

# Early identification and interventions for dyslexia: a contemporary view

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**This paper reviews current proposals concerning the definition of dyslexia and contrasts it with reading comprehension impairment. We then discuss methods for early identification and review evidence that teacher assessments and ratings may be valid screening tools. Finally, we argue that interventions should be theoretically motivated and evidence based. We conclude that early identification of children at risk of dyslexia followed by the implementation of intervention is a realistic aim for practitioners and policy-makers.**

Scientific research on dyslexia has burgeoned during the past 50 years, and a great deal is now known about its nature, aetiology and assessment. Against this backdrop, it should be possible for educators to recognise the signs which suggest that a child is at risk of reading failure. Such early identification should allow interventions to be implemented before a downward spiral of underachievement, lowered self-esteem and poor motivation sets in. This paper begins by reviewing the new proposals for the Diagnostic and Statistical Manual's (DSM-V) definition of dyslexia and proceeds to examine whether children with dyslexia and related literacy difficulties can be identified based on their response to good quality reading instruction. This aspiration was at the core of the recent independent review on dyslexia for UK government, conducted by Sir Jim Rose (2009). The review advocated a three-tier system beginning with high-quality mainstream teaching delivered to all, proceeding with adaptations and catch-up programmes for those 'at risk' and finally individualised teaching for those at greatest need. A growing evidence base of effective interventions suggests that this aim could become a reality.

## Children's literacy difficulties

### *Dyslexia*

Dyslexia is a neurodevelopmental disorder with a probable genetic basis, and it is generally agreed that more boys than girls are affected (although the gender ratio is higher in referred samples). The core feature of dyslexia is a problem with word decoding, which in turn impacts spelling performance and the development of reading fluency. Dyslexia is persistent across the lifespan, and adult outcomes are vari-

able; although some young people with dyslexia proceed to a university education, others leave school with minimal qualifications. Most adults with dyslexia complain of slow reading, problems of spelling and difficulties with written expression. In addition, problems with working memory, attention and organisation are frequently reported.

For many years, dyslexia was conceptualised as a specific reading difficulty affecting children for whom reading achievement was below that expected on the basis of a child's age and intelligence quotient (IQ). Gradually, this 'discrepancy definition' of dyslexia has fallen from use, and it is now recognised that dyslexia occurs across the IQ spectrum, although it needs to be borne in mind that, in terms of reading comprehension, those with higher IQ are likely to do better.

The predominant cognitive explanation of dyslexia is that it arises from a phonological deficit affecting the processing of speech sounds in words (see Vellutino et al., 2004 for a review). Early manifestations are difficulties with the development of phonological awareness and perhaps more so, problems of phonological learning (Carroll and Snowling, 2004). These in turn affect the acquisition of letter knowledge, one of the first signs that a child is at risk of reading problems. Problems with word recognition ensue together with phonological decoding deficits, seen most clearly when attempting to read novel words (Rack, Snowling and Olson, 1992). Problems with slow and inaccurate word reading can, in turn, be a bottleneck that impedes adequate reading comprehension.

The prevalence of dyslexia depends upon the precise definition and criteria that are used for its 'diagnosis' with estimates ranging from 3% to 10%. In a recent test standardisation, we collected data on the York Assessment of Reading and Comprehension [YARC; Snowling et al., 2009; Stothard et al., 2010; from a large sample (1553) of children aged 6–16 who were attending 50 state-funded primary and secondary schools in England]. Pupils were randomly selected according to their date of birth to ensure that the sample was representative of the schools concerned, and the schools were selected from different areas in an attempt to make the sample broadly representative of children in England. Because it is recognised that reading skills fall on a continuous dimension with no clear cut-off

1 between 'normal' and 'impaired' (dyslexia) reading, we  
2 considered a number of different cut-off points for the  
3 classification of decoding difficulties/dyslexia (Stothard,  
4 Snowling and Hulme, in preparation). The YARC com-  
5 prises tests of single-word reading, prose reading accuracy,  
6 reading rate and comprehension; here, we focus on the  
7 pupils who experienced moderate to severe levels of dif-  
8 ficulty, as indexed by performance on the single-word  
9 reading test of 1.5 standard deviations (SDs) below the  
10 mean ( $SS < 77.5$ ) and 2 SDs below the mean ( $SS < 70$ ),  
11 respectively. Given that reading skills are normally distrib-  
12 uted, around 7% of pupils are expected to have reading  
13 standard scores below 77.5 and 2% below 70.

