the person needs to receive.

It is not necessary for a child to have a detailed psychometric assessment, or to be diagnosed as dyslexic, before seeing an optometrist. The limited available evidence suggests that the visual factors associated with dyslexia are also associated with milder and less specific degrees of reading difficulty. Therefore, it is recommended that all children suspected (by teachers or parents) of under-achieving at school should be examined by an optometrist, preferably one who has specialised in this field.

Dyslexia used to be called 'specific reading retardation' or 'specific reading disability', but 'specific reading difficulty' is now the preferred term. The term 'dyslexia' is sometimes misused, but the condition genuinely affects 4-5% of children, possibly more boys, and affects people of all IQs and backgrounds. It is not true to say that dyslexia is more prevalent in the middle classes, but the condition is under-recognised in people from lower socio-economic groups.

Diagnosis and treatment in the UK

State funded or private?

Further to the Education Act of 1996, in 2001 the Department for Education and Skills published a Code of Conduct for children with special educational needs³. This states, in principle, that a child with special educational needs should have their needs met. The code goes into great detail about how schools should act in the interests of children with special educational needs. In reality, parents often report great difficulties in persuading schools to fully investigate their children's difficulties. The British Dyslexia Association⁴ is a charitable organisation which, amongst other roles, provides information to help parents pursue a state funded assessment of their child's suspected specific learning difficulties.

An alternative approach is to seek a private



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awarded this article 2 CET credits.
There are 12 MCQs with
a pass mark of 60%.

Module 1 Part 1 Dyslexia and vision

About the author

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assessment by an educational psychologist. The Dyslexia Institute⁵ is a charitable organisation with local offices throughout the UK, where children who are having difficulties at school can attend for a private assessment by an educational psychologist. Some educational psychologists also offer private assessments independently of the Dyslexia Institute, or through other organisations. Assessments by educational psychologists are typically very thorough, and include a detailed assessment of IQ, reading, spelling, mathematics and other psychometric tests. The outcome is a thorough report with recommendations, often for extra teaching. Many of these organisations offer the services of specialist teachers and specialist teaching remains the core treatment for dyslexia.

Aetiology of dyslexia

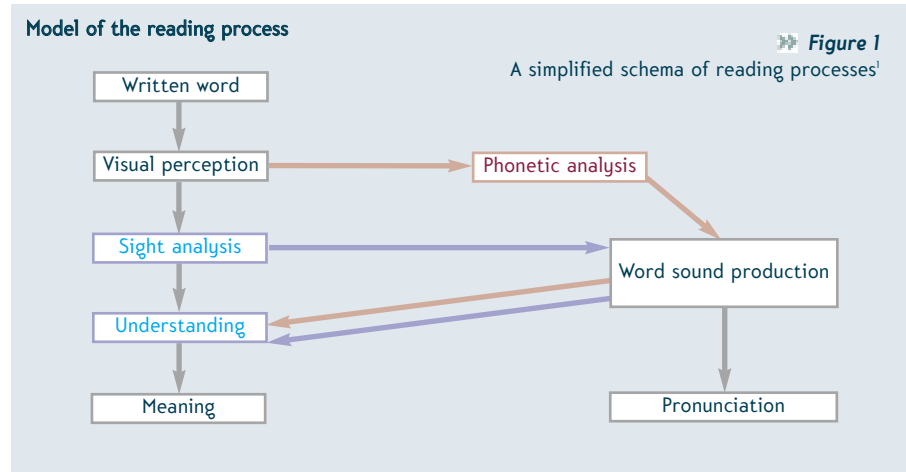
There is overwhelming evidence to suggest that a core deficit in most cases of dyslexia affecting English speaking people is a difficulty with phonological decoding. This refers to the ability to translate a visual image into its component sound units. The implication is that the visual image is unaffected; it is the higher level decoding which is a problem. This led to a famous stance by some psychologists researching phonological factors in dyslexia – the ‘no visual deficit hypothesis’.

However, there is also strong evidence to suggest that many people with dyslexia have visual deficits¹. The simple explanation is that a variety of different factors can contribute to dyslexia, and more than one of these factors may be present in a given case. Visual and phonological deficits often go hand in hand. This means that if an optometrist finds a visual deficit then they should not claim to be able to cure the dyslexia, since any visual treatment will not be likely to influence phonological skills. But it also means that if a psychologist or teacher finds evidence that a dyslexic child has difficulty with phonological decoding, then these children still may benefit from an optometric assessment.

