Local Offer

Cambridgeshire Dyslexia Guidance

"No matter where they live or what their background, every single child in this country deserves the opportunity to read, to read widely, and to read well - it's a simple matter of social justice."

Child Literacy Campaign 2015

Education   Health   Care

Foreword by the British Dyslexia Association

May 2016

The British Dyslexia Association (B.D.A.) welcomes this comprehensive guidance on Dyslexia developed by Cambridgeshire County Council, as part of their Local Offer. With as many as one in five pupils in the classroom having literacy difficulties, early and appropriate intervention is crucial to the long-term outcomes of this huge cohort of children. Yet Dyslexia is still not a core part of initial teacher training, so teachers may not have the knowledge and skills to understand and help these children and their families. This guidance should provide an invaluable resource for parents and teachers alike.

The guidance was developed following wide consultation with parents, pupils, teachers and other professionals. It promotes Dyslexia friendly schools, early identification and assessment, screening and evidence based interventions; it has F.A.Q.s, tips from parents on useful resources and a moving composite 'letter from a dyslexic pupil' to their teacher. An extensive research document backs up the guidance, with links to resources and opportunities for further learning. A focus on dyslexic strengths and what dyslexic children can do, and not just their dyslexic and co-occurring difficulties, can help to maintain self-esteem and motivation to learn and prevent behavioural and mental health problems.

This Dyslexia Local Offer enables parents to find out about dyslexia and what to expect if their child is, or might be, dyslexic as well as providing an opportunity for parents to feed back about local services and gaps. It embodies the ethos of the S.E.N.D. reforms, of working with parents, children and young people as well as teachers and other professionals to enable 'co-production' at all levels from a plan for an individual child, to a dyslexia friendly classroom and school, and county wide guidance, planning and commissioning. Cambridgeshire should be commended for an excellent, evidence-based Dyslexia Local Offer.

Margaret Malpas, Chairperson of BDA

Fay Dutton, Trustee of BDA, Pinpoint, and PaCDDA (Peterborough and Cambridgeshire District Dyslexia Association); parent member of the Cambridgeshire Local Offer Working Group

Contents

Introduction

This document has been written to provide guidance to professionals and parents on the most current approaches to support the successful inclusion and attainment of children and young people with dyslexia. The document forms part of the wider Cambridgeshire Local Offer which covers information on the local provision for Special Educational Needs (SEN) and Disability. It is a working document and will be reviewed annually.

The Cambridgeshire Dyslexia Guidance has been co-produced with parents and carers of children with dyslexia, young people with dyslexia and professionals working in the field of dyslexia[1]. It aims to provide easy access to information relating to dyslexia and to enable parents and schools/settings to have a common understanding of dyslexia and current best practice in order to achieve the best outcomes for children.

There is considerable evidence that dyslexia can significantly impact on a person's life chances and outcomes, in particular in relation to, <u>unemployment, poverty self-esteem and offending behaviour</u>. Cambridgeshire recognises that early identification and effective support for these children is essential.

This guidance draws on recent research on dyslexia and a detailed paper presenting the research basis for the offer is available <u>here</u>.

Throughout the document the term parent refers to parents and carers and the term schools and setting refers to all schools, early years' settings and further education colleges.

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[1] This has been carried out through parent events organised through Pinpoint as well as the seeking of feedback on the draft document and making changes as appropriate to current research and practice. The views of children and young people with dyslexia have also been sought through a series of focus groups. Drafts of the guidance document have also been circulated through SEND Specialist Services and Cambridgeshire Learning Directorate in order to seek feedback from Specialist Teachers (including those with Level 7 OCR qualification in Dyslexia) and from Cambridgeshire Educational Psychologists. It has been distributed among selected school staff with an interest in dyslexia and discussed at SENCO briefings across the county.

What is dyslexia?

Firstly, we acknowledge that dyslexia is an <u>emotive and often contested</u> issue and it is recognised that there are currently many <u>different definitions of dyslexia</u>.

Cambridgeshire is using the current evidence-based definition, endorsed by the Government, in order to provide clarity for parents, professionals and all others with an interest in improving the outcomes of children/young people with dyslexia.

"Dyslexia is a learning difficulty that primarily affects the skills involved in accurate and fluent word reading and spelling."

- **Characteristic features of dyslexia are difficulties in phonological awareness, verbal memory and verbal processing speed***
- **Dyslexia occurs across the range of intellectual abilities**
- **It is best thought of as a continuum, not a distinct category, and there are no clear cut-off points**
- **Co-occurring difficulties* may be seen in aspects of language, motor co-ordination, mental calculation, concentration and personal organisation, but these are not, by themselves, markers of dyslexia**
- **A good indication of the severity and persistence of dyslexia difficulties can be gained by examining how the individual responds or has responded to well-founded intervention**

From Rose, J (2009) '**Identifying and Teaching Children and Young People with Dyslexia and Literacy Difficulties** : an independent report from Sir Jim Rose to the Secretary of State for Children, Schools and Families,' DCSF.

We also accept the British Psychological Society (BPS) definition from 1999 (reprinted in 2005) "**Dyslexia is evident when accurate and fluent word reading and/or spelling develops very incompletely or with great difficulty. This focuses on literacy learning at the "word" level and implies that the problem is severe and persistent despite appropriate learning opportunities. It provides the basis of a staged process of assessment through teaching**"

The Rose Report definition acknowledges current research that:

- Dyslexia occurs across the range of intellectual abilities. The definition does not rely on identifying a discrepancy between a child's ability in one area and his/her abilities in other areas

- There isn't one specific profile of cognitive strengths and difficulties that needs to be identified in order to classify a child as having dyslexia

- There are clear genetic and biological bases to dyslexia. There are differences in the brain functioning of those with significant reading difficulties compared to typical readers. Studies report that many parents of children identified with dyslexia also have reading difficulties

- Based on current research and theory the term dyslexia can be used interchangeably with **reading difficulties** and **literacy difficulties**

Within this model we recognise that the biggest question is: What is the nature of the dyslexic difficulties and what are the best interventions to support an individual's particular needs relating to reading, spelling and some wider areas of literacy?

A glossary of less commonly used terms is available at the back of the document.

How do children learn to read?

- Early language and literacy (reading and writing) skills development begins in the first few years of life and are closely linked to the child's earliest experiences with language, books, stories and nursery rhymes

- Children usually begin to read with a whole word awareness of visual and spoken words (for example, recognising their name or a shop logo) and then tend to become aware of increasingly smaller units over time. Reading development is supported by exposure to print (regularly reading to children from a very early age, singing nursery rhymes) and vocabulary development (talking to your child)

- Being able to hear and identifying the different sounds in words (phonological awareness)* is a key skill and predictor of later reading success. As children learn to read, phonological awareness is used to work out the relationships between parts of words and what they sound like (syllables, onset-rime, phonemes)*. They learn to pronounce and identity the whole word. This may occur through breaking down the sounds in words (decoding) or through other approaches such as recognising whole words or rhyme

- In order to begin to read fluently and efficiently in a way which allows for comprehension (understanding of what has been read), eventually words which have been decoded* will need to move into memory so that they can be identified quickly by sight

- Skilled reading is a complex process and it is therefore not surprising that there is a great deal of individual variation in reading development

Developing early literacy skills (0-3 years)

Formal reading instruction which pushes very young children to achieve adult models of literacy (reading and writing words) is, for the vast majority of children of this age, not developmentally appropriate. Early literacy theory highlights the importance of providing young children with a language and literacy rich environment. All Early Years children should have access to the following:

- A language rich environment, where babies and toddlers are talked to and listened to from the earliest age
- A wide range of books available to suit their age.
- Regular opportunities to explore and play with books (board books, cloth books, plastic books, real books)
- Singing nursery rhymes and developing awareness of rhythm, rhyme and syllables in words
- Listening to stories and encouragement to look at favourite pictures, point to familiar objects, imitating an action seen in a book, encouraging babbling/ talking in imitation of reading
- Opportunities to recognise whole words e.g. the child's name
- Scribbling and mark making

Some strategies for developing pre-reading skills can be found on the family learning website.

What should all schools be doing to support children and young people with dyslexia?

Universal Support: A Dyslexia Friendly School

Dyslexia friendly policies in schools and settings are most effective when they form part of the whole school development plan and when progress towards the goals and targets on the plan are regularly monitored. Dyslexia friendly schools recognise that teaching staff, as individuals, are key to the success of students overcoming their difficulties.

The four key elements of good practice, identified in the Rose Report and OFSTED (2010) are:

- *A whole school ethos that respects individuals' differences, maintains high expectations for all and promotes good communication between teachers, parents and pupils*
- *Knowledgeable and sensitive teachers who understand the processes of learning and the impact that specific difficulties can have on these*
- *Creative adaptations to classroom practice enabling children with special needs to learn inclusively and meaningfully, alongside their peers*
- *Access to additional learning programmes and resources to support development of key skills and strategies for independent learning*

Schools are also encouraged to:

- Complete dyslexia awareness training
- To regularly review their training in order to keep up to date in line with national developments. This could also be achieved through school staff attending a course about dyslexia, whole school INSET or department INSET provided by a suitably qualified member of staff or an external agency including SEND Specialist Services

Whole school planning

- The literacy and Dyslexia-SpLD Professional Development Framework www.thedyslexia-spldtrust.org.uk is a free on-line programme providing the user with a full personalised report base on a 'gap-analysis' of their confidence in key areas related to dyslexia and Specific Learning Difficulties and recommending next steps for Continuing Professional Development
- The Dyslexia Inclusion Development Programme (IDP) is a free on-line programme split into 4 modules, including a self-evaluation tool

Cambridgeshire SEND Specialist Service and Schools Intervention Service offer a range of school based training that can be tailored to schools' needs. Here is a link to Cambridgeshire County Council's SEND Enhanced (Traded) Services, which offers dyslexia training to schools.

Here is a link to the British Dyslexia Association, Dyslexia Friendly Schools Guide.

Early Identification and Assessment

There is clear and consistent evidence that early identification of literacy difficulties, including dyslexia, is key to providing effective interventions and preventing difficulties from becoming worse. The focus of any assessment should be on identification of needs and the best way to respond. One recognised model of identification and assessment considers a child/young person's Response to Intervention (RTI) . This approach stands in contrast to a 'wait-to-fail' approach whereby assessment and identification of needs would traditionally have come following a period of not making progress and falling further behind peers. RTI involves the following stages:

- Relevant universal screening
- Progress monitoring
- High quality, evidence based instruction for all pupils
- Tiers of intervention targeting specific pupils not making progress (levels of support identified by the Special Educational Needs Code of Practice, 2015)

The Class Teacher should take responsibility for recognising the possible early indicators of literacy difficulties and putting steps in place to identify the specific nature of the difficulties the child/young person is having. The teacher, with help from within the school whenever appropriate (for example, from the SENCo or other with more detailed knowledge of dyslexia), should adapt learning and teaching approaches to ensure the child/young person's needs are met appropriately. Teachers should involve parents and children at the earliest stage of identification, planning and intervention so that they are fully engaged in the process.

One useful toolkit is: Assessing Dyslexia: Toolkit for Teachers – an online tool providing guidance, assessments and strategies for subject/class teachers, support teachers and specialists.

There is no single test which will indicate dyslexia; rather there are a range of materials that can be used effectively by schools, and, for more severe and persistent difficulties, specialist practitioners. The expected procedure is that the assessment of literacy development will be ongoing. This will need to address areas of difficulty as well as ensuring that educational opportunities are not curbed by literacy difficulties. This may include the following:

- Ensuring that children and young people are grouped and/or set according to their ability in a way that allows them to achieve their best, rather than set according to literacy skills
- Ensuring that there is appropriate task differentiation
- Ensuring that there are opportunities to record ideas in a variety of ways

Universal Screening

There are a number of early screening tests available to schools that give an indication of whether children are at risk of dyslexia. Effective assessments highlight areas of strength and difficulties and this information is then used to guide interventions. This should include measures which are meaningful and relevant and reflect assessment over time.

Although there are many commercially available dyslexia screening tests, there are also assessment tools available in schools that can be effectively used by teachers to identify children who are failing to respond to high quality teaching and who are likely to need additional support.

The materials below are used to assess the progress of all children in mainstream school and can be used to identify children at risk of dyslexia:

- Early Years Foundation Stage Profile
- Letters and sounds phases
- Year 1 Phonics screening test

In addition, the following are used by some primary and secondary schools:

- Standardised reading and spelling tests
- Target Tracker Steps

Cambridgeshire SEND Specialist Services and Learning Directorate have produced an Assessment for Schools document that contains some additional recommended assessment tools.

Vision and Hearing

One of the first steps, when addressing the needs of a child with literacy difficulties is to check their hearing and vision as difficulties in these areas can impact on the development of literacy skills.

There is also some evidence that some children experience 'visual stress' which may be reduced by the use of coloured overlays.

Progress monitoring

The SEND Code of Practice (2015) for the Children and Families Act describes the process for children with SEND who are not achieving as well as their peers, as a cycle of '**Assess, Plan, Do, Review'**. The purpose of this is to find the most effective way to support a pupil's learning.

However support is provided, a clear date for monitoring and reviewing progress should be agreed, and the parent, pupil and teaching staff should each be clear about how they will help the pupil reach the expected outcomes. At the review, decisions should be made regarding the next step for the child, for example, continuing with an effective intervention, considering an alternative evidence-based intervention.

Progress Monitoring, Evaluating and Responding to Progress

Consider area of difficulty (E.g. see reading model)

Identify intervention and set SMART target

4 – 6 weeks

Review: Progress towards target(s)?

Little or no progress

Moving forward

Target achieved

Are interventions and approaches consistently in place?

4 – 6 weeks

Keep going

4 – 6 weeks

Is the difficulty still causing concern?

yes **no**

• Adapt interventions/ approaches

• Relaunch
• Ensure consistency

yes

Update/ refine target and intervention

no

Discard target

4 – 6 weeks

4 – 6 weeks

Review: progress towards target(s)?

no

Review: progress towards target(s)?

Adapt targets

no

yes

yes

Revisit consideration of areas of difficulty (including available information from assessments)

yes

Interventions

Once a child/young person's strengths and difficulties have been identified, the questions that need to be asked are:

1. 'What is the nature and severity of the dyslexia?'
2. 'What do we need to do to support the child/young person?'

Any intervention that is put in place must reflect the needs identified through assessment.

If a child/young person requires additional support there are many evidence-based interventions that can be carried out in school. Any intervention should be done alongside the universal support that school is putting in place.

Recommended Interventions

Type of intervention	Primary	Secondary / Further Education	Name of Intervention
To develop reading and writing skills	X	X	Acceleread-accelewrite (online programme)
To develop reading fluency	x	x	Academy of Reading (online programme)
To develop Reading Accuracy	x	x	Catch up literacy
To improve phonological awareness	x		The Reading Intervention Programme http://www.readingintervention.org.uk/
To improve phonological awareness	x	x	Toe by Toe

To improve reading accuracy and comprehension	X		[Reading Recovery](#)
To improve reading comprehension skills	X	X	**Inference Training** (Training available through School Intervention Service)
To improve Comprehension skills	X	X	[Reciprocal Teaching](#) (Training available via SEND Specialist Services [here)](#)
To improve spelling using peer tutoring	X		**Cued Spelling** (Training available via SEND Specialist Services [here](#))

The above table of interventions are a small sample taken from Brooks Report (March 2016). Further information and a detailed list of effective interventions can be found in the full report [here](#).

The Cambridgeshire [Improving Outcomes Document](#) also recommends interventions appropriate for supporting children and young people with dyslexia.

Specialist Assessments

For those children whose literacy difficulties are persistent and not responsive to the evidence-based interventions delivered over time, more specific assessments of strength and needs and bespoke interventions (based on these assessments) may be required.