14 Within the primary school sample, 10.5% of pupils  
15 obtained a standard score below 77.5 and 3.9% below 70 in  
16 single-word reading. In addition, 3.3% of sample showed  
17 a significant discrepancy between good reading comprehen-  
18 sion (from the prose reading task) and poor reading accu-  
19 racy (16–41 standard score points), a profile sometimes  
20 associated with discrepancy-defined dyslexia. Within the  
21 secondary school sample, rates of reading impairment were  
22 similar as expected given the cut-offs and 4.9% of the  
23 sample showed a significant 'discrepancy' between decod-  
24 ing and reading comprehension.

25 More boys than girls were poor decoders in primary school,  
26 and the proportion of pupils with EAL was significantly  
27 higher among these children than in the remainder of  
28 the sample. Decoding difficulties were also more common  
29 among children from socially deprived areas. Together,  
30 these data remind us that social and cultural factors influ-  
31 ence the prevalence of reading difficulties: dyslexia is more  
32 than a constitutional difficulty.

33 *Problems of reading comprehension*

34 Some children with dyslexia have problems with reading  
35 comprehension, which are attributable to slow and inaccur-  
36 ate word reading, leaving few attentional resources avail-  
37 able for comprehension. However, reading comprehension  
38 impairment can occur in the absence of poor decoding,  
39 suggesting that it is a distinct disorder. Indeed, the profile  
40 of reading comprehension impairment contrasts markedly  
41 with dyslexia. These children (sometimes referred to as  
42 'poor comprehenders') can decode and spell words accu-  
43 rately but have problems understanding the meaning of  
44 what they read. Poor comprehenders have been much less  
45 studied than children with dyslexia and the condition is not  
46 well recognised by teachers (see Hulme and Snowling,  
47 2011 for a review). However, data from the YARC stan-  
48 dardisation (discussed earlier) revealed that 5.3% of the  
49 primary sample and 5% of the secondary school sample  
50 could be defined as poor comprehenders. Reading compre-  
51 hension impairment is therefore quite a common disorder  
52 that at present is a 'hidden' disability in the classroom  
53 setting.

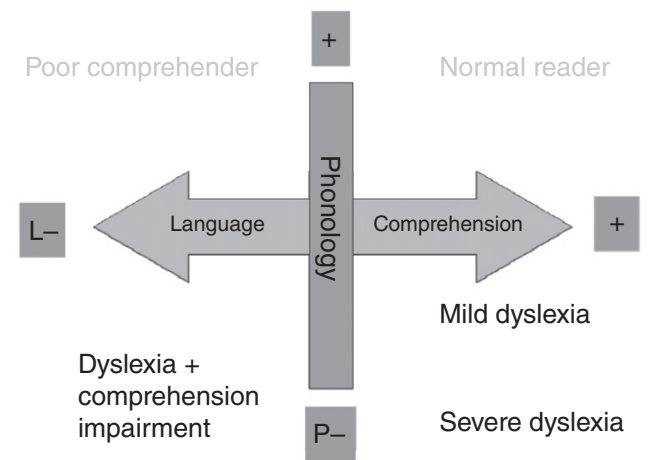
54 Many children with reading comprehension impairment  
55 have wide-ranging oral language impairments coupled with  
56 good phonology; it is their intact phonological skills that

57 account for their ability to decode. Prospective studies start-  
58 ing in the very early stages of learning to read suggest that  
59 children who go on to be poor comprehenders have weak-  
60 nesses in basic language skills including vocabulary knowl-  
61 edge, grammar and syntax from an early age (Catts, Adlof  
62 and Ellis Weismer, 2006; Nation et al., 2010). Poor com-  
63 prehenders also experience higher order language difficul-  
64 ties, including problems with inferencing and figurative  
65 language use as well as in text-related processes includ-  
66 ing comprehension monitoring and knowledge of story  
67 structure (Cain, 2010). Whether these are a cause or a  
68 consequence of their reading comprehension impairments  
69 remains debated, and there is considerable heterogeneity in  
70 the deficits shown by this group.