All dyslexic children ought to have their visual function thoroughly investigated. Visual factors are rarely the sole cause of reading difficulties, but are often contributory factors.

An American optometrist, Harold Solan, summarised this issue when he said, “Optometrists do not treat dyslexia. They treat reading-disabled children who manifest some type of visual dysfunction....”. But it should also be noted that the presence of an optometric problem (e.g. refractive error or convergence insufficiency) in a dyslexic person does not necessarily mean that this problem is contributing to the child’s specific learning difficulty. The optometric anomaly may just happen to be there as a coincidental finding, or may be a non-causal correlate of dyslexia.

Studies of cortical blood flow show that



many different areas of the brain are involved in reading. The brain, as we know it, evolved before written language was developed so there is not a single ‘reading area’ of the brain. This is one reason why children learn to speak automatically but have to be taught to read.

Galaburda and colleagues, in post mortem studies, have found a lack of cerebral asymmetry in dyslexia and minute focal abnormalities (ectopias, or ‘brain warts’), scattered over the surface of the cerebral cortex⁶. Their theory is that these findings result from some abnormality during foetal development, possibly a testosterone imbalance. The testosterone hypothesis is attractive because it could account for the greater prevalence of dyslexia in males, although a few people argue that it is equally prevalent in males and females. In any event, the scattered focal abnormalities could account for the many correlates of dyslexia. It could just be a coincidence that some of the areas which are affected influence reading, and hence cause dyslexia. This hypothesis raises the possibility of non-causal correlates of dyslexia and some visual factors are probably non-causal correlates of dyslexia (e.g. a pursuit eye movement deficit).

It should be noted that Galaburda’s findings are subtle. When speaking to patients and their parents, it is best to describe the brain as ‘different’ (not ‘abnormal’) in dyslexia. Many people with dyslexia have great gifts and geniuses such as Leonardo da Vinci, Einstein, Shakespeare and Rodin are thought to have been dyslexic. Indeed, it is possible that some people are particularly gifted because they are dyslexic.

A recent survey suggested that self-made millionaires (e.g. Richard Branson) were particularly likely to have dyslexia, perhaps because they tended to look at the whole picture instead of becoming bogged down in detail. Perhaps in the future our society might celebrate the difference that is dyslexia rather than thinking of the condition only in terms of its negative side, i.e. the difficulty with reading and spelling.

Technology will no doubt help; as software developments in dictation and spell checking continue to improve, this will inevitably reduce the handicap of dyslexia.

Types of dyslexia

One source of confusion relates to the use of the terms ‘vision’ and ‘sight’ to refer to many different things. When psychologists use these terms in their psychometric reports, then the terms often have very different meanings to their use by optometrists.

When children first start to read, they learn to recognise simple words by their shapes (sight analysis), building their sight vocabulary. Later, they learn how to analyse complicated words by breaking them down into their sound components – phonetic analysis (Figure 1). Some people with dyslexia have a deficit in one of these two pathways and this has been used to classify the dyslexia. But these pathways refer to high level cognitive factors, not to the low level visual factors that optometrists assess.

Both the above pathways start with visual perception (Figure 1) and indeed, with the exception of Braille, all forms of reading start with visual perception. This is important because when psychologists assess people with dyslexia, they sometimes classify them as having a visuo-spatial or an auditory-phonetic form of dyslexia. Other authors have used different terminology for these two sub-types of dyslexia, with the visuo-spatial type being called dyseidectic or surface dyslexia, and the other type dysphonetic or phonological dyslexia. However, it should be noted that most cases are probably best described as a mixture of these two types.

People with the visuo-spatial type of dyslexia are sometimes described as having ‘visual dyslexia’, although this term can cause confusion. This classification into visuo-spatial and auditory-phonetic is based on deficits in the two pathways outlined in Figure 1. The types of low level visual anomalies discussed in this series are very different to the high level analytical processes relating to visuo-spatial dyslexia.

It is sometimes assumed that children who see a psychologist for an assessment only need to be then referred to an optometrist if the psychologist finds a visual-spatial type of deficit, and not if there is an auditory-phonetic form of dyslexia. But, in fact, people with either type of dyslexia should see an optometrist. Put another way, the psychometric profile of a dyslexic person's difficulties does not accurately predict how likely that person is to have an optometric problem.