> *"Where a pupil continues to make less than expected progress, despite evidence-based support and interventions that are matched to the pupil's area of need, the school should consider involving specialists, including those secured by the school itself or from outside agencies."* **(6.58 SEN Code of Practice 2015)**
>
> *Schools* **may** *involve specialists at any point to advise them on early identification of SEN and effective support and interventions. A school* **should always** *involve a specialist where a pupil continues to make little or no progress or where they continue to work at levels substantially below those expected of pupils of a similar age despite evidence-based SEN support delivered by appropriately trained staff. The pupil's parents should always be involved in any decision to involve specialist.* **(6:59 SEN Code of Practice 2015)**

Some schools have Specialist Literacy Teachers within their school or school cluster (group of neighbouring schools) who are able to support them in further understanding a child/young person's strengths and difficulties in relation to dyslexia. Others may seek the support of the Cambridgeshire County Council SEND Specialist Services which is made up of Educational Psychologists, Specialist Teachers and Specialist Practitioners. This service might become involved if:

- Schools are able to evidence that they have delivered High Quality Teaching and dyslexia friendly classrooms
- Baseline assessments are in place and universal and targeted support has been delivered and has been monitored consistently. Support has been based on evidence-based interventions which have been delivered appropriately (duration, frequency etc.)
- The child or young person is not making progress, or making only very limited progress and remains significantly behind their peers

If the child meets the thresholds for involvement from the SEND Specialist Service a Specialist Teacher or Educational Psychologist may be involved in the following:

- Have a consultation with school staff and parents to explore interventions that have been put in place, look at pupil assessment information and make further recommendations on teaching and learning strategies. They may work with the school staff (not always directly with the child) to achieve a better understanding of the factors that may be preventing the child from making progress
- Contribute to staff development by providing dyslexia training and model specific interventions relevant to the child's needs. Details of available training can be found here
- Work directly with the child to complete a detailed assessment of their strengths and difficulties and recommend targeted interventions based on the findings of the assessment. These would then be then reviewed
- Be involved in Access Arrangements at secondary school and FE colleges if a specialist assessment is required and school do not have the resources. This is part of the traded offer

- Any assessment should:
  - Include the views of the child/young person
  - Consider the child/young person's strengths and difficulties and use this information to inform interventions
  - Include the views of the parent
  - Consider the social and emotional impact of their persistent literacy difficulties/dyslexia
  - Consider the persistence and severity of the reading, writing and/or spelling problems
  - Investigate the main gaps in the pupil's knowledge and skills (e.g. phonological awareness, phoneme-grapheme correspondence, writing fluency, comprehension)
  - Draw, where appropriate, on the views of other professionals
  - Provide recommendations, based on the assessment, to support the child to make progress
  - Provide a written report
  - Plan a review date
- The SEND Specialist Service will also work at Local Authority level by contributing to research, policy development and guidance around dyslexia

The majority of children and young people with dyslexia can be supported through School SEND Support (Code of Practice 2015). For a very small minority, an Education, Health and Care Plan (EHCP) might be appropriate. Children and young people may meet the criteria if they:

• Have severe and/or complex long-term needs which affect everyday life

• Require provision and resources which are above those normally available

• Requires intensive and longer term help and support from more than one agency

• Are making limited or no progress despite high levels of support and purposeful interventions

There must be evidence that a graduated response has already been put in place by the school or setting (e.g. appropriate assessment and interventions including support and resources available through the Local Offer).

Details of thresholds for an Educational Health Care Plan (EHCP) are available [here](#).

Co-occurring difficulties

These co-occurring difficulties are not, in themselves, markers of dyslexia, but may be seen in some people with dyslexia. As would be expected for a child with any special educational need, these should be addressed using the graduated response as outlined in the Code of Practice (2015).

Social and emotional impact

The [social and emotional](#) impact of dyslexia is well documented. Teachers and parents need to be mindful of children and young people's emotional levels and recognise that reduced motivation is often a consequence of the struggle they are experiencing. Some children may try and protect themselves from a sense of humiliation associated with their literacy difficulties, by appearing unmotivated and dismissive of learning, by playing the 'class clown' or by becoming withdrawn. Adults helping children and young people with dyslexia need to be aware of this and know how to help them to overcome this. Interventions that improve self-esteem along with reading interventions can be effective.

Children/young people with dyslexia need to know that their teachers and other adults are aware of their strengths and that these are highlighted regularly. It is important to build on a child/young person's strengths as this is likely to improve self-esteem and engagement of learning. All children and young people need to be empowered to believe that they can and will make progress with their literacy and should be encouraged to take an active part in their learning.

Language

There is a strong link between reading difficulties and language difficulties. Many language difficulties relate to the same weaknesses that are found in significant literacy difficulties/dyslexia, for example, phonological awareness, ability to retrieve information and label something quickly.

For more information on Speech and Language needs, please refer to the Speech and Language Local Offer here.

Motor co-ordination

Motor co-ordination difficulties may involve fine motor co-ordination (drawing, handwriting, threading) and gross motor co-ordination (running, skipping, cycling). For some children, their difficulties are so significant that they would be identified as having a developmental co-ordination disorder (DCD). There is evidence to suggest that many children with dyslexia may also reach the criteria for developmental co-ordination disorder (differing research varies between 5 and 50%).

These documents are designed to help teachers and support staff to help children address motor coordination difficulties.

Maths

Some children and young people with dyslexia also have difficulties with maths (co-occurrence of significant maths difficulties and dyslexia is estimated to be between 20 and 70%).

For some, this may include difficulties memorising formulae, struggling with number symbols and operations, difficulties retrieving information from long-term memory and answering mental calculations at speed and difficulties reading written maths questions.

Concentration/attention control

Difficulties with concentration can be linked to dyslexia. In many cases appropriate interventions to support literacy can reduce difficulties with concentration. However, for some children, difficulties are more significant (research suggests that there is a

co-occurrence of 5 and 35% for attention deficit/hyperactivity disorder (ADHD) and dyslexia). Therefore, for some who have significant difficulties with concentration/attention control, further investigation for ADHD may be needed.

Personal organisation

Some dyslexic children can appear very disorganised e.g. forgetting homework, missing appointments with teachers, or not bringing in the correct equipment for lessons. They may have problems telling the time and poor time management.

Organisational difficulties may be a consequence of poor literacy, verbal processing or short-term memory difficulties. Older children and young people may require support to develop study skills, note taking and revision.

Memory: Working memory and short term memory

Some dyslexic individuals may have difficulties with particular aspects of memory. Difficulties with short-term memory will impact on recalling/remembering what they have just heard, whilst poor working memory will impact on their ability to hold information mentally and process it at the same time, There are many classroom adaptations that can easily be made and strategies that children and young people can be taught to use to address such difficulties. Helpful guidance is available here.

Assistive Technology

Some children and young people's dyslexia will be so severe and persistent that they will struggle to read throughout their lives and will benefit from assistive technology. This area is continually growing and improving, but here are some resources that can help children and young people.

- [Clicker](#) is the most widely-used reading and writing tool in the UK for young learners with dyslexia
- [Dragon dictate](#) used for dictation (Mac version) Dragon Naturally Speaking (Windows version)
- [Easy spelling aid](#) helps children independently spell words.
- [Exam pen](#) Instantly displays scanned words on the screen and Instantly says the word or line of text aloud. The exam pen is approved by Joint Council for Qualifications (JCQ)
- [Whispersync](#) is an app for kindles that allows you to switch between reading and listening
- [Read and write software](#) enables the user to read on-screen text aloud.
- [Claro-read](#) enables the user to read on-screen text
- Predictive text software [co-writer](#)
- Predictive text software [sprint-plus](#)
- Mind-mapping [Kidspiration](#)

A letter to school from dyslexic children in Cambridgeshire

This letter has been compiled from the comments received during focus groups with pupils with dyslexia in primary and secondary schools in Cambridgeshire.

Dear Teacher,

Having dyslexia can be hard, and at times we feel embarrassed and sad. Please make sure you highlight the things that we are doing well and you explain to others that having dyslexia doesn't mean you're stupid. You know that people with dyslexia need to work harder than others to write and spell and read, but don't assume we are all the same. We struggle in different ways so please make sure you find out what our strengths and difficulties are and differentiate work for us according to our needs.

We may have amazing ideas, but can't get them down on paper. Help us to find another way of sharing our ideas with you and our peers. Offer lessons where we can work with others, this helps us get our ideas across without having to write them down. If we are seated near a friend we can ask them for help, we may not feel comfortable asking students we don't know well.

Not all of us with dyslexia see it as a disadvantage and some of us have strengths in other areas; some are better at art than our friends without dyslexia. Some of us have good creative ideas; we have noticed that peers without dyslexia don't have ideas as 'out of the blue' as some of us. We may be more visual than other people and good at seeing things from a different viewpoint. Just remember that we are all different and everyone's strengths are different.

When we are in your lesson, please ask us what help we would like (subtly!), we may not want the support of a Teaching Assistant, especially as we get older, and would prefer to try things on our own first. Don't make us read in front of the class, in fact don't make anyone feel they have to read in class, and please don't read out our test scores so everyone can hear. I don't want everyone to know what I got.

If we struggle to write quickly please help us by sending homework via email or sharing the power points from class with me. We may need extra time to complete work as some tasks take us longer to finish, don't punish us for this, show that you understand and give us time.

Nobody likes to be labelled so please see us as who we are and not just as our dyslexia.

Yours sincerely,

A student with dyslexia

Frequently asked questions for parents

1. Are all children with reading difficulties dyslexic?

No, there are some other reasons why children may struggle to develop their literacy skills, for example, poor vision, poor hearing, early learning experiences, not having access to appropriate teaching or extended absence from school.

Reading difficulties lie on a continuum, and the most severely affected children and young people will need ongoing literacy support throughout their education. These children are likely to be described as dyslexic although at this time there is no clear or absolute cut off point where a child can be said to have dyslexia.

2. Is dyslexia hereditary?

Dyslexia has a strong hereditary influence and appears to run in families, if there is a family history of dyslexia it is important to tell your child's teacher/SENCo.

Research suggests that individual differences in reading performance are partially accounted for by genetic variations and that the relationship is stronger for those with significant difficulties. Future work in this area should provide more information.

3. Is the involvement of a specialist teacher or educational psychologist needed in order to have dyslexia recognised?

Literacy difficulties, including dyslexia can be identified (not diagnosed) by following the Code of Practice (2015), using the Assess, Plan, Do, and Review approach. If schools have access to the appropriate screening and assessment tools it is not always necessary to have an educational psychologist or another external specialist to identify dyslexia and support the child accordingly. However, staff in schools sometimes like to discuss the difficulties with a member of the SEND Specialist Service, and seek further, in depth assessments, if a child's difficulties appear to be significant and persistent.

Formal identification can be completed by a teacher with the appropriate qualification or an educational psychologist but they should always consider how the child/young person has responded to well-founded interventions that have been implemented. Nonetheless, a formal identification of dyslexia should not be necessary in order for a child or young person's literacy difficulties to be identified and addressed in schools.

4. Someone has recommended I have my child assessed for Visual Stress difficulties, what do they mean?

Some children find it easier to read when using a coloured overlay, as this reduces their visual stress, and their reading speed improves, although this in itself is not an indicator of dyslexia. Speak to your school about this as they may be able to do an informal assessment using coloured overlays or recommend someone who can assess this area.

[Anglia Ruskin Eye Clinic](#)*, also works with local schools*

5. Does the school have to accept the findings of a private dyslexia assessment?

You can expect the school to read the report and discuss it with you. It is important to remember that a diagnosis by a specialist who does not have access to information about the learning context and response to interventions over time will only provide a snapshot of the pupil's difficulties.

The main focus for discussion should be to acknowledge your concerns and any recommendations made in the report and for school to discuss with you how these may fit with the current support being delivered in school. If the school support is different they should be able to share with you what they are doing and why it has been selected, together with the evidence of its impact in supporting your child's learning.

6. I have heard that people with dyslexia have particular strengths, for example, they are artistic and creative. Is this true?

It is not true that all children with dyslexia are creative, however, many are! All children have strengths in areas and it is important to find, encourage and develop these, whatever they may be. These can have a significant impact on confidence and self-

esteem. It is worth sharing with your child the many successful people in all fields who have dyslexia.

7. I have been told that my child has a 'spiky' profile, what does that mean?

A spiky profile may be referred to in a report when children have strengths in some areas assessed and weaknesses in others.

8. My child has a high I.Q but average literacy skills. What should school be doing to support them?

If a report states that your child has a large discrepancy between their literacy ability and cognitive ability, and their literacy scores are within the average range for a child of their age, they wouldn't necessarily be described as dyslexic under the Rose Report and BPS definitions of dyslexia. However, this information is still important to share with school staff. In these situations schools need to consider factors such as, setting, differentiation and working with the child's strengths to ensure that all pupils are stretched academically in order to achieve the best outcomes.

9. My child has been identified as dyslexic. What support should they be receiving and should it be delivered by a specialist dyslexia teacher?

Children with severe and persistent literacy difficulties should have received a graduated response to their needs in line with the Code of Practice 2015. If their difficulties are severe, they are likely to be accessing targeted provision. Support should include effective literacy teaching and intervention based on the needs identified during assessment, as well as high quality teaching and access to dyslexia friendly classrooms. Many children/young people with dyslexia experience feelings of low self-esteem and high levels of frustration and it is important that emotional support is also available.

Getting a formal identification may not change what is currently happening in class if schools are already putting in support. It may be that minor adaptations are needed (see dyslexia friendly classrooms section)

The research favours good quality, small group or individual catch up intervention using evidence based approaches. This can be provided by a teacher or teaching assistant trained in the intervention in school; there is no evidence to suggest that outcomes are more favourable when this is delivered by a specialist dyslexia tutor. If progress is not made in response to intervention, advice could be sought from SEND Specialist Services (link to threshold)

There are many training courses that teachers and teaching assistants can attend in order to support children with literacy difficulties/dyslexia. Some training courses are available from the Local Authority here *and schools are encouraged to take this up in order to ensure that they are following the most up to date understanding, interventions and approaches to support children with dyslexia.*

10. My child did really well in Key Stage 1 and passed the phonics screening test but is now really struggling to understand what he is reading, why is this?

There are a number of reasons why children may begin to struggle as they get older. One possible reason may be because they have difficulties with reading quickly (fluency) which affects what they can remember. It is important to discuss your concerns with their teacher.

11. I thought my child could read well but they are really struggling now they are doing their GCSE's/A'levels and they are becoming stressed. What could be wrong?

Some children find ways of coping with literacy difficulties earlier on in their education, but struggle with the amount of reading and writing expected in Key Stage 4 and beyond. Difficulties may relate to their speed of reading and writing and this may impact on their accuracy when expected to read/write for an extended length of time, particularly when under pressure. It is important to speak to their teachers about this so that support can be put in place if required.

12. **What support will my child get during exams?**

Support is based on the pupil's presenting needs and is not dependent on the pupil having any formal identification of dyslexia. If your child has a history of requiring additional support, and meets the criteria, they will be eligible for extra support. This can be extra time, a reader or a scribe. Equally, access to additional resources in school is not contingent on a formal identification of dyslexia but on a needs-led basis.

More information is available at the links below:

<u>*Primary*</u>

Access arrangements for Key Stage 2 can be found <u>here.</u>

<u>*Secondary/ FE*</u>

For children undertaking KS4 exams (e.g. GCSE's) and A'Levels, an assessment is required by specialist assessor with post graduate qualifications in individual specialist assessments, equivalent of an OCR Level 7* qualification or a psychologist registered with HCPC.

*Those with a Level 5 equivalent qualification are able to undertake assessments for the 2015-16 academic year but then must gain the additional qualification.

Exam Access Arrangements can be found <u>here</u>

13. **What can I do if I am unhappy with the support the school is providing?**

If you are unhappy with the support your child is receiving request a meeting with the Form Teacher and SENCo at which you can express concerns and listen to the views of the school. Remember that pupils make most progress when schools and parents work together. If you remain concerned you could contact the SEND Governor of the school.

<u>Special Educational Needs, Information, Advice and Support Service</u> (SENDIASS) can provide advice and support with regard to meetings in school.

14. What can I do to help my child at home?

Parents in Cambridge have developed a [list of strategies](#) and resources that have helped them to help their child at home

[Homework](#) can often be a stressful time and the British Dyslexia Association has provided advice to support parents.

Frequently Asked Questions for School

1. What should I say to a parent/carer who has had an independent assessment which concludes that their child is dyslexic?