71 The distinction between dyslexia and reading compre-  
72 hension impairment is consistent with the simple view of  
73 reading (Gough and Tunmer, 1986). According to the  
74 simple view, reading comprehension skill is the product  
75 of decoding and listening comprehension. Thus, there are  
76 three sorts of poor readers – those with poor decoding  
77 (dyslexia), those with poor listening comprehension (poor  
78 comprehenders) and those with impairments in both decod-  
79 ing and listening comprehension. Taking this view as a  
80 starting point, Bishop and Snowling (2004) reviewed a  
81 large body of literature on the relationship between reading  
82 and language impairments and proposed that to under-  
83 stand reading disorders, it is important to take this two-  
84 dimensional view (see Figure 1). Further, children who  
85 enter school with poor phonology are at risk of decoding  
86 difficulties, while children with broader language im-  
87 pairments are at risk of reading comprehension difficul-  
88 ties. Children with clinically diagnosed specific language  
89 impairment generally have pervasive reading disorders  
90 with both processes affected.

91 In short, dyslexia is not a clear-cut diagnostic category.  
92 Rather, in keeping with other neurodevelopmental dis-  
93 orders that affect learning, it can be thought of as the behav-

94  
95 **Figure 1: Two-dimensional model of the relationship**  
96 **between language and reading impairments (after**  
97 **Bishop and Snowling, 2004)**



1 journal outcome of a multiple risk factors, both genetic and  
2 environmental (Hulme and Snowling, 2009). It is  
3 also increasingly recognised that dyslexia co-occurs with  
4 other disorders; in particular, many children with dyslexia  
5 have language impairments (McArthur et al., 2000), symp-  
6 toms of inattention (Carroll et al., 2005), attention deficit  
7 hyperactivity disorder (McGrath et al., 2011) and problems  
8 of motor coordination (Rochelle and Talcott, 2006). This  
9 nuanced view of dyslexia as a dimension that has contin-  
10 uities and comorbidities with other disorders has significant  
11 implications for contemporary theory and practice (see  
12 [4] Snowling, 2009 for a review and access to related papers).

13 *DSM-V proposals for the classification of*  
14 *learning disorders*

15 The DSM of the American Psychiatric Association, cur-  
16 rently in its fourth edition (DSM-IV; American Psychiatric  
17 Association, 1994) is a classification system of disorders of  
18 mental health in children and adults. It is the guide to US  
19 psychiatric practice and has a global influence on how  
20 disorders are diagnosed. However, because it is based on a  
21 medical model, there are tensions surrounding its use in  
22 education. Current proposals for the new edition of the  
23 manual (DSM-V) make significant changes to the way in  
24 which learning (and hence reading) disorders are classified  
25 ([http://www.dsm5.org/ProposedRevisions/Pages/  
26 \[5\] proposedrevision.aspx?rid=429](http://www.dsm5.org/ProposedRevisions/Pages/proposedrevision.aspx?rid=429)).

27 Within DSM-V, learning disorder is the generic term used  
28 to describe the disorders with onset in childhood, charac-  
29 terised by difficulties in learning, which significantly affect  
30 academic achievement. Learning disorders are grouped  
31 together with communication disorders (both are described  
32 as neurodevelopmental disorders) to reflect their early  
33 onset; they include dyslexia, dyscalculia and disorder  
34 of written expression. Reflecting the dimensional view,  
35 DSM-V drops the need for the individual to fulfil a dis-  
36 crepancy criterion, but it retains the possibility of using the  
37 term ‘dyslexia’ when an individual performs less well than  
38 expected – ‘not consistent with the person’s intellectual  
39 abilities’.