The term visual dyslexia has also been used in a completely different way in the 1980s to describe people with dyslexia who had an unstable response on the Dunlop test (see Part 2). In the 1990s, it was used to describe dyslexic people who had a magnocellular deficit (see Part 2). More recently, the same term has been used yet again to describe people who benefit from coloured filters. The use of the term visual dyslexia to refer to these low level visual deficits is completely different to the more common use by psychologists to refer to high level visual deficits, and this is a source of confusion. Another disadvantage of the use of the phrase visual dyslexia by eyecare practitioners is that parents might imply that the sole cause of the reading difficulty is a visual problem, and this is rarely the case. Such claims, or misperceptions, can antagonise other professionals (e.g. educational psychologists) who come across so many claims for new 'cures for dyslexia' that they become understandably sceptical. For these reasons, the term visual dyslexia is more likely to mislead than to inform and is best avoided.

Other specific learning difficulties

Dyscalculia is a specific learning difficulty affecting numerical skills, such as mathematics. It is sometimes associated with dyslexia. Compared with dyslexia, dyscalculia receives relatively little attention and it is much less frequently diagnosed.

Dyspraxia is a disorder of voluntary movement. People with dyspraxia have an inability to perform, command or imitate a familiar action, even though they understand the action that they have been asked to do. Dyspraxia is sometimes associated with dyslexia. Two other terms (developmental co-ordination disorder and clumsy child syndrome) are used to describe conditions which are similar in nature (but have subtle differences from) dyspraxia⁷.

Attention deficit disorder (ADD) is a condition which often goes hand in hand with dyslexia. ADD is sometimes associated with hyperactivity; these are the children who, left unguarded, might wreak havoc in your consulting rooms. But ADD can also occur without hyperactivity; these people may have difficulty concentrating, but are not overtly hyperactive. ADD may

influence many of the results that optometrists obtain during their eye examinations. For example, if during a near point of convergence test the child's attention wanders from the fixation target, then we might think that they have poor convergence – when, in fact, the finding might just be a manifestation of ADD. Similarly, when an optometrist carries out the ocular motility test on a patient with ADD, the patient may lose fixation of the target; the smooth pursuit eye movement may be interrupted with saccadic eye movements. This does not necessarily mean that the patient has an eye movement deficit; it may just be that as their attention wanders, so then does their fixation. Optometrists need to bear this in mind during their eye examination, and this point will be discussed later in the series.

There has been very little research on visual factors and specific learning difficulties other than dyslexia. Until more is known about these conditions, it would seem prudent to carry out a similar optometric work-up for people with these conditions as for people with dyslexia.

Non-specific learning difficulties

People with non-specific learning difficulties have general learning difficulties across a wide range of activities and the person's IQ would also be significantly below average. A mild non-specific learning difficulty is not a disease or a reason for excessive concern. If the average IQ is defined precisely, then half the population will have a lower than average IQ.

The term profound learning difficulties, or learning disabilities, is usually reserved for people who have a severe intellectual impairment. In the past, people with profound learning difficulties might have been described as mentally retarded. In some cases, there can be a constitutional cause for the learning disability, such as a genetic (chromosomal) defect in Down's syndrome, fragile X syndrome, or problems around the time of birth (e.g. hypoxia) in cerebral palsy (although many people with cerebral palsy have normal intellectual functions). The term 'learning disabilities' is sometimes used differently in North America to refer to specific learning difficulties (e.g. dyslexia), which are described above.

There are visual anomalies which are particularly likely to affect people with profound learning difficulties. This subject is not covered in these articles, but has been the subject of an excellent CET package on Learning Disabilities produced by DOCET in 2000⁸.

Visual symptoms and dyslexia

Some research studies have found that children with dyslexia report more visual symptoms than good readers. However, children might not report their symptoms, assuming that everyone has the same

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Select the examination you want to enter from those available. It is important that you choose the right one and do not enter your answers into any other available examinations running at the same time as you will not be able to go back to try again. Any errors made by participants cannot be recalled.



Enter your answers, and an optional email address if you want email notification of your results. Check your name is correct and press the 'send answers' button. The next screen will show your percentage and any credits gained. The results page can be printed or emailed to you if you entered your email address earlier. You will need to keep this for your records.