Firstly, acknowledge the parents' views and concerns. The following information may be helpful in discussion:

- *There is no single assessment for dyslexia, however, an independent assessment can contribute to the overall picture of a child's strengths and weaknesses and provide helpful information that will help you support the child in your school. It is therefore, important to read through the assessment and invite parents in to meet with you to discuss their concerns and hear how you are supporting their child.*

- *Professionals outside the Local Authority may be using a different definition or description of dyslexia, for example, the discrepancy model. If this is the case and the child appears to have average reading ability, reassure the parent, discuss their concerns and use the information provided in the assessment to help you support the child (for example, do they need to be stretched in some areas of the curriculum? Do you need to reconsider settings and groupings?)*

- *If the private assessment recommends a number of interventions to support the child, discuss these with parents, and share what you are already doing in school that may be similar to the suggestions or, if you disagree, explain why and provide your evidence. The private report may provide some very helpful*

new information and it is important to identify which interventions are evidence based and manageable given the available resources

- *Parents should be reassured that school are aware of their child's needs and that appropriate support is available.*

2. Do I need a specific qualification in order to identify dyslexia?

No, as a teacher, using the definition in this guidance, you will have the teaching skills needed to identify persistent literacy difficulties and dyslexia, although this is not a formal identification. Parents/carers need to feel confident that a formal identification of dyslexia is not necessary in order for you to address their child/ young person's difficulties in this area.

A formal identification can be completed by a teacher with the appropriate qualification or an educational psychologist but they should always consider how the child/young person has responded to well-founded interventions that have been implemented.

There are also a number of training opportunities within the county that can be found here if you would like to further develop your skills in this area.

3. Should I be using the term 'dyslexia' with children and parents?

Consideration should always be given to whether using the term 'dyslexia' is helpful for the pupil. Many children and parents find it reassuring to be able to describe their difficulties in this way, however, professionals and parents should also be aware of the danger of creating low expectations from those who don't understand the term, including the belief that the pupil is not able to make progress.

If a child has made very little progress despite following a graduated response of 'Assess, Plan, Do, Review' and you are confident that you have used evidence based interventions that focus on the child's needs, then, according to the Rose Report definition and the BPS definition, you can use the term dyslexia as a description of a child's needs. You will need to be very clear about current literacy levels and that interventions have been implemented appropriately. You will need to describe to

parents and children what you mean by the term and that this is not a diagnosis but an identification of need. Sharing this guidance is one way of supporting parents.

4. What is the best way of working with parents to support their children?

Cambridgeshire parents have provided a [list of things that they have found helpful](#) when working together with schools.

Useful links

The [IDP materials](#) for dyslexia were revised in line with the Rose Report and remain a useful resource:

The [dyslexia/spld trust](#) has the support of the Department of Education to provide information for parents and schools on a wide range of topics:

http://www.bdadyslexia.org.uk/services/quality-mark

A child's perspective on dyslexia
http://www.bbc.co.uk/cbbc/games/newsround-try-being-me-dyslexia

CBBC video – dealing with dyslexia
https://www.youtube.com/watch?v=kMTO4JMECQI

5 minute TED talk on dyslexia
https://www.youtube.com/watch?v=zafiGBrFkRM

High interest/ low reading age books

The following links are books that are advertised as having a high level of interest but at a lower reading level. These books are commonly known as 'high-low', which means that the content is appropriate to chronological age but the text is adapted to suit a lower reading age. Finding more interesting books that a struggling reader can access is important to help maintain children's interest in reading. Interesting books can be found at:

- Barringtonstoke
- BoffinBoy,
- helena-pielichaty,

Glossary

Analytic phonics: In analytic phonics children are taught to analyse whole words to detect spelling patterns and then split them into the onset and rime. This decoding enables them to make a comparison with other words they may know from the same word family. For example, if the child knows 'goat', 'boat' and 'float', then the word 'moat' will be easy to read, even if it is the first time that it has been seen

Auditory Processing: Auditory processing difficulties relate to a hearing or listening problem caused by the brain not processing sounds in the normal way

Co-occurring: The presence of two or more difficulties at the same time

Decoding: Decoding refers to the process of translating a printed word into its separate phonemes

Digraph: A grapheme containing two letters that make just one sound, e.g. 'sh', 'ea'

Grapheme - A way of writing down a phoneme. Graphemes can be made up from 1 letter e.g. p, 2 letters e.g. sh, 3 letters e.g. tch or 4 letters e.g. ough

Letter Sound: The sounds that a letter makes (c as in 'cat')

Onset and rime: The "onset" is the initial phonological unit of any word (e.g. c in cat, sh in shout) and the term "rime" refers to the string of letters that follow, usually a vowel and final consonants (e.g. 'at' in cat, 'out' in shout)

Peer reviewed research: Peer review is used by people who write research papers to decide which research results should be published in a journal. The peer review process ensures that all the papers published have been checked and scrutinised by other qualified experts (peers) before they are made public

Phoneme: the smallest unit of sound that you can hear within a word; the word phoneme refers to the sound. For example, in the word *cat*, there are three phonemes (c-a-t). There are 44 phonemes in English

Phonics deals with the relationship between sounds and the letters that represent those sounds. Phonics teaching refers to a method of teaching people to read by matching sounds with letters in the alphabet. Tip for teaching phonics can be found [here](#)

Phonological awareness is the ability to hear sounds that make up words in spoken language. This includes recognising words that rhyme, deciding whether words begin or end with the same sounds, understanding that sounds can be manipulated to create new words, and separating words into their individual sounds. Phonological awareness deals with the sounds in the words and not the letters

Synthetic phonics: A strategy for teaching word reading skills. Children are taught to read letters or groups of letters by saying the sound(s) they represent. Children can then start to read words by blending (synthesising) the sounds together to make a word

Syllable: Any one of the parts into which a word is naturally divided when it is pronounced, e.g. Ho-tel, beau-ti-ful

Trigraph: A grapheme containing three letters that make just one sound, e.g. 'igh'

Verbal memory: The ability to remember an ordered sequence of verbal material for a short period of time; for example, to recall a list of words or numbers or to remember a list of instructions.

Verbal processing speed: The pace at which you take in spoken information, make sense of it and begin to respond.

CAMBRIDGESHIRE DYSLEXIA GUIDANCE

Research Basis

"No matter where they live or what their background, every single child in this country deserves the opportunity to read, to read widely, and to read well - it's a simple matter of social justice."

Child Literacy Campaign 2015

Introduction and Rationale

Scope of this document

The aim of this document is to provide a transparent rationale and basis for the Cambridgeshire Dyslexia Offer by sharing the evidence-basis which underpins key positions and decisions. Evidence presented draws from academic research to

practice research in education, psychology and educational psychology. It is hoped that, in addition, this document may prove useful to a range of stakeholders in developing as clear (as far as that is possible within this field) and as comprehensive as possible an understanding of current key issues and factors relating to dyslexia and, crucially, how to go about addressing the needs of dyslexic individuals who they support. A complete meta-analysis of the research related to all aspects of dyslexia is not possible within the scope of this review (arguably within any single review given the vastness of the field). Nonetheless, as far as possible, the evidence from research presented reflects peer-reviewed publications that are either as recent as possible or which reflect relatively recent meta-analyses and seminal papers (which may be older).

Living with dyslexia

Human experience

A discussion around dyslexia is ultimately a discussion about people. The potential social and emotional impacts of reading failure have long been recognised, and are often referred to briefly in published reports on dyslexia (although less so by academic researchers) (e.g. Rose, 2009; Goswami, 2008; Reason, 2001; Snowling, 2008). However, there has as yet been relatively little systematic research into the personal experiences of dyslexic individuals (see Glazzard, 2012; Humphrey, 2002). Pollack (2005), Riddick (2010) and Edwards (1996) have carried out extensive interviews with dyslexic individuals, adults and children, as well as their families. Pollack (2008) found that many dyslexic students in higher education reported thinking that many of the significant adults in their lives (parents and teachers) considered them to be incompetent and unintelligent. Their respective findings have repeatedly revealed dyslexic individuals' feelings of distress and low self-esteem. Humphreys and Mullen (2002) also found that dyslexic individuals tended to attribute success to external (rather than internal) factors, which left them prone to a sense of 'learned helplessness'.

Riddick (1996; 2010) notes the risk of children and young people with reading difficulties developing behavioural difficulties, either as a response to the frustration or to distract others from their reading difficulties. She further states that, *"it is*

important that the behavioural difficulties are not seen as the primary cause of the reading difficulties, although by now they may also be a strong contributory factor" (Riddick, 1996, p.48). Chiappe (2013) provides an overview of the experiences of dyslexic individuals in further education (FE) and concludes that many of the barriers faced represent a lack of flexibility within systems in FE as well as the limited awareness of and understanding around dyslexia of many staff working in FE.

The cost of dyslexia

In 1952, Kellmer-Pringle wrote of dyslexic children that:

"...their under functioning means a loss of efficiency and a waste of ability now and in the future which the country can ill-afford. More important still, the children themselves suffer and if offered no help become sooner or later emotional problems. The fact that the great majority of juvenile delinquents are educationally retarded[2] shows how failure to derive emotional satisfaction at school may well be an important factor in directing children's energies into anti-social channels."

- Kellmer-Pringle, 1952, cited in Newton and Thomson, 1975, p.3

Over 60 years later, there remains an overwhelming indication that there is a significant cost of dyslexia on life chances and outcomes, in particular in relation to unemployment, poverty, self-esteem and offending behaviour (Bennett, 2008; Györfi & Smythe, 2010). Students entering secondary education with very low literacy skills are, according to Gross (2008), five times more likely to be excluded from school than their peers with age-expected levels, and are reported to be four times as likely to truant. According to Bennett (2008), it costs £9,900 per year to provide provision for a child who had been excluded from school and he also reports that 20% of UK prisoners are dyslexic. Bennett further suggests that if all dyslexic children received early identification and effective support, the Crown Prosecution Service would stand to save in excess of £300 million per year. It is worth noting that risk-taking and offending behaviour are not solely accounted for by dyslexia and that there are many other related factors (e.g. Guttmannova, Szanyi & Cali, 2008; Hecht, Inderbitzen & Bukowski, 1998; Laukkanen, Shemmeika, Notkala, Kaivumaa-Honkanen & Nissinen,

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[2] Some of the word choices presented in this quote may appear insensitive. However, it may be worth bearing in mind that this terminology may not have had elicited the same emotional responses when it was written over fifty years ago.

2002; Kraatz-Kelly, Bates, Dodge & Petit, 2000). Nonetheless, dyslexia left unaddressed and unsupported presents an unequivocal risk factor which carries with it significant human and financial cost.

<u>Misperceptions</u>

Understanding, awareness and theory around dyslexia have undergone multiple paradigm shifts since its early inceptions (Hinshelwood, 1917; Orton, 1937; Pringle-Morgan, 1896). The evolving nature of theory and related operationalisation as a function of developments in research and understanding is perhaps an inevitable feature of any phenomenon under investigation; educational, social, medical, psychological, or otherwise. This certainly appears to be of particular relevance to the topic of dyslexia which appears to be at present emerging from a paradigm and cultural shift in theory and understanding (e.g. McGeowan, 2015). This has, perhaps inevitably, resulted in a great deal of dissonance among a range of stakeholders (e.g. parents, children and young people, lobby groups, specialist educators, teachers, educational psychologists, politicians) who perceive that their understanding, knowledge and skills around dyslexia are being undermined and challenged (e.g. British Dyslexia Association, 2015). By consequence, a number of perceptions have been shared about the intention and wider implications of this shift in theory and understanding, which have led to anxiety and anger.

For example, Julian Elliott (Elliott, 2005; Elliott and Grigorenko, 2014)'s suggestion that 'dyslexia' in itself is not a useful term because it does not refer to a tangible, concrete or shared understanding of a child's reading needs and cannot, in itself impact on effective intervention, has been repeatedly met with the response that such a position dismisses the needs of and impact of individuals with reading difficulties (specifically those with a formal identification of dyslexia). This may most usefully be considered to be a straw man argument[3] on the basis that Elliott's argument refers to the utility and reliability of a construct and terminology, and does not dispute the real and potential distressing impact of significant reading impairment on children's, young people's and adults' lives (Knight, Day and Patten-Terry, 2009). Much of the discussion is around how to ensure that literacy needs can be best

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[3] A straw man argument refers to a situation whereby rather than dismissing a point, argument or position, the opponent actually refutes an argument that was not put forward in the first place.

understood and addressed for struggling readers (see Elliott, 2015). Similarly, Brooks (2015) shares feedback that recent changes in understanding and policy around dyslexia are perceived by some to reflect a covert intention to remove resources for those with a formal identification of dyslexia. This, assures Brooks (2015) is not the case, not least because a formal identification of dyslexia does not in itself ensure access to additional resources as it is, and also because in fact the opposite premise is the case, that all struggling readers require access to the support necessary to address their needs.

Indeed, there is a nascent but growing body of agreement that the term, 'dyslexia' is, of itself amorphous and unhelpful on the grounds that it is so difficult to tightly define (e.g. Elliott & Grigorenko, 2014; Reason & Stothard, 2013; Snowling, 2015; Van Daal, 2015). There also appear to be almost as many definitions and understandings of dyslexia as there are stakeholders (Györfi & Smythe, 2010). Nonetheless, Snowling (2015) argues that it is better to have a vague and imprecise label and understanding for reading impairment than none at all in order to ensure that children can be supported as best as possible (see also Bishop, 2014 in relation to language disorders). In addition, there is evidence that recourse to the label of 'dyslexia' is valuable for many individuals who are struggling readers (e.g. BDA, 2015; Glazzard, 2010; Snowling, 2015) although there are documented positives and drawbacks to a 'label' (e.g. Elliott & Gibbs, 2008; Elliott & Grigorenko, 2014; Lauchlan & Boyle, 2007).

Pool (2003) provides a succinct response to such theoretical and ideological arguments, suggesting that, *"We urgently need to separate what is an interesting debate for researchers from what is likely to help children with learning difficulties"* (p. 168). It is not in the remit, scope, interest or authority of this document to discontinue the use of the terminology of dyslexia, and regardless , Reason and Stothard (2013) note that whatever the views of current research and theory, terminology around 'dyslexia' is in the public domain. As such, the term 'dyslexia' is referred to throughout this document and the related Guidance Document and, based on the consensus of research and theory in the field as discussed in due course, is used interchangeably with reading difficulties and literacy difficulties (e.g. National Institute of Child Health and Development, 2007; Pennington & Bishop, 2009; Siegel and Mazabel, 2013; Swanson & Hsieh, 2009). This, in no way,

dismisses or undermines the significant difficulties faced by struggling readers who have a formal identification of dyslexia.

Reading

Reading is not an evolutionary skill with dedicated neural architecture like speaking or walking (e.g. Nicolson, 2005). Rather it is a complex social and cultural activity which draws on existing neural and cognitive architecture (e.g. Bjorklund & Blasi, 2011; Pennington & Olson, 2011; Pollack, Luk & Christodoulou, 2015). The Oxford English Dictionary (2nd Ed.) holds full entries for 171,576 words, each of which are composed of different combinations of the 26 letters of the English alphabet. Upon encountering a piece of text a reader is potentially faced with a vast arena of words composed from the many different possible combinations of letters, yet adult readers are able to identify a familiar word somewhere in the order of 400 – 600milliseconds (e.g. Rayner, Pollatsek & Schotter, 2012). Readers can narrow down the possible words in a text to some extent by using cues such as word frequency and context. Nonetheless, the automaticity of skilled reading is an astounding feat, described by Mason (1975) as "perhaps the most complex and intriguing skill that has evolved in the history of the human race," (Mason, 1975, p147). Altman (1997) identifies the written word as one of the greatest achievements of humankind alongside the discovery of fire and the invention of the wheel, claiming that without the written word, we may still be in the dark ages because science relies on too much information to have been passed down through word of mouth alone.

Models of reading

Aside from an opportunity to celebrate the enormity and complexity of the achievement of learning to read, consideration of models of skilled reading serve to remind us that reading and learning to read are extremely complex processes which we should perhaps be wary not to oversimplify when considering points at which the process may go awry for those who struggle to learn to read. Indeed, it may be argued that part of the difficulty discussed below about agreeing a definition of dyslexia that accounts for the needs of all dyslexic individuals is that it is likely that there are multiple points at which individual differences in the reading process may

occur, resulting in difficulties with reading (and by extension, spelling) (e.g. Coltheart, 1996; Howard & Best, 1996).