40 Thus, the proposed definition of dyslexia for DSM-V is:

- 41 1. Difficulties in accuracy or fluency of reading that are  
42 not consistent with the person’s chronological age,  
43 educational opportunities or intellectual abilities.  
44 Multiple sources of information are to be used to  
45 assess reading, one of which must be an individually  
46 administered, culturally appropriate and  
47 psychometrically sound standardised measure of  
48 reading and reading-related abilities.
- 49 2. The disturbance in criterion A, without accommoda-  
50 tions, significantly interferes with academic achieve-  
51 ment or activities of daily living that require these  
52 reading skills ([http://www.dsm5.org/Proposed  
53 Revisions/Pages/proposedrevision.aspx?rid=84](http://www.dsm5.org/ProposedRevisions/Pages/proposedrevision.aspx?rid=84)).

54 It is worth discussing some of the features of the proposed  
55 diagnostic criteria from an educational perspective. First, it

56 is noteworthy that the term dyslexia is used for the first  
57 time, and reading fluency is recognised as relevant to diag-  
58 nosis; this is particularly important when assessing older  
59 pupils and adults. Second, a drawback is that there is no  
60 mention of spelling difficulty; rather this is to be considered  
61 under ‘disorder of written expression’. This strategy is  
62 potentially misleading because, in principle, poor spellers  
63 could be good at writing – indeed some are poets! Third,  
64 and most worryingly given our previous discussion, specific  
65 difficulties with reading comprehension (previously coded  
66 within reading disorder) are not recognised here. In fact, the  
67 ‘poor comprehender’ profile is briefly referred to as feature  
68 of language impairment. More generally, the apparent separa-  
69 tion of learning and communication disorders downplays  
70 the overlap between reading and language impairments  
71 (Snowling and Hulme, 2012).

72 DSM-V has faced a number of theoretical issues concerning  
73 how best to diagnose developmental disorders, and the pro-  
74 posed form of classification has been questioned (Rutter,  
75 2011). A key issue is the extent to which apparently differ-  
76 ent disorders might reflect the same underlying condition at  
77 different stages in development (Hulme and Snowling,  
78 2009, ch. 9). This issue is brought into focus with regard to  
79 the relationship between learning and communication dis-  
80 orders. As discussed earlier, children with difficulties of  
81 language and communication are at high risk of literacy  
82 problems (Bishop and Snowling, 2004). Moreover, among  
83 children at risk of dyslexia, it is clear that poor oral lan-  
84 guage is a primary risk factor for reading failure (Snowling,  
85 Gallagher and Frith, 2003); on the other hand, intact lan-  
86 guage skills can provide a compensatory resource for  
87 children with word-level reading difficulties (Nation and  
88 Snowling, 1998). It falls to theoreticians and practitioners  
89 alike to recognise the interrelationships between spoken  
90 and written language if they are to be tuned to the conti-  
91 nuities between delays and difficulties in oral language  
92 development and dyslexia – yet this is not mentioned in  
93 the proposed definition. Arguably, recognition of the overlap  
94 should set the agenda for early identification and interven-  
95 tion for reading and language disorders.

96 *Early identification of children at risk of*  
97 *literacy problems*

98 For many years, the importance of early identification and  
99 intervention for children with dyslexia has been stressed.  
100 Accordingly, much research has been directed towards  
101 establishing precursors of dyslexia in the preschool years in  
102 international studies of children at family risk of reading  
103 problems (e.g., Gallagher, Frith and Snowling, 2000; [6]  
104 Lyytinen et al., 2006; McBride-Chang et al., 2008).  
105 Although significant progress has been made in identify-  
106 ing cognitive skills that predict literacy outcomes on a  
107 group basis (e.g., letter-sound knowledge and phoneme  
108 awareness; Muter et al., 2004), at the individual level, it is  
109 much harder to make accurate predictions (Puolakanaho  
110 et al., 2007). In this light, the merits of costly screening and  
111 assessment procedures must be questioned.