Note: Netscape Navigator 5 and Internet Explorer 5 or more recent is recommended.

Table 1

Examples of some symptoms that can be useful in assessing people with specific learning difficulties (SpLD) – NB this list is not exhaustive

Symptom or history	Rationale
Is the SpLD mainly with reading, spelling, writing or mathematics?	If a visual problem is present, then one would expect reading to be a problem. But, sometimes reading may be adequate, but nonetheless capable of improvement
History of spectacle wear	Evans <i>et al</i> ¹⁰ found that children with dyslexia were more likely to have been prescribed spectacles, but no more likely to be using them ¹¹ . This may indicate zealotry for practitioners to try borderline refractive corrections, which are not helping
History of eye exercises or patching	Some children may have received eye exercises for binocular vision anomalies, or indicating vision therapy by a behavioural optometrist (see Part 2). Patching might indicate amblyopia or a treatment advocated by some practitioners who use the Dunlop Test (see Part 2)
History of use of coloured filters	Sometimes, the required colour changes (see Part 3). So, discontinued use in the past does not necessarily mean that filters are no longer required
History of epilepsy, fits or convulsions	Some people with photosensitive epilepsy can also be helped by using coloured filters ¹¹
Headaches: frequency, type, severity, location, associated factors, triggers	Headaches when reading, or from lights or patterns, can be a sign of Meares-Irlen syndrome (see Part 3) or visual stress, particularly if the headaches have the characteristics of migraine ¹² . Headaches can also be triggered by binocular vision anomalies or uncorrected refractive errors ¹
Is reading usually clear; does it ever go blurred?	Blurring can be a sign of refractive, accommodative, or orthoptic anomalies. It can also be a sign of Meares-Irlen syndrome. For some children, text is initially clear and then blurs, so the questioning needs to ask specifically whether text ever blurs
Do letters or words stay still or do they move?	Moving text is a common symptom of Meares-Irlen syndrome, but can also be a sign of binocular instability. Again, the movement may only happen after reading for a while, so the question should reflect this
Do letters or words change size or fade or disappear?	Both these symptoms can indicate anomalies of binocular co-ordination or accommodation, or Meares-Irlen syndrome
Do you have trouble changing your focus from things on the board to in a book?	This could be a sign of accommodative dysfunction or binocular 'inco-ordination'. Alternatively, there may be no visual cause since people with dyslexia often have poor short-term memory and copying from the board requires the person to hold information in short-term memory
Do you ever experience double vision?	A classic sign of a binocular vision anomaly, but can also be a sign of Meares-Irlen syndrome. Diplopia can be demonstrated (e.g. with a vertical prism) so that the child knows what is meant
Do you ever experience sore or tired eyes (e.g. when reading)?	This may be a sign of refractive, binocular, accommodative and anterior segment anomalies, Meares-Irlen syndrome, or just normal tiredness
Do you hold reading unusually close or far away?	This may be a sign of refractive, binocular, or accommodative anomalies; Meares-Irlen syndrome, or just a habit
Do you ever close or cover one eye?	This symptom is strongly suggestive of a binocular anomaly. Occasionally, it can be a sign of Meares-Irlen syndrome
Do you tend to skip or omit words or lines?	This could be a sign of Meares-Irlen syndrome, a binocular anomaly, or just late reading development. Much more rarely, it might be a sign of an eye movement anomaly
Are you particularly sensitive to light?	This could be a sign of Meares-Irlen syndrome or a binocular vision anomaly. Photophobia and frequent headaches seems to be a strong indicator that precision tinted lenses may help ¹³
Family history of learning problems	Dyslexia tends to run in families
Family history of orthoptic problems	Orthoptic problems tend to run in families
Family history of migraine	Migraine headaches tend to run in families and can sometimes be helped with precision tinted lenses

experience. It is not uncommon for a child to fail to describe any symptoms for a visual condition which would, in an adult, cause acute complaints of blurring, eyestrain, or headaches. Yet, once the condition has been corrected, the child may then describe the initial symptom which has now been alleviated. The term 'visual perceptual distortions' is sometimes used to generically described several symptoms which can occur when viewing a page of text or writing on a white board (e.g. blurring, doubling, movement, patterns, fading, colours).