The Simple View of Reading (Gough & Tumner, 1986)

The Simple View of Reading (Gough and Tumner, 1986) provides a neat framework within which to conceptualise the process of reading and the place of dyslexia within it.
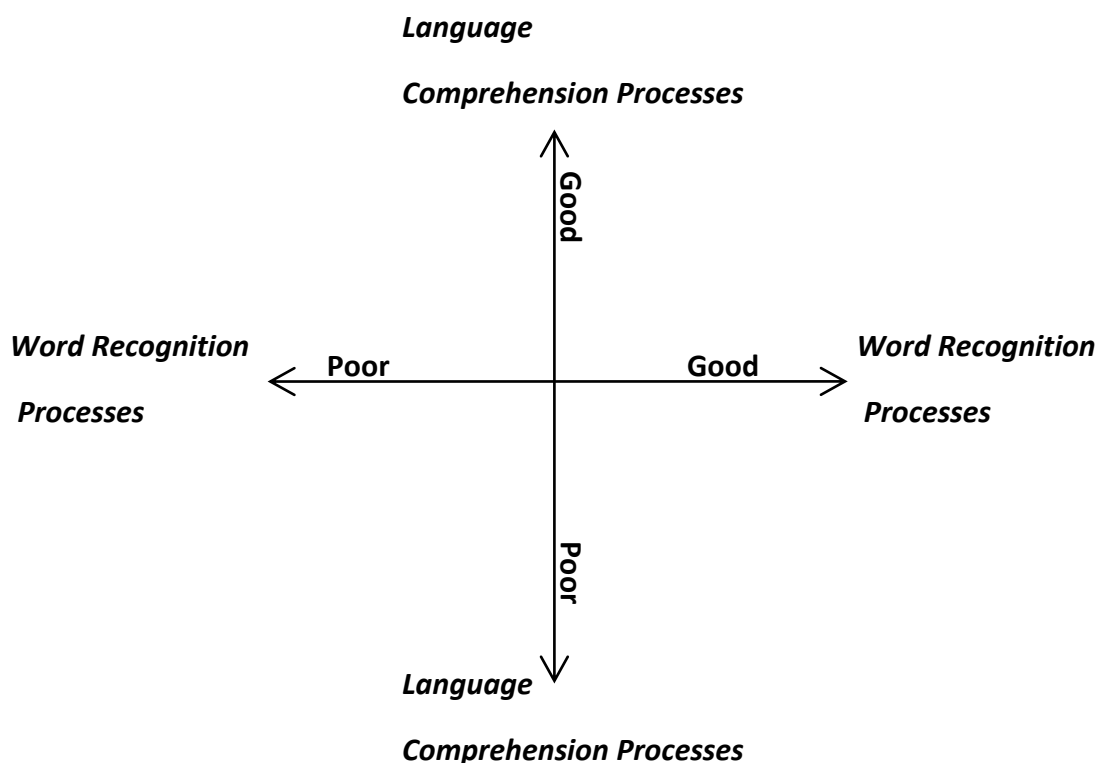
Language

Comprehension Processes

Good

Word Recognition   Poor   Good   *Word Recognition*

Processes   *Processes*

Poor

Language

Comprehension Processes

Figure 1. The Simple View of Reading (Gough &Tumner, 1986).

The simple view of reading apportions reading into word recognition processes (decoding words; ascertaining word identity) and language comprehension processes (i.e. lexical understanding; processes by which given word identification, sentences and discussions can be interpreted). Gough and Tumner (1986) propose that word recognition is necessary, but not sufficient for successful reading to take place because being able to pronounce a word does not guarantee understanding of a text. Conversely, language comprehension is a necessary, but not sufficient condition for

successful reading, as being able to identify what words are must precede being able to understand the meaning of a text.

The Simple View of Reading is presented in Figure 1. as a continuum within which word recognition processes may be good or poor, as may language comprehension processes. This may provide a useful framework within which to consider dyslexia, which is by definition a difficulty with word recognition. A dyslexic individual may therefore be expected to have poor word recognition skills, and on account of not being able to decode words successfully may appear to have poor language comprehension skills despite having unimpaired oral language comprehension skills. Conversely, an individual may have excellent word recognition skills, but poor language comprehension skills; they can identify what the words in a sentence are, but they are unable to extract meaning from what they have read.

What the 'Simple View' model is not able to do is provide a more detailed overview of the more specific mechanics involved in the process of reading. Within cognitive psychology, there exist a number of computational models of reading relating to various aspects of the overall reading process including:

- Identification of individual words (e.g. Coltheart, Coltheart, Rastle, Perry, Langdon & Ziegler, 2001; Seidenberg & McClelland, 1981; Plaut, McClelland, Seidenberg, and Patterson, 1996)
- Encoding of letter position (e.g. Davis & Bowers, 2006; Grainger & van Heuven, 2003; Whitney, 2001; Wagstaffe, 2004; 2005)
- Eye movements (e.g. Reichle, Rayner, & Pollatsek, 2003; McDonald, Carpenter, & Shillcock, 2005)
- Discourse processing (i.e. connecting the meanings of sentences to support sentence comprehension; e.g. see Kintsch,1988,1998;Schmalhofer, McDaniel, & Keefe, 2002)
- Syntactic parsing (i.e. sentence-level processing. E.g. Frazier, 1995; McRae, Spivey-Knowlton, & Tanenhaus, 1998; Tabor, Juliano, &Tanenhaus, 1997).

Rayner and Reichle (2010) suggest that an integrated framework of all the elements of the reading process is necessary, in particular in relation to seeking an integrated understanding of dyslexia (Fletcher, 2009). In the meantime, despite the

inconsistencies in definitions of dyslexia, what they do all seem to agree on at their base is a difficulty with word reading and spelling (e.g. Györfi & Smythe, 2010; Rose, 2009). As such, of the models of skilled reading available, models of word identification may be considered the most relevant framework within which to consider dyslexia.

Brief summaries of the two main models of word recognition are provided in order to allow for a more detailed overview of what this stage of reading entails. It may be worth noting that these models are somewhat elderly (Coltheart et al, 2001: Plaut et al., 1996). However, there appears to have been little change in the models since their inceptions and they continue to be referred to as the most relevant models of word identification in most contemporary texts (e.g. Eysenck & Keane, 2013; Rayner & Reichle, 2010; Welcome, Leonard & Chiarello, 2010).

The Dual Route Cascaded (DRC) Model of Word Recognition (Coltheart, Rastle, Perry, Langdon & Ziegler, 2001)

The essence of the DRC model of word recognition is that there are two potential routes by which the pronunciation of a word may be derived from print; a lexical route and a sub-lexical, grapheme-phoneme correspondences (GPC) route (see Figure 2).
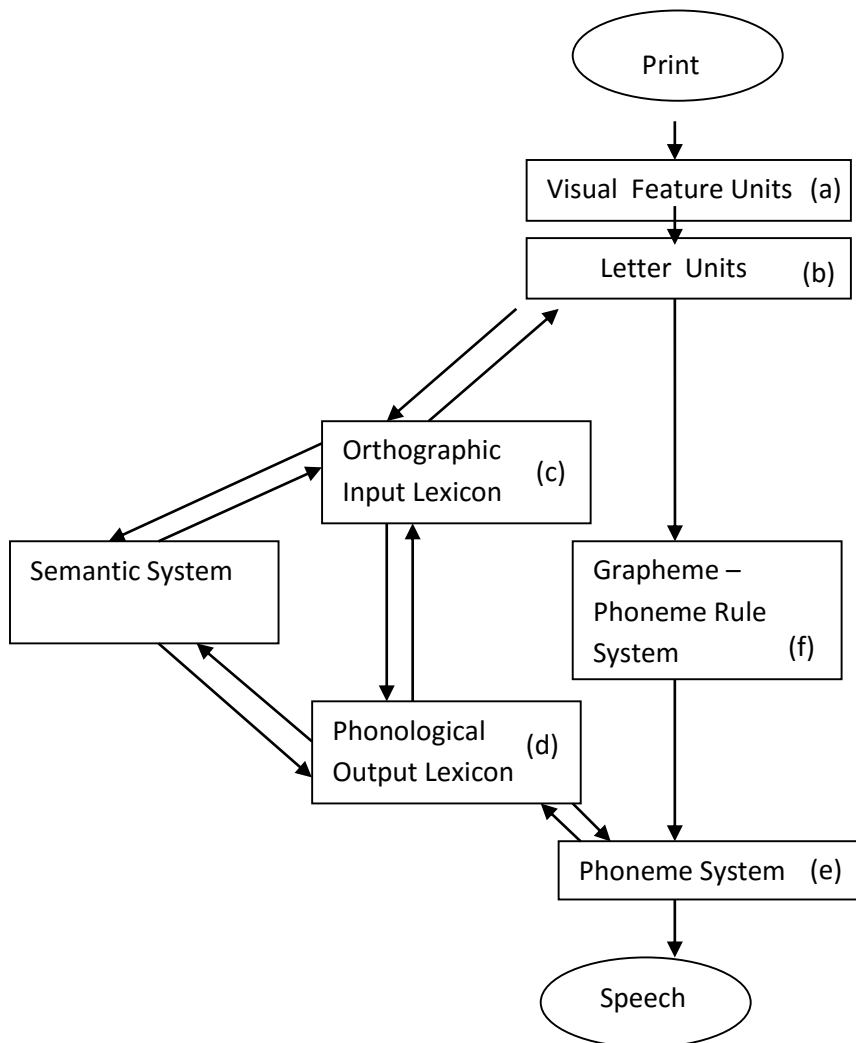
Figure 2. The Dual Rote Cascaded (DRC) Model of Reading (Coltheart et al., 2001)

The lexical[4] route achieves word identification via a process that within education may be referred to as 'sight reading' of whole words or parts of words, as opposed to letter-sound decoding. When a word is presented in print, the visual features of letters are processed at the letter feature level (a). The features then activate the word's letter units at the letter unit stage (b). Having been identified, the letters then activate the corresponding word (or part of a word) entry in the orthographic lexicon[5] (c). They then activate the corresponding word (or part of a word)

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[4] Lexical = word-based
[5] The orthographic lexicon is the name given to the stored set of visual representations of words or parts of words.

entry in the phonological lexicon[6] (d), and finally the letters activate the word's phonemes in the phoneme system (e), which allows the reader to pronounce the word. It is by this route that irregular words such as 'yacht' are able to be read.

The grapheme-to-phoneme[7] correspondence (GPC) route identifies the features of letters and the identities of letters via the same mechanisms as the lexical route. Having identified the letters, the grapheme-to-phoneme rule system (f) converts the letters into their phonological representations using GPC rules. The phonemes are assembled into a phoneme string, allowing the word to be pronounced. This route allows unfamiliar regular words (i.e. words with a transparent grapheme to phoneme correspondence) and pronounceable non-words (e.g. 'luftan') to be read.

Parallel Distributed Processing Models of Word Recognition (e.g. Seidenberg & McClelland, 1981; Plaut, McClelland, Seidenberg, and Patterson, 1996).

Parallel Distributed Processing (PDP) models of reading comprise similar processing levels to the DRC model, but all processing operates in parallel via a single route. Figure 3 shows Seidenberg and McClelland's (1989) model of lexical processing. PDP models are based on the premise that a processing system consists of a great many processing units, which are connected to each other. The strength of the connections between the units depends on several factors, and crucially, adapts each time the system encounters a new experience. PDP models of visual word recognition (e.g. Seidenberg and McClelland, 1989; Plaut, McClelland, Seidenberg and Patterson, 1996) hold that when a word is presented (i.e. on input), information about its orthography (i.e. constituent letter identities) is received by the processing system, while phonological information about the word is generated at an output level (see Figure 3). The connection between the input and output levels is mediated by hidden

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[6] The phonological lexicon is the name given to the stored set of phonological representations of words or parts of words.

[7] Grapheme to phoneme correspondence refers roughly to the mappings between letters and sounds. For example, the visual representation of the letter, 'p' maps onto the letter sound /p/. In reality, it is somewhat more complex than this, as where letters can be defined as single units of orthographic representation, graphemes are defined as the visual representations of phonemes. This becomes more complicated as in English orthography every letter is a grapheme - as each letter represents a phoneme - but there are additional phonemes that are represented by more than one letter; multi-letter graphemes (e.g. 'ng; is the grapheme representing the phoneme, /ŋ/ in 'bring', and the grapheme, 'th' represents the phoneme /θ/ in 'thanks')

units (*). The process is identical regardless of the type of word that is presented to the system (i.e. regular word, irregular word or pronounceable non-word).
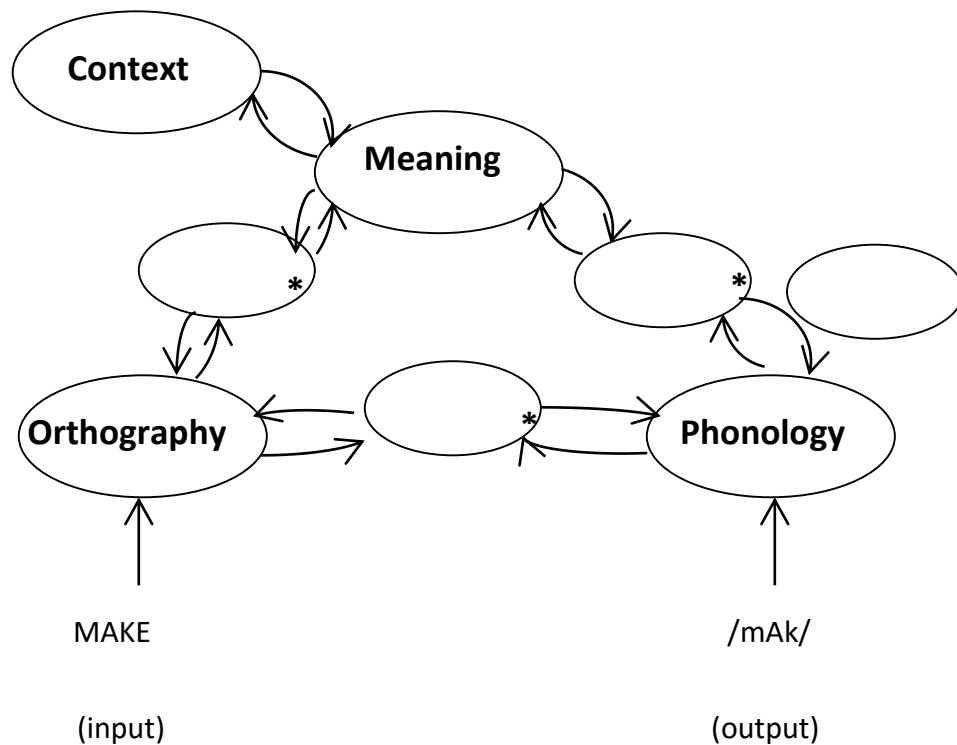

Figure 3. A Parallel Distributed Processing (PDP) model of reading (Seidenberg & McClelland, 1989).

Both DRC and PDP models of reading have successfully simulated dyslexic-type impairments in word recognition in their computational models (e.g. Coltheart et al., 2001; Plaut et al., 1996), although these theoretical accounts of dyslexia have been rather dismissed within education research[8]. What the two theoretical models of reading outlined above do show is that word recognition is an extraordinarily complicated process, and that there may be several different stages at which it could be dissimilar in dyslexic readers compared to typically-developing readers. Indeed, the Dual Route Cascaded (DRC) model (Coltheart et al, 2001) has slightly more success

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[8] The fact that DRC and PDP accounts of dyslexia have not been embraced within applied research and practice, may reflect the underlying motives of the researchers. Coltheart et al. (2001) and Plaut et al. (e.g. 1996) are primarily cognitive researchers of the processing involved in reading from a theoretical point of view. Their models of reading and dyslexia do not necessarily appeal to applied researchers, perhaps because they do not offer direct implications or suggestions for intervention. It may also be the case, more generally, that the language used by academic researchers is less appealing to applied practitioners, who are more likely to take account of social and emotional implications of theory. For example, many academic discussions of dyslexia talk of 'deficits', 'dysfunction' and 'abnormality'; applied discussions of dyslexia are more likely to refer to learning 'differences' and 'relative areas of strength and weaknesses'.

than the PDP models (Plaut et al, 1996) with accounting for phonological dyslexia[9] (see Eysenck, 2013) and as such the DRC model will be referred to through the remainder of this document when considering models of skilled reading.