112 An alternative approach to screening and assessment  
113 pioneered in the US is ‘response to intervention’ (RTI; see



1	Fletcher et al., 2007 for a review). This method, as its name	57
2	suggests, involves monitoring the progress of a group of	58
3	children through a programme of intervention rather than	59
4	undertaking a static assessment of their current skills. Chil-	60
5	children with the most need are those who fail to respond to	61
6	effective teaching, and they are readily identified using	
7	this approach. Indeed, such a strategy was advocated by	62
8	the Rose (2009) Review on identification and teaching of	63
9	dyslexia and other literacy difficulties. Ideally, each child	64
10	in wave 1 receives 'quality first' teaching in mainstream	65
11	classes, perhaps adapted for the slower learners in the class.	66
12	Following this, at wave 2, a small group or catch-up pro-	67
13	gramme is offered and at wave 3, an individualised inter-	68
14	vention. Within this approach, a child need not wait to fail	69
15	sufficiently to fulfil diagnostic criteria but will be offered	70
16	support as soon as they are dropping behind.	71
17		72
18	In the UK, at the time of writing, most children are reci-	73
19	ipients of a National Curriculum, and reading is taught	74
20	using systematic phonics instruction. More importantly for	75
21	present purposes, a considerable amount of data is routinely	76
22	collected on individual children by teachers, schools and	77
23	local authorities. An important question concerns whether	78
24	these data be used to identify children 'at risk' of under-	79
25	achievement. We will discuss later findings from one local	
26	authority that suggest that this is indeed the case.	
27		80
28	<i>The validity of the Early Years Foundation Profile Stage</i>	81
29	<i>(EYFS) to screen for language and literacy difficulties</i>	82
30	In 2003, the assessment of children's progress at the end of	83
31	the Foundation Stage (from 3 years to 5 years) was formally	84
32	introduced into English schools. Subsequent to this, it	85
33	became mandatory for all schools and early years providers	86
34	to deliver a curriculum consistent with what was renamed	87
35	the EYFS for children from birth to 5 years.	
36		88
37	To investigate whether an assessment undertaken by teach-	89
38	ers at the end of the EYFS (after children had been in school	90
39	for 1 year) could provide a screening tool for the identifi-	91
40	cation of children at risk of dyslexia, we investigated pupils'	92
41	data from the EYFS profile (EYFSP) in one local education	93
42	authority. Data were available from three cohorts of chil-	94
43	children entering all 50 maintained primary schools within	95
44	the authority from September 2006 to July 2009. We have	96
45	followed the progress of these children in acquiring literacy	
46	skills (Snowling et al., 2011; <a href="http://www.education.gov.uk/publications/eOrderingDownload/DFE-RR172a.pdf">http://www.education.gov.uk/publications/eOrderingDownload/DFE-RR172a.pdf</a> ). Here,	97
47	we focus on the data from the EYFSP and its relationship	98
48	to later literacy attainments.	99
49		100
50	The EYFSP (Department of Children, Schools and Fami-	101
51	lies, 2008a) comprised 13 scales within six areas of learn-	102
52	ing, each containing nine scale points. The areas of learning	103
53	were personal, social and emotional; communication,	
54	language and literacy; problem solving, reasoning and	104
55	numeracy; knowledge and understanding of the world;	105
56	physical development; and creative development. On each	106
	scale, scale points 4-8 are the early learning goals, and	107
	scale point 9 describes the attainment of a child who is	108
	working consistently beyond early learning goals. Points	109
	1-3 describe attainment below the early learning goals. The	110
	longitudinal data we collected included National Curricu-	111
	lum attainment levels at the end of Key Stage 1 (year 2), and	
	language and literacy data from a representative sample of	
	children followed up in year 3.	
	We first examined correlations between the EYFS measures	
	and the Key Stage 1 Attainments, focusing on both the total	
	score on the EYFSP and the more specific score for com-	
	munication, language and literacy (CLL) total. At the end of	
	Key Stage 1, teacher assessments are informed by statutory	
	tasks and tests usually administered during May of year 2.	
	The data analyses revealed moderate to strong correlations	
	between EYFSP scores and Key Stage 1 attainments. More	
	specifically, the score for CLL correlated strongly with	
	performance 2 years later at the end of year 2 in reading	
	(0.71) and writing (0.69) attainments. Our next question	
	concerned how much of the differences (variance) in chil-	
	dren's attainments at the end of Key Stage 1 was accounted	
	for by the CLL scale of the EYFSP at the end of reception	
	year. We found that about 50% of the differences between	
	children in statutory assessments (at approximately age 7)	
	could be accounted for by teachers' ratings of their CLL at	
	the end of Early Years (around age 5) on the EYFSP.	
	These findings are promising and provide some validation	
	for teacher ratings. However, a critic might argue that, as	
	both EYFSP scale scores and Key Stage 1 assessments are	
	based on teacher ratings, these are not as objective as would	
	be desirable for identifying children whose literacy devel-	
	opment is slow. Accordingly, we assessed a representative	
	subsample of 360 of the children in year 3 on a battery of	
	objective tests.	
	The tests given to assess literacy included a single-word	
	reading test (inform the YARC; Snowling et al., 2009), a	
	test of prose reading and comprehension (YARC; Snowling	
	et al., 2009), and the British Ability Scales Spelling Scale	
	(Elliott, Smith and McCullough, 1978). In addition to using	
	individual measures in the analyses, we also formed a 'lite-	
	racy' factor score from scores on all of the reading and	
	spelling measures that provided a very reliable estimate of	
	literacy skills in Year 3.	
	The findings of this follow-up study confirmed that the	
	EYFSP score for CLL was a good predictor of later literacy	
	attainments (slightly better than the EYFSP total score).	
	Indeed, it showed moderate correlations with measures of	
	reading, spelling and reading comprehension in year 3, and	
	the correlation between children's CLL and the literacy	
	factor was 0.59.	
	Together, these findings show that teacher assessment at	
	5 years, based on ongoing observation, provides a valid	
	measure of children's current development and is a reason-	
	able predictor of literacy attainments 2 years later. The	
	findings underline the importance of the Early Years as	
	providing a critical foundation for learning. They also	
	provide evidence relevant to current proposals for the revi-	
	sion of the EYFS framework (Tickell, 2011, Review) by	