Even when children do report visual symptoms, their reports are often difficult to interpret. Whilst many adults can clearly differentiate between blurring, doubling, and words moving, many children cannot. And even if they can, these symptoms are non-specific. In other words, different visual problems can cause similar symptoms. For example, the symptom of words moving on the page is suggestive of Meares-Irlen syndrome (see Part 3), but could also be caused by binocular instability (see Part 2). Conversely, the symptom of diplopia is suggestive of binocular vision anomalies, but could also be caused by Meares-Irlen syndrome.

Many of the visual symptoms in Table 1 do not occur immediately, but rather after the child has been reading for a while and the questioning of the patient needs to detect this. For example, many children who would say "No" to the question, "Are words in a book normally clear?", would say "Yes" to the question, "Do words in a book ever go blurred?".

Some research studies have attempted to discover questions which parents or teachers can ask children to try to identify those with visual problems. But for the reasons given above, this approach has many limitations. Hence, although it is sensible for parents or teachers to carefully question dyslexic children about any symptoms that they may have, it is not safe to conclude that people who do not report symptoms do not need an eye examination.

This is not to say that symptoms are of no use. There are certain visual symptoms which, although not always present, are particularly likely to be present in children whose reading difficulties are associated with visual anomalies. In some cases, these symptoms might cause the optometrist to suspect certain visual anomalies, although the symptoms should never cause the optometrist to ignore the possibility of other visual problems being present. It is recommended that optometrists specialising in this field should carry out a detailed investigation of visual function in people with specific learning difficulties. It is useful to send out a questionnaire in advance of these appointments and this might include, as a starting point, the questions listed in Table 1.

Evidence-based approach

A quick Internet search for the keywords 'dyslexia' and 'treatment' produces over 56,000 websites dealing with this subject. A glance at some of them reveals some very varied approaches, with literally hundreds of different treatments including exercise regimens, dietary supplements, computer programs, vision therapy, and pharmaceutical agents. Of course, some of these treatments will be valid and complementary to one another, but inevitably some will be ineffective and, in certain cases, an expensive waste of money. Some of these treatments relate to vision and parents may turn to their primary eyecare practitioner (i.e. the optometrist) for advice. As healthcare professionals, we should be able to provide impartial and objective advice and should be able to tell enquirers which visual interventions are valid.

This type of problem is not, of course, unique to dyslexia or vision. All healthcare professionals must encounter new and unproven treatments, so how can we decide objectively what is valid and what is not? The medical profession has dealt with this issue by adopting the principle of evidence-based medicine, and it would seem appropriate for optometrists to follow evidence-based optometry⁹.

The practice of evidence-based healthcare means integrating individual clinical expertise with the best available external clinical evidence from rigorous systematic research. Both these components (individual expertise and external evidence) are important and it is widely recognised that a slavish top-down cookbook approach to patient care has no place in evidence-based healthcare. Practitioners should be prepared to embrace new approaches, but only once these approaches have been properly validated.

People who are advocating a particular treatment will often talk about 'supporting research'; but is this research rigorous enough to allow one to conclude that the treatment is proven? Table 2 includes a hierarchy of levels of evidence, and it can be seen that the highest level of

evidence is attached to double-masked, randomised placebo-controlled trials (RCTs). The advantage of this type of research trial is that the beliefs of the practitioner and the patient cannot influence the result. A treatment is only taken as being proven when it is supported by one or, ideally more than one, RCT.

A good guide as to whether research is valid is to see if it has been published in peer-reviewed inter-disciplinary journals (e.g. *Ophthalmic & Physiological Optics*). The peer review process means that the article has passed the critical eye of two or three experts which, with occasional exceptions, means that the research is of a high standard. It is best to be wary of research which is only supported by reference to a website or to 'data on file'.

As a general rule, this series will concentrate on approaches which have been supported by rigorous research and on treatments supported by RCTs. Other approaches which optometrists or their patients are likely to encounter will be mentioned, but with due regard to their limitations.

Ethical statement and acknowledgment

The author does not have a financial interest in any of the investigative tools or diagnostic instruments described in this series. An earlier, shorter, version of this manuscript was published by Optometric Educators as a distance learning article.