Reading development

Models of the way in which children learn to read tend to acknowledge that first phase of word recognition is a pre-alphabetic (e.g. Ehri, 2005) or logographic (e.g. Frith, 1985) stage which reflects that children appear to recognise visual word information at a whole word level from the environment (e.g. their name or shop logos etc) at the level of shapes and other visual cues. This is consistent with the development of children's awareness of the phonological structures (sounds) of language, which begins with the largest units of language (words). As such, young children tend to be aware of words as whole units but not of the parts that make them up.

It is widely agreed that children's phonological awareness thus begins with whole words and is gradually refined to increasingly smaller units from syllables[10], onset-rimes[11] and eventually phonemes[12] (e.g. Stanovich, 1992). This gradual process down the hierarchy of the size of units of language tends to be consistent across languages (Anthony, Lonigan, Driscoll, Phillips & Burgess, 2003; Ziegler & Goswami, 2005).

There is a wealth of evidence indicating a strong relationship between children's early phonological awareness skills and their later reading development (e.g. Bradley & Bryant, 1983; Bryant, Maclean, Bradley & Crossland, 1990; Goswami & Bryant, 1990; Share, 1999). However, there remains some debate about the order in which

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[9] It may be interesting to note that some academic research continues to distinguish between 'phonological', 'surface' and 'deep' dyslexia although the latter two are rarely, if ever, referred to in practice.

[10] A syllable refers to a unit of pronunciation with one vowel sound; it typically reflects the way a word naturally divides into parts when pronounced. For example, syl/la/ble.

[11] Onset-rimes refer to dividing a word into the part before the first vowel (onset) and the part of the word which includes the vowel onwards. For example, ex (onset) - ample (rime); v (onset) - owel (rime).

[12] A phoneme refers to the smallest units of speech sounds, i.e. the sounds of letters (graphemes) or groups of letters. E.g. sound has 4 phonemes: s/ou/n/d and 5 letters, and sand has 4 phonemes and 4 letters (s/a/n/d).

they may develop different phonological skills. What does appear to be generally acknowledged is that development of vocabulary is a strong predictor for skills at the larger units of words (whole words, syllables, onset-rime) and may be a necessary precursor for the impact of awareness of phonemes on later reading (e.g. Byrne, 1998; Muter, 2003). As such, although some phonological skills (e.g. awareness of syllables and onset-rimes) may pre-date the teaching of reading, some rely on exposure to print and explicit teaching (e.g. Goswami and Bryant, 1990). The relevance of this to the current discussion is that there is a general consensus that the two most important factors in beginning to learn to read are phonological awareness and knowledge of letter sounds, but that the combined impact of these may be mediated by a number of other factors and are both likely to develop atypically for (many or most) dyslexic readers (e.g. g. Bradley and Bryant, 1983; Goswami and Bryant, 1990; Lundberg and Hoien, 2005; Snowling, 2000; Swan and Goswami, 1997).

Defining Dyslexia

Definitions

Defining dyslexia is 'somewhat paradoxically' both very easy and very difficult because the definition needs to be wide enough to capture the range of needs that dyslexia reflects, while being specific enough to refer a distinct group of individuals who it represents (Elliott & Grigorenko, 2014).

Critchley (1970) *was* among the first to posit a definition of dyslexia, as:

"a disorder manifested by difficulty with learning to read, despite conventional instruction, adequate intelligence and sociocultural opportunity. It is dependent upon fundamental cognitive disabilities which are frequently of constitutional origin"

As research and understanding of dyslexia continued to develop, the need for a refined definition saw Critchley's increasingly replaced on the grounds that its emphasis was too exclusionary (i.e. it said more about what dyslexia is not rather than what it is, see Rutter, 1982). Over time, a number of updated definitions have emerged, including:

International Dyslexia Association (2003), defining dyslexia as:

"Difficulties with accurate and fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive areas and the providing of effective classroom instruction"

The IDA definition moves away from a 'discrepancy model' (see below) by removing any reference to intelligence, but does emphasise that reading difficulties may otherwise be unexpected for a child or young person with dyslexia. It is helpful in that it narrows down the elements of reading that may be impacted. However, part of the problem in applying this definition operationally is in determining in a consistent way which may be considered to be unexpected so that this can be applied in a helpful or meaningful diagnostic sense (e.g. Elliott & Grigorenko, 2014; Wagner, 2008). Shaywitz (2005) suggests that unexpectedness can be determined by a cognitive profile whereby decoding is an isolated difficulty within 'a sea of strengths'. Although this profile may reasonably apply to many dyslexic individuals, it is difficult to generalise because reading development and vocabulary development are so closely linked, which means that there are many dyslexic individuals who would not necessarily have good language skills (e.g. Tumner & Greaney, 2010) or good general knowledge (e.g. Vargo, Grossner & Spafford, 1995) which is further compounded by not being able to effectively access text. As such, there is no clear logical or theoretical grounds on which to apply a different criteria or understanding for children whose cognitive profiles are 'relatively flat', reflecting needs in one or more area than just a difficulty with decoding (Fletcher, Morris & Lyon, 2003. Fletcher, Stuebing, Morris & Lyon, 2013).

The European Dyslexia Association (2007) defines dyslexia as:

"a difference in acquiring reading , spelling and writing skills, that is neurological in origin. The cognitive difficulties that cause these differences can also affect organisational skills, calculation abilities, etc. It may be caused by a combination of difficulties in phonological processing, working memory, rapid naming, sequencing and the automaticity of basic skills. Alongside these issues is the ongoing challenge for people with dyslexia navigating through life in a largely non-dyslexia friendly world. Researchers acknowledge that there are many possible causes of dyslexia including genetics. There is no relationship between a person's levels of intelligence, individual socioeconomic position and the presence of dyslexia. Furthermore, across Europe the diversity of languages and the multilingual demands, sociocultural backgrounds as well as educational opportunity, have a significant impact on the life-chances for dyslexic children and adults" (from Györfi & Smythe, 2010, p. 89).

This provides a good example of an inclusionary model of dyslexia in that it provides guidance about what may be involved for an individual with dyslexia and what their experiences may include, as well as acknowledging the significant real-life impacts of long-term reading impairment. Note an explicit statement refuting 'intelligence' as a mediating factor. However, there are theoretical and operational difficulties with using such a definition in any sort of helpful diagnostic sense. Firstly, as discussed in due course, the overwhelming consensus from research within the UK currently recognises phonological processing difficulties as causal in dyslexia, with the other accounts mentioned here (working memory, rapid naming) being accounted for as epiphenomena (i.e. by-products) of phonological processing difficulties (e.g. Hulme & Roodenrys, 1999) or as not sufficiently reliable to account for the needs of dyslexic individuals (e.g. Snowling, 2000). Note that this discussion is based on the consensus of research evidence, and as discussed in more detail below, it is likely to be helpful to at the least acknowledge a wide range of theoretical models when considering individual needs in dyslexia. However, in guiding a definition to be used in a clear, consistent and operational sense, based on the weight of evidence from research, the European Dyslexia Association definition is not sufficiently reliable.

In addition, both the European Dyslexia Association (2007) and Snowling (2008) suggest that a defining feature of dyslexia is a 'neurological origin' for the deficits

experienced. Although there is undisputable evidence for neurological and genetic substrates of reading difficulties (see below), there is not currently any mechanism whereby these can be used in any diagnostic sense (e.g. Grigorenko & Naples, 2009; Leonard & Eckhert, 2008; Rutter, Kim-Cohen and Maughan, 2006; Van Daal, 2015), nor at present are they able to guide intervention in any meaningful way (e.g.Elliott & Grigorenko, 2014; McCardle & Miller, 2012). As such, reference to a causal neurological component as a determining feature of dyslexia is not at present operationally relevant or practical, although it remains an important theoretical question and ideally a future paradigm shift in dyslexia may involve being able to usefully and meaningfully apply this crucial body of research (e.g. Everatt & Reid, 2009; Fletcher, 2009).

Health Council of the Netherlands (1997)

Perhaps unsurprisingly, the implication of such difficulties with reaching a clear, reflective, usable and meaningful definition of dyslexia has resulted in increasing reduction of the definition. Indeed, the Health Council of the Netherlands (1997) identified criteria by which the acceptability of a definition of dyslexia could be approved. These included that it should be:

- descriptive with no explanatory elements
- specific enough to identify dyslexia within reading and spelling problems
- general enough to allow for various scientific models and any developments they may undergo
- operationalizable for the purpose of research into people and groups
- directive for statements concerning the need for intervention
- applicable to the various groups involved.

This led to the resulting definition of dyslexia:

"*Dyslexia is present when the automatization of word identification (reading) and/or spelling does not develop or does so very incompletely or with great difficulty*" (from Györfi & Smythe, 2010, p. 88).

British Psychological Society (1999; 2005)

A trend towards increasingly inclusive (i.e. reflecting agreement of what dyslexia is, rather than what it is not) definitions has followed in the UK, with the British Psychological Society's (1999, re-issued in 2005) definition:

"Dyslexia is evident when accurate and fluent reading and /or spelling develops very incompletely or with great difficulty. This focuses on literacy learning at the 'word level' and implies that the problem is severe and persistent despite appropriate learning opportunities. It provides the basis for a staged process of assessment through teaching".

Rose (2009)

The 2009 Rose Review, Identifying and Teaching Young People with Dyslexia and Literacy Difficulties, although not without its critics, built largely on the BPS model, added to its definition a crucial sentence that moved identification of dyslexia into a new era.

"Dyslexia is a learning difficulty that primarily affects the skills involved in accurate and fluent word reading and spelling.'

- *Characteristic features of dyslexia are difficulties in phonological awareness, verbal memory and verbal processing speed.*
- *Dyslexia occurs across the range of intellectual abilities.*
- *It is best thought of as a continuum, not a distinct category, and there are no clear cut-off points.*
- *Co-occurring difficulties may be seen in aspects of language, motor co-ordination, mental calculation, concentration and personal organisation, but these are not, by themselves, markers of dyslexia.*
- *A good indication of the severity and persistence of dyslexia difficulties can be gained by examining how the individual responds or has responded to well-founded intervention."*

It is worth noting that Scotland has a separate education system to the rest of the U.K and The Scottish Government and Dyslexia Scotland have agreed on a slightly

different definition: Dyslexia can be described as a continuum of difficulties in learning to read, write and/or spell, which persist despite the provision of appropriate learning opportunities. These difficulties often do not reflect an individual's cognitive abilities and may not be typical of performance in other areas.

The impact of dyslexia as a barrier to learning varies in degree according to the learning and teaching environment, as there are often associated difficulties such as:

- *auditory and /or visual processing of language-based information*
- *phonological awareness*
- *oral language skills and reading fluency*
- *short-term and working memory*
- *sequencing and directionality*
- *number skills*
- *organisational ability*
- *Motor skills and co-ordination may also be affected.*

Dyslexia as a Continuum

The 2009 Rose definition of dyslexia has not been superseded to date and is widely considered to provide a 'best-fit' framework for understanding dyslexia, in a way which impacts on assessment through a Response to Intervention approach, rather than a 'wait to fail' approach, and which acknowledges frequently-arising co-occurring difficulties in a reliable way which doesn't require them to be a 'marker' for identification. It accounts for the difficulties of a heterogeneous group of dyslexic individuals and is inclusive enough to recognise characteristic features without applying them as exclusionary criteria. It is for these reasons that the 2009 Rose definition of dyslexia has been adopted by Cambridgeshire County Council as well a majority of other Local Authorities nationally.

The crucial sentence in the Rose definition, according to Reason and Stothard (2013) was that referring to dyslexia as a *"continuum, not a distinct category, and there are no cut-off points"* (p. 10). This, according to Reason and Stothard (2013) moved understanding of dyslexia firmly from a question of 'dyslexia or not' to a

question of 'what is the nature of the dyslexia and how severe is it?' In fact, reference to dyslexia as a continuum without clear cut-off points reflects a view that has been prevailing in dyslexia research and theory for some time and appears to now be largely uncontested (e.g. Snowling, 2015; Fletcher, Lyon, Fuchs and Barnes, 2007; Rice and Brooks, 2004; Pennington, 2009; Elliott, 2008; Van Daal, 2015).

Identification (note distinction to diagnosis) of dyslexia on a continuum has engendered debate over whether there is any qualitative difference between the reading difficulties of children who are specifically dyslexic and those whose difficulties with reading and writing are due to more general or pervasive developmental difficulties (e.g. Elliott, 2005). Indeed, there is little evidence of any meaningful distinction of a dyslexic subgroup within the wider group of struggling readers in terms of causality, assessment, neurology or intervention (e.g. Knight, Day & Patten-Terry, 2009; Rice & Brooks, 2004; Elliott & Grigorenko, 2014; McCardle & Miller, 2012; Pennington, 2009) [13]. It is important to note that this reflects developments in evidence and theory and does not in any way detract from the very

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[13] Discussion of the Rose definition of dyslexia by the House of Commons Science and Technology Committee concluded that *"The [Rose] definition is so broad and blurred at the edges that it is difficult to see how it could be useful in any diagnostic sense"* (71; 2009). Brooks (2015) responded that, *"it wasn't meant to be 'useful in any diagnostic sense' because no definition could ever be precise enough to deliver the sort of dichotomous 'is it/isn't it dyslexia judgement…"* (p. 17). The House of Commons Science and Technology Committee appear eventually to have come to the same conclusion, noting that: *"The answer we reached was that it is not useful from an educational point of view. There is no convincing evidence that if a child with dyslexia is not labelled as dyslexic, but receives full support for his or her reading difficulty, that the child will do any worse than a child who is labelled as dyslexic and then receives specialist help. That is because the techniques to teach a child diagnosed with dyslexia to read are exactly the same as the techniques used to teach any other struggling reader. There is a further danger that an overemphasis on dyslexia may disadvantage other children with profound reading difficulties.* **We conclude that 'specialist dyslexia teachers' could be renamed 'specialist literacy difficulty teachers'. There are a range of reasons why people may struggle to learn to read and the Government's focus on dyslexia risks obscuring the broader problem. The Government's support for training teachers to become better at helping poor readers is welcome and to be supported, but its specific focus on 'specialist dyslexia teachers' is not evidence-based"** (77; 2009 emphasis in original). And, *finally "This is an interesting admission: that the Government decided to spend time and money looking specifically at dyslexia because of the strength of the dyslexia lobby, rather than because of any pre-existing, well researched, well defined problem. We have demonstrated the range of difficulties in this area: that dyslexia is so broadly defined that it encompasses a continuum of reading difficulties that have little if any relation to specific literacy interventions; and that the research in this area is not of the highest quality. The Minister's admission explains why teachers who are being trained to help all children with reading difficulties are labelled 'specialist dyslexia teachers'.* **We recommend that the Government be more independently minded: it should prioritise its efforts on the basis of research, rather than commissioning research on the basis of the priorities of lobby groups"** (House of Commons Science and Technology Committee, 2009; 84).

real, distressing and ongoing difficulties of dyslexic individuals. Indeed, perhaps there is reason to be optimistic that the reading needs of a wider group of dyslexic individuals are increasingly better understood and can be addressed.

The demise of the discrepancy model

The first reported case of what we now refer to as 'dyslexia' was of a fourteen-year old boy named Percy who had been unable to learn to read. Pringle-Morgan, the doctor who reported this case noted that it was surprising because *"the school master who taught him for some years says that he would be the smartest lad in the school if the instruction were entirely oral"* (Pringle-Morgan, 1896, cited in Miles and Miles (1990, p.vii). Such reported difficulties with reading took on many different names over the years, from 'congenital word blindness' (Hinshelwood, 1917), to 'strephosymbolia' (which literally translates as 'twisting of symbols'; Orton, 1937). One factor that remained constant throughout these early inceptions of dyslexia is that the difficulties that underlay reading and writing acquisition for such individuals were surprising given their general abilities and 'intelligence'. Thus was born the discrepancy model, which is inherent in early definitions of dyslexia (see Critchley, 1970 definition above).   Snowling (2000) notes several issues with the Critchley definition of dyslexia, including the vagueness of terms such as 'conventional instruction' and 'adequate intelligence'. It is perhaps the latter that has formed the focus of the most ardent objections to the discrepancy model; the reliability of IQ measures of intelligence has come under considerable scrutiny. Therefore, to identify individuals as dyslexic as opposed to generally 'backward[14]' (Snowling, 2000), on the basis of such a poorly defined and ethereal construct, is considered by many to be neither valid nor useful (e.g. Stanovitch, 2005; Stanovitch and Siegel, 1994; Stuebing, Fletcher, Le Doux, Shaywitz and Shaywitz, 2002). A lack of relevance or usefulness of IQ in dyslexia has been replicated in research in many other languages including Finnish (e.g. Korttenein, Närhi & Ahonen, 2009) and Spanish (e.g. Jiminéz & Garcia de la Cadena, 2007). Nonetheless, as noted by Elbheri and Everatt (2009*), "IQ and dyslexia have been associated in such a way that it is often impossible to disconnect the two in social/political discourse"* (p.24).