1	highlighting that key elements of development can be	57
2	assessed at age 5; assessments at the end of Early Years can	58
3	be used to identify children who are at high risk of educa-	59
4	tional difficulties; and the best predictors of educational	60
5	success are measures of language, communication and	61
6	literacy.	62
7	<i>Screening for dyslexia using RTI</i>	63
8	The findings from the EYFSP suggest that the risk of	64
9	reading and writing difficulties are apparent early in devel-	65
10	opment, and a screening tool targeting early language, lite-	66
11	racy and communication skills has the potential to identify	67
12	children who will go on to be dyslexic. However, no screen-	68
13	ing tool is perfect, and hence it is important to include	69
14	additional checks on children's development to reduce the	70
15	probability of over- and underidentification of learning dif-	71
16	ficulties. In this regard, the RTI approach offers a useful	72
17	adjunct to a screening tool as it involves monitoring the	73
18	progress of children in receipt of a given curriculum.	74
19	Following the recommendation of Rose (2006), many	75
20	primary schools in England implemented a systematic	76
21	phonics approach to the teaching of reading. A large body of	77
22	evidence suggests that such an approach is very effective for	78
23	teaching children to read (National Reading Panel, 2000;	79
24	Brooks et al., 2006). It follows that children who are finding	80
25	reading difficult despite this quality approach are likely to	81
26	be at risk of dyslexia.	
27	The local authority with which we had worked for the	82
28	EYFSP research had implemented a systematic phonics	83
29	curriculum from 2006. Moreover, in line with policy	84
30	recommendations, teachers were trained to track pupils'	85
31	progress through a series of developmental phonic phases,	86
32	with each phase being quantified by a number of phonic-	87
33	related skills (Department of Children, Schools and Fami-	88
34	lies, 2008b). The phases move from sensitivity to rhyme	
35	and alliteration at phase 1 to confident and fluent use of	89
36	letter-sound knowledge (grapheme-phoneme correspon-	90
37	dences) for reading and spelling unfamiliar words at phase	91
38	6. Because we had collected data from whole cohorts of	92
39	children on a termly basis, we were able to use this to	93
40	identify children who were 'failing to thrive' in terms of	94
41	their phonics progress. We decided to carry this out when	95
42	the children were about 6 years of age and had been in	96
43	receipt of reading instruction for just over 1 year (Snowling	97
44	et al., 2011).	98
45	Using school records, our criterion for 'dyslexia risk status'	99
46	was taken to be 'not secure in phonic phase 2 at the end of	100
47	the fourth term in school'. Phonic phase 2 requires the child	101
48	to be able to provide the sound when shown any grapheme	
49	that has been taught – particularly being secure with the	102
50	sounds of s, a, t, p, i and n; to select the correct grapheme to	103
51	represent any of the 19 phonemes taught in this phase; and	104
52	to blend and to segment CVC and VC words. Based on	105
53	these criteria, 16.4% of the school population was assessed	106
54	as 'behind expectation' in phonic skills. Because this is	107
55	well above reported prevalence rates for dyslexia (typically	108
56	7–10%), it is clear that these judgments alone would	109
	over-identify children who subsequently go on to be 'free'	110
	of difficulty. However, to assess the validity of the teacher	111
	judgments, we proceeded to assess the same children at the	
	end of year 1, some 6 months later, on objective tests of	
	reading and related skills, comparing them with a represen-	
	tative sample of children from the same classrooms,	