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► Table 2

Summary of levels of evidence in evidence-based healthcare (higher levels of evidence are lower down the list)

Expert opinion without critical appraisal
Case study
Series of case studies (case series)
Systematic review of case series
Controlled trial (cohort study) but not randomised or masked
Single-masked randomised controlled trial
Double-masked randomised controlled trial (RCT)
Systematic review of RCTs

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MCQs

Module 1 Part 1 of the Dyslexia and vision series**The role of the optometrist in dyslexia****Part 1 Specific learning difficulties**

Please note there is only ONE correct answer

1. Which of the following statements is most accurate? A phonological decoding deficit is:
 - a. a cause of unstable eye movements
 - b. a core cause of dyslexia
 - c. detected as a low amplitude of accommodation
 - d. treated with coloured lenses
2. Which of the following statements is most accurate? Optometrists:
 - a. treat dyslexia
 - b. cure visual dyslexia
 - c. diagnose dyslexia
 - d. treat visual problems in dyslexic people
3. Which of the following statements is most accurate?
 - a. Dyslexia is a developmental problem, so only affects children
 - b. In dyslexia, a spelling difficulty is less likely to persist than a reading difficulty
 - c. In dyslexia, the reading difficulty is less likely to persist than the spelling difficulty
 - d. Dyslexic people, with professional extra teaching, will not have significant difficulties in adult life
4. Which of the following statements is true? The term 'visual dyslexia' has been used to describe dyslexic people:
 - a. with a visual-spatial deficit on psychometric testing
 - b. with a magnocellular deficit
 - c. with binocular instability
 - d. all of the above
5. Which of the following statements is NOT true?
 - a. People with dyscalculia always have difficulties with numerical skills
 - b. People with dyspraxia always have a disorder of voluntary movement
 - c. People with attention deficit disorder are always hyperactive
 - d. People with attention deficit disorder always have difficulty concentrating
6. Which of the following is not a cause, in some cases, of profound learning disability?
 - a. Dyslexia
 - b. Severe hypoxia at birth
 - c. Fragile X syndrome
 - d. Cerebral palsy
7. Three of the options below describe ways in which attention deficit disorder (ADD) might influence findings in an optometric examination. Which option is not likely to result from ADD?
 - a. The patient appears to daydream during eye examination
 - b. The patient's fixation keeps wandering during ophthalmoscopy
 - c. The patient fidgets during eye examination
 - d. The patient is abusive and aggressive during eye examination
8. Which one of the following phrases best describes the sight vocabulary?
 - a. The vocabulary that a person can readily visualise in their 'mind's eye'
 - b. The size of word that can be perceived according to the person's visual field
 - c. Simple words that can be recognised without phonetic analysis
 - d. Complex words that can be recognised by breaking them down into their sound components
9. Which one of the following statements is not true about visual symptoms in dyslexia?
 - a. Children who report words moving around on the page are probably hysterical
 - b. Visual symptoms are more likely to be reported by children with dyslexia than by good readers
 - c. Visual perceptual distortions can result from both binocular instability and Meares-Irlen syndrome
 - d. Headaches might be a sign of uncorrected refractive errors, binocular vision anomalies, or Meares-Irlen syndrome
10. Which one of the following phrases best describes an evidence-based approach to healthcare?
 - a. Always using the latest techniques in place of conventional approaches
 - b. Trying new approaches out on a few patients free of charge and, if they seem to work, adopting them
 - c. Ignoring individual clinical expertise but taking account of evidence from rigorous systematic research
 - d. Integrating individual clinical expertise with the best available external clinical evidence from rigorous systematic research
11. When are treatments considered to be most valid?
 - a. When supported by case studies published in interdisciplinary peer reviewed journals
 - b. When supported by controlled trials (cohort studies)
 - c. When supported by systematic reviews of controlled trials (cohort studies)
 - d. When supported by double-masked randomised placebo-controlled trials
12. Which of the following statements is the most accurate?
 - a. The evidence-based approach should be used to validate techniques that have been used for years
 - b. The evidence-based approach should be used to validate new techniques for investigation and diagnosis
 - c. The evidence-based approach should be used to validate new techniques for treatment
 - d. All of the above

An answer return form is included in this issue. It should be completed and returned to: CPD initiatives (c4767a), OT, Victoria House, 178-180 Fleet Road, Fleet, Hampshire, GU51 4DA by February 25, 2004.

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