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[14] Original terminology (Snowling, 2000)

As such, despite an almost unanimous agreement that IQ is not a meaningful or relevant factor in identifying or responding to dyslexia (although see Herrington Hunter-Carsh, 2001; Thomson, 2002), there appears to be a prevailing public view that has outlived the paradigm shift in research and understanding. That dyslexia occurs across a range of learning needs (including otherwise high achievers or able learners as well as learners who are struggling across many areas of learning and development) does not detract from the very real and difficult experiences that dyslexic learners face.

It may be worth noting that acknowledging that IQ scores in themselves are not helpful or relevant in identifying and addressing dyslexia, this does not mean that cognitive assessments are never useful for understanding the needs of struggling readers. As outlined later, there may be some children who, following a carefully planned and monitored Response to Intervention approach, continue to find their reading and spelling development resistant to intervention. In such situations, a cognitive or learning assessment aimed to explore their relative areas of strength and need and how these link with their reading difficulties can be helpful in guiding intervention. Nonetheless, even in this scenario the overall IQ score remains irrelevant to understanding the nature of the need or to guiding intervention.

The discrepancy model in academic research

One particular area in which a discrepancy identification of dyslexia often continues to be applied is in academic research studies (e.g. Berringer, Raskind, Richards, Abott & Stock, 2008; Goswami, Huss, Mead, Fosker & Verney, 2013; Gooch, Snowling & Hulme, 2012; Snowling, 2000; Stein, Talcott & Witton, 2001) despite acknowledgement that a discrepancy model is no longer considered to be a valid marker of dyslexia in practice (e.g. Van Daal, 2015). The continued use of this model reflects a difference in the perspective and purposes of the different professional groups working around dyslexia. Academic researchers need to refine participant groups so that they are as homogenous as possible in order to allow reproducibility of findings and to allow consistency and specificity to support the development of theory (e.g. Singleton, 2009; Stanovich, 1992; Van Daal, 2015).

Prevalence

Perhaps unsurprisingly given the wide and ever evolving definitions of dyslexia outlined above, there is little consistency in reported prevalence rates of dyslexia. The US National Institute of Health (cited in Elliott & Grigorenko, 2015) reports a rate of 20%, consistent with Shaywitz (2005). Gyòrfi & Smythe (2010) cite a prevalence for dyslexia in Europe affecting 10% of the population, as does van Bergen, de Jong, Plakas, Massen and van der Leij (2012) in the Dutch population and the Dyslexia Foundation of New Zealand (2008). More locally, Crisfield (1990) wrote on behalf of the British Dyslexia Association that there was prevalence in the UK of 10% for mild dyslexia and 4% for severe dyslexia. Goswami (2008) also identifies a rate of 4 – 10%, whereas Nicolson (2005) works on a rate of 5% of the population. Butterworth and Kovas (2013) refer to a prevalence rate of 4 – 8% of dyslexic individuals in the general population, as does Snowling (2008), although Snowling (2013) later refers to a rate of 3 – 10%.

Indeed, Fletcher (2009) notes reported rates of dyslexia in the population varying from 3 – 17% and concludes, that, "*Deciding where on a continuum a disability resides is inherently arbitrary, which is why prevalence estimates vary*" (p 3; see also Pennington, 2009).

In practice, it may be a helpful heuristic for teachers to assume a prevalence rate of 20% in order that they are prepared or expecting at least one in every five children in their class to struggle with reading and to be prepared to make adaptations to support in line with a Response to Intervention approach at that level.

Biological Factors: Neurology and Genetics

There is incontrovertible evidence that dyslexia (as defined by the Rose model) has genetic and neurological substrates (e.g. Hoskyn, 2008; Galaburda, 1993; Masland, 1990; Leonard & Eckhart, 2008; Nicolson, 2005; Grigorenko, 2004; Elliott & Grigorenko, 2014).

Research in genetics has identified a number of genes linked with reading impairment (e.g. Grigorenko & Naples, 2010) and an interaction between genetic factors and access to education which has implications for early intervention (e.g.

Samuelson, Byrne, Olson, Hulslander, Wadsworth, Corley et al, 2008). Indeed, Leavitt, Nash and Snowling (2014) have reported that many parents of children identified as dyslexic also have reading difficulties. However, no clear causal model and specific genetic aetiology for dyslexia has yet been identified (e.g. Grigorenko & Naples, 2010; Pennington, 2009).

Similarly, research in neuroscience has identified a number of key regions of the brain that differ for dyslexic and typically-developing readers (e.g. Pollack, Luk & Christodoulou, 2015; Leonard & Eckhart, 2008; Galaburda, 1993; Berringer et al, 2008). Hoskyn (2008) notes that, "*the general assumption that guides much of this* [neuropsychological] *research is that once identified, a neurobiological signature for developmental dyslexia has important implications for early detection and for the design for intervention efforts"* (p. 659). Fletcher (2009) notes that as theoretical models of reading impairment become more specific, so will the biological correlates become more apparent and more applicable to support dyslexic children in practice. However, as noted by Pollack et al (2015), although there are many and increasing brain regions involved in impaired reading, "*…the mechanism underlying this functional disruption and how it relates to behaviour requires further investigation"* (p.8; see also Leonard and Eckhert, 2008). This is perhaps unsurprising when taking into account the multiple points in the cognitive processes underlying reading at which difficulties may arise (see Figure 2), many of which reflect differing neurological architecture. Furthermore, there are not yet any clear implications for intervention, at least not beyond general principles around overlearning and pacing learning (Everatt & Reid, 2009).

Developments in genetics and neuroscience thus indicate a clear link between biological factors and dyslexia, and show how these interact with environmental experiences. This does not yet have any clear practical implications for identifying or supporting dyslexic individuals but neuroscience is a rapidly developing field so there may be reason to be optimistic that such practical applications may become more apparent over time (e.g. Fletcher, 2009; Hoskyns, 2009).

Causal models of Dyslexia

The Phonological Deficit Hypothesis

Early accounts of dyslexia assumed that its associated reading difficulties were visual in origin, as reflected in some of its early terminology ('word blindness'; 'strephosymbolia'). One of the major paradigm shifts in thinking about dyslexia was that it may not reflect a problem purely of visual processing, but also (or indeed primarily) of processing language (Vellutino, 1979). The Phonological Deficit Hypothesis (e.g. Snowling, 2000; Swan and Goswami, 1997) proposes that the core deficit within dyslexia that results in poor word reading arises as a consequence of poor phonological representations[15] (e.g. Boada and Pennington (2006; Bradley and Bryant, 1983; Goswami and Bryant, 1990; Thomson, Richardson, & Goswami, 2005). Lundberg and Hoien (2005) outline the way in which some of the main features of phonological difficulties (at a cognitive level) in reading may manifest as the following difficulties at a behavioural level. These include: difficulty segmenting words into phonemes, difficulty retaining letter strings (presented either as visual or auditory stimuli) in short term memory, and difficulty with manipulating phonological information (e.g. spoonerisms). The Phonological Deficit Hypothesis is currently the most widely accepted account of dyslexia (see Rose, 2009), and is supported by a multitude of research in English, (e.g. Hulme and Snowling, 1994) as well as in other languages including Dutch (e.g. de Jong and van der Leij, 1999), French (Courcy, Beland and Pitchford, 2000) and Chinese (Perfetti, Tan and Siok, 1996). There is also some evidence that a paucity of exposure to a rich language and literature in the early years can impact on later phonological development, thus suggesting a link between early home experiences and later reading development (e.g. Corriveau, Goswami & Thomson, 2010).

A large majority of published interventions for dyslexic children and young people are designed to promote phonological awareness and ability (see later section on interventions); indeed the importance of explicitly teaching synthetic phonics in to all

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[15] Phonological representations refer to information that is stored in the brain about the sounds of words and individual letters or graphemes, in the form of phonemes.

children in primary schools has become increasingly embraced in recent years (e.g. DfES, 2007; Johnston and Watson, 2014; Rose, 2006).

It may be tempting to conclude from this that all dyslexic children must by definition have a difficulty with phonological processing skills as the basis of their reading difficulties and that any intervention for any dyslexic child must take the form of additional, intense phonics intervention. Indeed, this has been the gist of the proposed government response to dyslexia (Rose, 2009). There are also a range of accounts for the origins of phonological processing difficulties (e.g. Corriveau ate al, 2010; Goswami et al, 2013; Perrachione, Del Tufo & Gabrieli, 2011). However, there are some dyslexic children for whom phonics interventions are not successful in helping them to progress with their word reading skills (e.g. Snowling, 2008; Torgesen, Wagner and Rashotte, 1994). While there is general agreement in research and applied psychology communities that phonological deficits are a core feature of dyslexia, they do not necessarily account for all of the subtle features of all dyslexic children, even within the narrow focus of word recognition (e.g. Byrne, 2011; Ramus & Szenkovits, 2008). Indeed, Peterson, Pennington, Shiberg & Boada (2009) refer to the 'tyranny of the phoneme' (p. 1997) as an overrepresented linguistic unit in studies of reading and reading impairment. As has been discussed previously, dyslexia is not straightforward or neat; not all dyslexic children have the same profile of strengths and weaknesses, and as shown in Figure 2 and Figure 4 there are many possible stages in the reading process at which difficulties may become apparent. There are a number of additional theories which aim to account for some of these variations, but which are often overlooked outside of academic research, perhaps because they do not fit neatly within a 'one-size-fits-all' approach (e.g. Reynolds & Shaywitz, 2009). If all dyslexic children are to receive support that specifically meets their needs, we may need to consider the possibility that a phonological deficit is certainly one, but not necessarily the only cause of dyslexia (e.g. Nicolson and Fawcett, 2008).

The Double Deficit Hypothesis

The Double-Deficit Hypothesis proposes that there is a second core deficit in dyslexia, in addition to the phonological deficit outlined above. This second core deficit is apparent in naming speed (e.g. Geschwind, 1974), which is thought to manifest in dyslexia as processing rates that are not sufficiently rapid to support

fluent reading (Wolf and O'Brien, 2001; Wolf, Bowers and Biddle, 2000). Results of studies using Rapid Automatized Naming[16] (RAN) tasks (e.g. Denckla and Rudel, 1974) suggest that the speed (but not the accuracy) with which the names of test items are recovered are significantly slower for dyslexic readers than for average readers. There is thus a large and growing body of evidence to suggest that dyslexic readers in general have a significant difficulty in the rapid retrieval of item names from memory, particularly when the items are alphanumerical in nature.

The Double-Deficit Hypothesis proposes that there are some dyslexics whose reading difficulties are purely phonological, a small number whose difficulties relate purely to speed of processing (as evidenced by speed of naming) and some dyslexics who have a double-deficit of both phonological and naming-speed difficulties (Lovett, Steinbach and Frijters, 2000). These individuals, according to Wolf and Bowers (2000) are the most impaired dyslexics, perhaps because their double deficit limits their potential to use compensatory routes to word recognition and reading. Part of the reason why this theory has received relatively little attention within educational publications of dyslexia is that naming speed has been assumed by many proponents of the Phonological Deficit Hypothesis, to fall under the category of a phonological deficit (e.g. Snowling, 2000) However, there is also a growing body of research to suggest that the phonological and speed of processing deficits implied in this account of dyslexia are mutually independent (e.g. Wolf and Bowers, 2000; Kirby, Georgiou, Martinussen, Parrila, Bowers & Landerl, 2010 but see also Ziegler, Bertrand, Tóth, Csépe, Reis, Faísca et al, 2010).

Working Memory

Issues of whether naming-speed deficits are subsumed by phonological deficits in general, reflect a somewhat broader debate about the role of working memory in dyslexia. There is increasing agreement among researchers and educationalists that some dyslexic difficulties may be related to difficulties in working memory. Again, proponents of the core Phonological Deficit Hypothesis have argued that working

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[16] During Rapid Automatized Naming (RAN) tasks, participants are asked to name a series of stimuli as quickly as they can. These stimuli can be alphanumerical (letters or numbers), categorical (e.g. colours) or nominal (e.g. pictures).

memory deficits in dyslexia are reflective of difficulties in retrieval and manipulations of phonological items within the phonological loop (e.g. Hulme and Roodenrys, 1995). Pickering (2006) however, suggests that some dyslexic reading difficulties reflect functionally separate working memory difficulties, at the level of visual working memory, and at the level of the central executive. Research into the role of working memory in dyslexia is prolific (e.g. Menghini, Finzi, Carlesimo & Vicari, 2011; Gathercole, Pickering, Knight & Stegman, 2004) and yet tends to be relatively dismissed (e.g. Ricketts, 2011) in the crucial process of applying theory to classroom practice, at least through the route of government-endorsed education policy and practice[17]. Interestingly, however, many independent resource guides and books on classroom practice include advice and tips on how to effectively address the needs of dyslexic children whose speed of processing is not as rapid as that of their peers, or who find it difficult to carry out several instructions at once (perhaps reflecting a working memory deficit, (e.g. Pollack and Waller, 1990; Mackay, 2005). There is a developing body of interventions aimed to support the development of working memory in the classroom, but these have not yet indicated consistently promising results in relation to classroom performance or generalisation (e.g. Dunning, Holmes & Gathercole, 2013; Elliot, Gathercole, Alloway, Kirkwood & Holmes, 2010; Melby-Lervåg & Hulme, 2013 although see Egeland, Aarlien & Saunes, 2013).

Low-Level Visual Processing Deficits

In a return to more visual accounts of dyslexia, Lovegrove, Martin, Blackwood and Badcock (1980) found results suggesting that there were functional differences in the visual processing systems of dyslexic and non-dyslexic readers. Specifically, they found that many dyslexics have lower contrast sensitivity[18] than skilled readers, particularly at low temporal and high spatial frequencies,[19] which are processed by magno cells (Stein, 2003). A large body of subsequent studies have found similar differential qualities in the physical structures (e.g. Livingstone, Rosen, Drislane, & Galaburda, 1991) and functional responses (e.g. Lehmkuhle and Williams, 1993) of

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[17] This tendency may be reflected in the fact that many of the members of the expert advisory group called upon by Jim Rose in his most recent review of the current research evidence in dyslexia were themselves proponents of the Phonological Deficit Hypothesis.

[18] Contrast sensitivity refers to measurement of how well details can be seen at low contrast; i.e. the degree to which an image can be faded without becoming indistinguishable from its surroundings or background.

[19] Spatial frequency refers to the width of the bands in a sine-wave grating.

the magnocellular system of dyslexic and non-dyslexic readers. Magnocellular deficits have also been found to affect visual motion sensitivity in dyslexic readers (Stein, 2003) as well as visual instability which may cause dyslexic readers' eyes to 'wobble' during fixations (e.g. Eden, Stein, Wood and Wood, 1994). The conclusion that dyslexic readers may have reduced sensitivity in their magnocellular processing (e.g. Pammer, 2012; Vidyasagar, 2012) has been criticised on account of a degree of inconsistency in findings; the proportion of dyslexic readers found in studies to have a magnocellular deficit is relatively small (e.g. Skottun, 2000). Accounts of causal connections between low-level visual processing deficits and reading difficulties have also been dismissed as mere epiphenomena of the phonological deficits thought to be implicit in dyslexia (e.g. Hulme, 1988). However, Talcott, Witton, McClean, Hansen, Rees, Green and Stein (2000) found that features of low-level visual processing such as motion sensitivity could account for orthographic (visual) reading ability, when phonological ability was controlled for, suggesting that such psychophysical characteristics of dyslexia may be more than mere epiphenomena. "*From a neuropsychological perspective, development dyslexia has multiple causes. One may be a M*[magnocellular]-*deficit subtype.*" (Chase, Ashourzadeh and Kelly, 2005, p.135).

A further account of a link between low level visual processing difficulties and dyslexia is provided by theories of scotopic sensitivity (Meares-Irlen Syndrome) (e.g. Singleton, 2009a; Irlen, 1997). This refers to visual discomfort experienced during reading due to increased sensitivity to glare, resulting in a number of visual distortions (Singleton, 2009a). Mearles-Irlen Syndrome has been largely dismissed as a causal factor in dyslexia (e.g. American Academy of Paediatrics, 2009; Wilkins, 1995; Whit, Milne, Rosen, Hansen, Swettenham, Frith et al. 2006), there is equally acknowledgement that visual stress may make reading unpleasant and therefore lead to avoidance (e.g. Singleton, 2009a). This may account for the high number of dyslexic readers who anecdotally report that they find coloured overlays helpful (e.g. Wilkins 1995; 2003).

Automaticity

The Dyslexic Automatization Deficit Hypothesis (DAD; Nicolson and Fawcett, 1990) proposes that dyslexic individuals have difficulty with developing automaticity in cognitive as well as motor skills. This view is supported by the observation that even once dyslexic children have mastered word reading skills in terms of accuracy, their performance remains relatively slow and less fluent than non-dyslexic readers (e.g. Snowling, 2000). It is suggested that such difficulties in acquiring automatization in reading, as well as a wide range of other skills, originates from differential functioning of the cerebellum[20] in dyslexic compared to non-dyslexic individuals (e.g. Frank and Levinson, 1973; Fawcett, Nicolson and Dean, 1996; Nicolson and Fawcett, 2008). This account of dyslexia appears to have been entirely overlooked in educational spheres and has come up against significant criticism as far as concerns its reliability as a causal factor in reading (e.g. Chaix et al, 2007; Stoodly & Stein, 2011; 2013; Rochelle & Talcott, 2006). One of the original proponents of this model, Nicolson (2005), himself acknowledges that it is perhaps of limited interest in education as its implications for intervention for dyslexic learners are not readily appreciated (Elliott & Grigorenko, 2014).

Co-occurring Difficulties

The Rose (2006) definition of dyslexia notes that "*Co-occurring difficulties may be seen in aspects of language, motor co-ordination, mental calculation, concentration and personal organisation, but these are not, by themselves, markers of dyslexia".*

Indeed, there is reported comorbidity between dyslexia and ADHD, with prevalence rates varying between 5 – 7 % (e.g. Polanczyk, Silva de Lima, Horta, Biederman & Rohde, 2007) and 15-35% (e.g. Willcutt & Pennington, 2000). Similarly, dyslexic children frequently have associated motor coordination difficulties, with comorbidity rates reported between 5 – 18 % (e.g. Geuze, Jongmans, Schoemaker& Smits-Englesman, 2001) and 50% (Kaplan et al., 1998). Dyslexia has also been found to be a common additional need for children with Specific Language Impairment (e.g.

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[20] The cerebellum ('little brain') sits towards the back of the brain and overlays the brain stem. Information about sensory inputs that convey body position, as well as motor outputs are inputted into the cerebellum. Further inputs to the cerebellum include visual, auditory and balance information. The outputs of the cerebellum are to motor and premotor cortex; the role of the cerebellum is crucial in the coordination of movement. It may be worth noting that it is not the cerebellum itself that controls movement; its key role is to integrate information in order to allow coordinated and fluent movement (Gazzaniga, Ivry and Mangun, 2002).

Catts, Adolf, Hogan and Weismer, 2005) and as noted above, is frequently associated with difficulties in working memory (e.g. Jeffries and Everatt, 2004). As such, it is important for school staff working with dyslexic children to be aware that they may have associated needs and to ensure that they are accounted for in planning, support and monitoring approaches. However, it is important to note that these co-occurring difficulties are not in themselves markers of dyslexia in the absence of other reading or writing difficulties.

Operationalising Dyslexia

Identification

There is no dispute that early identification of dyslexia (note that this is used interchangeably with reading difficulties) is key to providing effective intervention and preventing escalation of more entrenched difficulties (e.g. Crombie & Reid, 2009; Elliott & Grigorenko, 2014; Muter, 2003; Ott, 2007; Györfi & Smythe, 2010; Knight et al, 2009; Rose, 2009). Changes in understanding around dyslexia in relation to its heterogeneous nature, as well as its status as a continuous rather than a distinct category, suggest that a 'diagnosis' of dyslexia is no longer a meaningful, relevant or accurate terminology, and that focus needs instead to be on 'identification' and response.

One model of identification and assessment used widely and increasingly in the United States is a Response to Intervention (RTI) approach (e.g. Fuchs & Fuchs, 2009; Fuchs, Fuchs & Compton, 2012). This approach stands in contrast to a 'wait-to-fail' approach whereby assessment and identification of needs would traditionally have come following a period of not making progress and falling further behind peers (e.g. Knight et al., 2009; Elliott & Grigorenko, 2015).

Models of RTI operate through simultaneous identification of need and intervention to support need with a built-in mechanism for monitoring impact and progress (Fuchs, Fuchs and Compton, 2012). They tend to include the following levels:

1. **A relevant process of universal screening:**

This can be carried out using authentic and effective measures that predict later reading development, from early visuo-perceptual skills to early vocabulary, early phonological awareness skills and so on as relevant. There are a number of packages available but 'soft' measures available to school staff can also be used (Knight et al, 2009). Of paramount importance is that the measures used are valid and authentic and that they know how and what they are measuring and how it links to literacy development (Bryan, Ergul & Berstein, 2008). Crombie and Reid (2009) suggest screening of skills relating to rhyming, alliteration, difficulties with recall and coordination and ideally this sort of screening should occur in the Foundation Stage (Knight et al, 2009).

2. **Progress monitoring:**

This approach uses curriculum based and other available measures to determine whether progress is being made in relation to previous performance and intervention effectiveness. There is debate about how frequent monitoring updates need to be. Stecker, Fuchs and Fuchs (2005) suggest weekly checks, but Speece and Walker (2007) note that this may not be practicable and that monitoring every three weeks is perfectly appropriate. Built in decision points mean that if an intervention or approach is not impacting on measure of progress, it can be adjusted and through this progress, theories about the factors causing difficulty can be refined and interventions adjusted accordingly (see Figure 4).
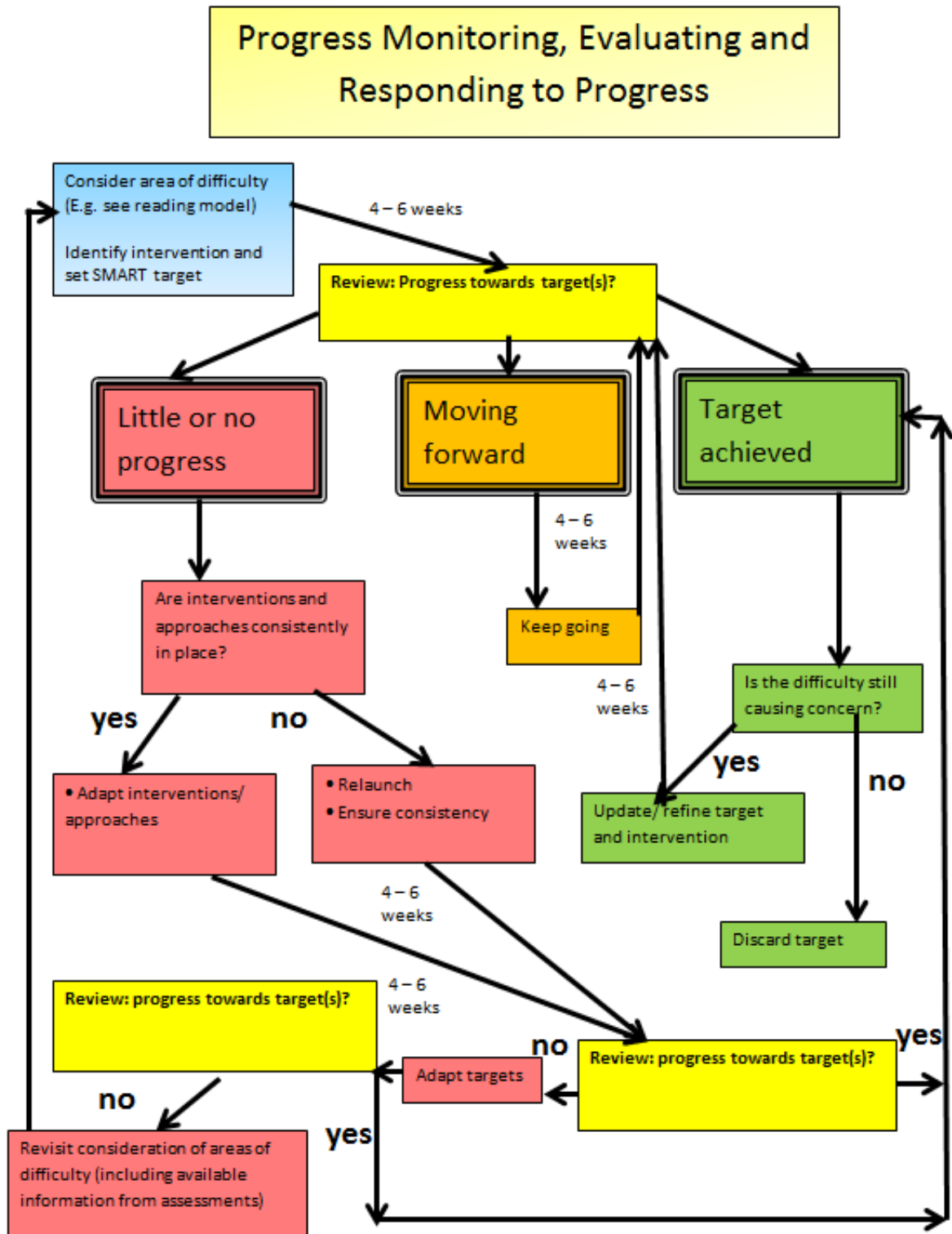
Progress Monitoring, Evaluating and Responding to Progress

Consider area of difficulty (E.g. see reading model)

Identify intervention and set SMART target

4 – 6 weeks

Review: Progress towards target(s)?

Little or no progress

Moving forward

Target achieved

Are interventions and approaches consistently in place?

4 – 6 weeks

Keep going

4 – 6 weeks

Is the difficulty still causing concern?

yes   no

yes

4 – 6 weeks

• Adapt interventions/ approaches

• Relaunch
• Ensure consistency

Update/ refine target and intervention

Discard target

4 – 6 weeks

4 – 6 weeks

Review: progress towards target(s)?

no

Adapt targets

no

Review: progress towards target(s)?

yes

yes

Revisit consideration of areas of difficulty (including available information from assessments)

Figure 4. Graphical representation of an approach to progress monitoring including decision points about continuing, adapting or revisiting targets and associated interventions.

3. **High quality, evidence-based instruction for all pupils in the classroom**

   In the UK context, this would include recourse to strategies and approaches suggested within Dyslexia Friendly Classrooms in all lessons. It would also reflect teachers with confidence, understanding and skills in responding to reading difficulties which is a factor consistently noted as a key factor in success for struggling readers (European Commission, 2011). It may be worth noting at this point that in a 2008 study by Elliott and Gibb, class teachers reported that they were relatively confident in supporting struggling readers but that they were less confident in response to struggling readers with a formal identification of dyslexia (see also Brackley, 2015). It is important that class teachers feel that they can confidently apply their skills for all struggling readers, especially as there is no clear evidence that there are different interventions necessary for struggling readers and those identified as dyslexic (Elliott, 2008; Elliott & Grigorenko, 2015; Ramus, 2014).

4. **Tiers of intervention targeting specific pupils who are not making progress in response to screening or progress monitoring measures (e.g. Mellard & Johnson, 2008).**

   Tiers at this level refer, in the UK, to the levels of support as identified by the Special Educational Needs Code of Practice (2013), using a graduated approach. This reflects increasingly bespoke intervention according to the level of need and access to more specific assessment and advice from specialist practitioners for children with the most severe and pervasive needs.

As such, the question is not about 'is the child dyslexic or not', but 'what is the nature and severity of their dyslexia' and crucially, 'what do they need to support them'? (Györfi & Smythe, 2010; Reason & Stothard, 2013; Brackley, 2015; Snowling, 2015; Pool, 2003).

Assessment and Intervention

The purpose of assessment must be to identify relative strengths and areas of difficulty so that they can be addressed. As outlined above, there is not a 'test for dyslexia', and given how complex and convoluted the reading process is, how many neural areas are involved and how wide the definition of dyslexia is, the lack of a single test is perhaps not surprising. However, there are a number of materials that can be used effectively by schools and, for the most severe and persistent difficulties, by specialist practitioners, that can be used to generate an accurate understanding of the nature of a dyslexic individual's reading needs. From the point of view of an educationalist, theories of reading and dyslexia are only as useful as their implications for intervention and interventions should therefore be selected which address understanding of an individual child's needs. At the most basic level this may reflect consideration of whether the difficulty is around word identification, comprehension or both (see Figure 1; Gough and Tumner, 1986). At a more targeted level, this will reflect consideration of some of the more specific components of the reading progress which may be causing difficulties for an individual and how best to address them (see Figure 5 for an example).

* Based on Coltheart, M., Rastle, K., Perry, C., Langdon, R. & Ziegler, J. (2001) DRC: A dual route model of visual word recognition and reading aloud. *Psychological Review, 108, 204 – 256.*
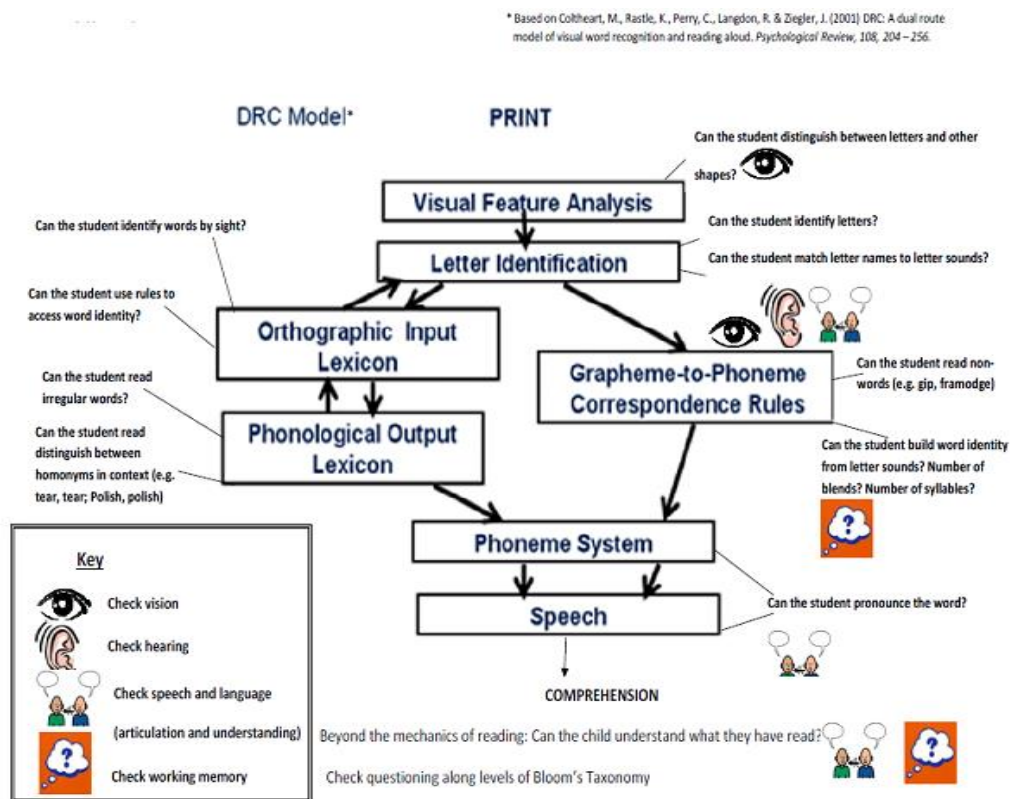
Figure 5. Example of how particular elements of the process may be considered in relation to an individual's reading difficulties so that they can guide specific intervention approaches.

General Evidence-Based Approaches

Hattie (2009) carried out meta-analyses of over 800 research articles in relation to effective approaches in education and provides helpful indication of the sorts of approaches that may be considered to have a strong evidence-base. In relation to reading intervention, Hattie found that the most effective approaches were based on extended vocabulary[21] (effect size: 0.66) instruction and repeated reading (effect size: 0.67). It is likely that this reflects evidence that the factors which can mediate successful reading and development of phonological awareness is vocabulary (e.g. Muter, 2003; Solity, 2015) and that development of fluency reduces cognitive load thus allowing capacity for comprehension. Phonic instruction was also found to be highly effective (effect size: 0.6), but note that this encompassed different types of phonic instruction including synthetic and analytic phonics as well as other phonological awareness skills. This is of particular relevance as for some dyslexic individuals, synthetic phonics instruction alone is unlikely to be effective, particularly if they have poor letter-sound representations (e.g. due to early glue ear and/or early speech articulation difficulties) or if their dyslexia is characterised by difficulties with working memory. Indeed, Van Daal (2015), Rose (2009) and Solity (2015) among others, note that an overreliance on synthetic phonics, as currently characterises reading instruction in the UK, may be unhelpful for some dyslexic individuals. Hattie (2009) found that comprehension programmes were relatively effective (effect size: 0.58) in supporting progress, as were programmes such as Reading Recovery (0.5).

Evaluation of Specific Intervention Programmes within the UK

Brooks (2002; 2007; 2013) has carried out a number of meta-analyses of a number of reading interventions commonly used in the UK, with his most recent publication (2013) evaluating the effectiveness of 26 reading schemes for Primary age children

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[21] Effect size refers to a measure of a quantitative difference between two groups. For example some measure of a variable in an experimental group who receive an intervention may be compared to the same variable in a matched control group.

and 11 for children at Key Stage 3. He also evaluates the effectiveness of a small number of interventions for children with the most persistent reading difficulties.

The following section provides a brief summary of the reading intervention schemes presented by Brooks (2013) and are selected for inclusion here on the basis that their evaluation data is published <u>and</u> analysed using meaningful statistical indicators of (i.e. they provide effect sizes and or indicators of statistical significance)[22].

Primary

Acceleread Accelewrite (Jersey Advisory Service, 1993)

This programme emphasises the development of reading and spelling accuracy and fluency through repeated reading and writing approaches using a computer programme. Brooks (2013) reports an encouraging effect size for the gain in reading age following a four week period of intervention.

Academy of Reading (Loh and Stanton, 2004)

A comprehensive computer-based programme which aims to develop fluency through: phoneme awareness, sound-symbol association, phonics and decoding, comprehension, reading practice. Brooks (2013) reports a robust effect size for gains in standardized reading scores which reflected statistically significant gains when pre- and post-measures were compared after a 20 week intervention.

Catch-Up Literacy (Holmes, Lawes, Reid, Dowker and Walker, 2011)

Catch-Up Literacy is a comprehensive reading programme that is delivered on a one-on-one basis by a trained teacher or teaching assistant and which should be tailored to the needs of each individual child. It is based around real books and involves discussion of the text at a preparatory level (e.g. looking at pictures, discussing key vocabulary etc), reading aloud while the adult notes accuracy to follow up, linked activities to address errors and support generalisation. Brooks (2013) reports that comparison of pre- and post- measures of reading age indicated

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[22] This is not intended to dismiss the utility of the additional schemes presented by Brooks, only to differentiate those presented with this document as evidence-based. Schemes presented by Brooks (2013) but not discussed in any detail here include: Arrow, Better Reading and Writing Partners, Better Reading Partnership, Cued Spelling, Easyread, ENABLE, FFT, Lexia, Phonographix, Read Write Inc, Reciprocal Teaching, SIDNEY, Sound Discovery, Sound Reading System, Sound Training for Reading, THRASS, Toe-by-Toe ®.

statistically significant progress after around 30 weeks when this programme was evaluated for children with reading ages around two years behind their chronological ages and gains were maintained at follow-up.

The Reading Intervention Programme (Hatcher, Hulme and Ellis, 1994).

This approach is based on 'Sound Linkage' which emphasises a combination of phonological skill development and intensive reading practice. When evaluated for readers with standardised reading scores in the below average range, Brooks (2013) reports significant gains in reading accuracy following a 20 week intervention period.

Reading Recovery (Sylva and Hurry, 1995a; 1995b; Hurry and Sylva, 1998; 2007; Burroughs-Lange, 2007).

This early intervention programme delivered by a teacher specially trained in this approach is tailored to the individual needs of the child so that targeted foci for teaching and support reflect their progress and needs over time. Children who do not make sufficient reading progress are identified for more specific assessments and targeted support. In this sense, Reading Recovery is highly compatible with a Response to Intervention approach. When evaluated for children with children whose reading skills placed them around the 5th percentile for their ages, Brooks (2013) reports substantial effect sizes for gains in word recognition (after an intervention period of 12 – 20 weeks) which were found to be maintained at one-year follow-up.

The Complete Spelling Programme (McMurray, 2006; McMurray & Flemming, 1998)

This spelling programme emphasises two key approaches to spelling by building on the phonological lexicon (whole words and common spelling patterns) whilst also building phonic (i.e. grapheme-phoneme) knowledge (consistent with the Dual Route Cascaded model of reading; Coltheart et al., 2001). For children whose spelling performance was at the lower end of the average range, Brooks (2013) reports a substantial effect size reflecting gains in standardized spelling scores .

Inference Training (Yuill and Oakhill, 1998)

Inference Training is an approach to supporting the development of comprehension skills by breaking down the skills needed to understand texts

into manageable chunks and emphasising the link between text and meaning. Brooks (2013) reports significant gains in reading comprehension scores for mixed ability readers following a four week period of intervention.

Secondary (Key Stage 3)

Elliott and Grigorenko (2014) note that, *"In many ways, identifying and addressing the precise nature of reading-related difficulties in adolescents is more complex than for young children"* and suggest therefore that, *"where an RTI model operates, there may be a need for some students to progress directly to a more intensive third tier intervention"* (p. 142; see also Compton, Gilbert, et al., 2012; Fuchs, Fuchs & Compton, 2010; Vaughn & Fletcher, 2012). There are fewer large-scale literacy interventions available for Key Stage 3. As for the primary-age interventions, only those with published and statistically meaningful data are reported here[23].

Catch-Up Literacy (Holmes et al, 2011; Holmes, Reid and Dowker, 2012)

Catch-Up Literacy (as outlined above) has also been evaluated in terms of its impact for struggling readers in Key Stage 3. Brooks (2013) reports that following a 17 week intervention period, significant gains in standardised word reading scores were found in a Nottingham-based randomised control trail.

Toe-by-Toe® (McKay, 2006)

This programme goes back to the basics of phonics and emphasises the development of decoding skills. A small scale study (n = 12 in the intervention group) indicated significant gains in comprehension scores following a 13 week intervention period.

Interventions for readers with significant and persistent needs

There remain some children for whom success with reading *"is elusive and this reinforces the need for skilled, intensive, one-to-one intervention"* (Brooks, 2002,

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[23] Other Key Stage 3 interventions reported by Brooks (2013) but not reported here include: Better Reading Partnerships, Corrective Reading, ENABLE-Plus, Inference Training, Rapid Plus, Read, Write Inc Fresh Start, Sound Training for Readers, Thinking Reading and THRASS.

p.16). Brooks (2013) presents evaluations of three programmes of intervention designed for individuals with pervasive and persistent literacy difficulties.

Partnership for Literacy (Rack, 2011)

This approach is based on close partnership between a school and Dyslexia Action and involves whole-school support with developing an understanding of dyslexia, identification of children with literacy difficulties, screening methods and implementation of specialist teaching materials. The teaching materials include the Active Learning Kit (ALK) which emphasises fluency in phonic knowledge and Units of Sound which is a comprehensive IT programme which addresses broader elements of literacy including vocabulary, spelling sentence construction, automaticity, listening skills, memory and comprehension. This is provided within the context of ongoing consultative support from Dyslexia Action. Brooks (2013) reports that for children identified as dyslexic (but with standardised pre-intervention reading scores at the upper end of the 'below average' range), there was a good effect size for gains in reading scores although this was only moderate for gains in spelling scores.

No to Failure (Dyslexia-SpLD Trust, 2009)

The Dyslexia-SpLD Trust set up a programme to evaluate the impact of 'Specialist Teaching' on progress for children at risk of dyslexia in Year 3 and Year 7. The Specialist Teaching approach reflected a range of features including theory around literacy learning, difficulties underlying reading difficulties, knowledge of phonological skills and speech and language skills and their relationships with reading development. Input involved bespoke approaches based on needs and addressed reading as well as wider areas of need including organisation, concentration and whole-curriculum support. Brooks (2013) reports statistically significant gains in reading scores for children in Year 3 and Year 7 although the effect size was larger for children in year 3 (consistent with Elliott and Grigorenko's (2014) assertion that reading difficulties become more complex as children progress through school, most likely because they are impacted by further factors including prior experience, motivation, self-efficacy and self-esteem.

Non-standard approaches to intervention

As long as they are closely matched to a child's identified needs (e.g. see Figure 5) and are regularly monitored in terms of their impact on a child's progress (e.g. see Figure 4), most of the interventions outlined above (as well as many others not mentioned above) should be expected to meet the needs of most dyslexic children. Indeed, Duff and Clarke (2011) note that *"a good understanding has been reached regarding how to ameliorate word-level weaknesses in children with dyslexic difficulties…"* (p. 5). However, there remain some children for whom barriers to their literacy remain significant and resistant to most interventions, *"Notwithstanding this, there is a growing appreciation that even interventions that honour best practice are not effective for all children…. Ongoing work is needed in order to understand the profiles of non-responders and how interventions can be adapted to suit their needs"* (Duff & Clarke, 2011, p.5). Shaywitz, Morris and Shaywitz (2008) also note that there is no single approach to, or programme of, intervention that will meet the needs of all struggling readers, or even any tightly defined group of struggling readers. There is an ongoing debate about whether standardized intervention programmes are more or less effective than individualised approaches in meeting the needs of struggling readers (e.g. Vaughn, Fletcher, Francis, Denton, Wanzek, Wexler et al, 2008; Wanzek and Vaughn, 2007 but see also Denton, Tolar, Fletcher, Barth, Vaughn and Francis, 2013). As such, for some children with the most severe and persistent needs that are most resistant to standard packages of intervention it may be more appropriate for them to access a bespoke package of interventions and approaches designed to reflect their individual needs including their motivation, self-esteem, self-efficacy). In drawing on implications from academic reading research there is a wider pool of evidence for interventions than may be reflected in educational practice. For example, reading interventions based on struggling learners accessing larger (and arguably more phonologically consistent units) of sound such as onset-rimes so that readers can learn using rhyme analogies (e.g. Goswami and Bryant, 1990) have been gaining ground and a growing evidence-base. For example, Graphogame-Rime, a computer-based intervention aimed to support struggling readers in developing phonological awareness at the level of rhyme analogy as well as through phoneme identification and blending have been shown to support progress for struggling readers more effectively than the same intervention using phoneme

identification and blending alone (Kyle, Kujala, Richardson, Lyytinen, & Goswami, , 2013). There is currently local research underway exploring the effectiveness of Graphogame Rime for struggling readers in Cambridgeshire.

Similarly, there is a growing local body of research around the effectiveness of an approach called the Expanded Rehearsal Technique which aims to support the development of children's automaticity and fluency in their phonic knowledge as well as their whole word recognition.

There are a number of interventions that have not been embraced as widely in education, for many of the same reasons as their associated theories have not been (see earlier sections on models of dyslexia). However, there are nascent pools of evidence implying that some of these interventions have been successful in helping some dyslexic individuals with their reading. These theories (and presumably therefore, their consequent interventions) are presented as complements to (and not competitors of) core Phonological Deficit theory (e.g. Snowling, 2000) and its associated phonological interventions. In considering that there remain dyslexic children who do not respond to phonological intervention alone, it may be remiss to disregard evidence of the effectiveness of the following interventions altogether.

Ray, Fowler and Stein (2005) present evidence that using yellow filters for three months when reading significantly increased dyslexic children's reading ages compared to those who had worn a placebo filter. This may provide a long-sought-after scientific basis for oft-cited anecdotal evidence that coloured overlays can be helpful for struggling readers. Lovett, Steinbach and Frijters (2000) found that a metacognitive phonics program that incorporated phonological interventions as well as interventions designed to increase naming speed, was more effective than a phonological reading program alone. Finally, as a result of the DAD-cerebellar model of dyslexia (e.g. Nicolson and Fawcett, 1990) an exercise-based intervention program was devised to accentuate the efficiency of cerebellar processing; Dyslexia, Dyspraxia and Attention-Deficit Treatment (DDAT). Following a six-month exercise-based intervention, Reynolds, Nicolson and Hambley (2003) found significant gains in children's reading ability (as measured by reading age). Furthermore, Reynolds

and Nicolson (2007) found that these gains were maintained following an eighteen month interval.

Summary

Interventions should be targeted and based on assessment of individual struggling reader's needs. There are a huge number of reading interventions in existence. This section has aimed to provide some information about the general characteristics of reading interventions that tend to support struggling readers (e.g. vocabulary development, reappeared reading, development of phonological skills etc) and then to consider some of the evidence-based interventions as reported by Brooks (2013) following a meta-analysis of intervention evaluations for children in primary school, Key Stage 3 and those with the most persistent needs. The value of individualised approaches as opposed to standardised packages of interventions was discussed for some children with the highest levels of need and some further links between academic reading research and implications for interventions in practice were reviewed. Throughout all of this, the importance of matching interventions to needs and closely monitoring effectiveness and impact are emphasised.

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What have teachers done to help my child manage their dyslexia?

This list has been compiled by Cambridgeshire parents of children identified with dyslexia (Autumn2015)

School ethos

- Good communication
- Whole school dyslexia policy

Resources
- Hand-outs on coloured paper – colour chosen by child
- Coloured overlays – colour chosen by child
- option to use different types of pen/pencil
- interactive whiteboard set in a more 'dyslexia friendly' colour
- key word list available
- posters/ information in a clear font (not cursive)

Support
- Scribe for exams
- Email from teacher with notes of the lesson
- Use of IT for homework assignments so child doesn't need to write down homework
- Reader for exams
- Not expecting child to write long notes
- Extra time for reading/recording
- Screening for dyslexia
- Regular testing of literacy skills
- Child passport so that all teachers are aware of strengths and difficulties
- Mixing ability groups – recognising the child's strengths
- Dyslexia club

Interventions
- Phonics intervention
- Intervention based on needs and not just phonics
- Paired reading with more advanced reader
- Providing measurable targets

Home-school relationship
- Sharing concerns with parents early
- Providing information for parents about what support schools are putting in place
- Information for parents about how they should be supporting their child at home (evidence based)
- Information about tutors
- Transparency – if schools don't know what to do, signpost to other resources
- Sharing the IT resources used at school, e.g. Apps
- Provide information on parent organisations e.g. Pinpoint, SENDIASS (Parent Partnership)

What has helped my child to manage their dyslexia?

This list has been compiled by parents of children identified with dyslexia (Autumn2015).

Good home-school communication

Focus on your child's strengths

- celebrate what your child can do
- encourage your child and keep things positive
- encourage out of school activities
- Lots of specific praise

Reading

- Read with, and to your child from a very early age
- Find reading opportunities whenever you can
- breaking down paragraphs into more manageable 'chunks'
- looking for significant words in paragraphs and checking for understanding
- **Paired Reading Intervention**
- Buy/borrow high interest, low reading age books, e.g. www.barringtonstoke.co.uk
- Audio books on CD

Specific interventions

- 'Teach your monster to read' books
- Sound Check https://www.bdadyslexia.org.uk/about/projects/sound-check
- Apps such as 'Hairy Phonics' , **Cambugs** www.cambugs.co.uk
- **Toe by Toe*** www.toe-by-toe.co.uk
- Sound Reading System (synthetic phonics reading programme)
- **AcceleRead, AcceleWrite*** http://www.dyslexic.com/acceleread
- Wordshark http://www.wordshark.co.uk

Information Technology

- Dictaphone
- speak to text software
- Learn to type (bbc touch typing)
- Dragon Software
- Predictive Text
- Swift Key
- Dyslexia Wheel of Apps

Resources

- Pencil grips
- choice of pen/pencil
- coloured overlays

*Interventions in **bold** are either recommended in the Brook Report or have been developed in Cambridgeshire and have a strong evidence base.