	matched on age and gender.	
	The findings of our study were clear: teachers were good	
	judges of their pupil's progress, and their assessments pre-	
	dicted 50% of the variability in children's reading skills at	
	the end of the school year (when considering this finding,	
	it is important to bear in mind that objective test scores	
	rarely produce better agreement over two points in time).	
	However, a further question we wanted to address was	
	whether these children could be described as dyslexic? To	
	address this question, we turned to a working definition	
	of dyslexia proposed by the expert advisory group serving	
	the Rose (2009) review. This definition goes beyond that	
	of DSM-V in describing the typical cognitive profile asso-	
	ciated with the condition:	
	<i>'Dyslexia is a learning difficulty that primarily affects</i>	
	<i>the skills involved in accurate and fluent word reading</i>	
	<i>and spelling. Characteristic features of dyslexia are</i>	
	<i>difficulties in phonological awareness, verbal memory</i>	
	<i>and verbal processing speed'. (Rose, 2009, p. 9)</i>	
	We proceeded to ask whether the group of children identi-	
	fied as 'at risk' showed the core characteristics of dyslexia –	
	poor phonological awareness, poor verbal memory and	
	slow verbal processing speed. This was indeed the case, and	
	on tests of phoneme deletion, verbal working memory	
	and rapid automatised naming, the children we identified	
	showed impairments relative to their peers.	
	In summary, although there are many commercially avail-	
	able screening tests designed to identify 'children at risk of	
	dyslexia', our findings suggest that there is no need to	
	implement such costly procedures. There are already many	
	data in schools that can be used by teachers to identify	
	children who are failing to respond to mainstream teaching.	
	A distinct advantage of teacher assessments is that they	
	occur on a regular basis and can avoid delays in the imple-	
	mentation of good-quality evidence-based intervention.	
	Ideally, school systems should embed such procedures in	
	their policies and empower teachers to identify children	
	with additional learning needs early (at the end of reception	
	year or in year 1).	
	<b>Interventions to ameliorate dyslexia</b>	
	<i>Early interventions at the foundations of literacy</i>	
	We have seen that the RTI approach to assessment and	
	intervention appears to hold promise for the early identifi-	
	cation of children who are failing to learn to read at the	
	expected rate. A further question is whether interventions	
	can strengthen the foundations of literacy skills in children	
	who show 'at risk' signs.	
	Bowyer-Crane et al. (2008) set out to address this ques-	
	tion in a randomised controlled trial comparing two	

1	interventions designed for children who enter school with	57
2	poorly developed language skills – the primary risk factors	58
3	for poor literacy. Here, we will focus on the impact of the	59
4	programme that targeted the development of decoding skills	60
5	[phonology with reading programme (P + R)], comparing	61
6	it with the alternative intervention that was designed to	62
7	improve spoken language skills [oral language programme	63
8	(OL)]. The programme comprised training in letter-sound	64
9	knowledge, segmenting and blending and reading from	65
10	texts, which were selected to be at the appropriate level	66
11	following the administration of a ‘running record’. It was	67
12	delivered each day for 20 weeks to children in reception and	68
13	year 1 classes by trained teaching assistants, alternating	69
14	between small group and individual teaching sessions (see	70
15	Carroll et al., 2011 for details of both programmes).	71
16	We found that the children who received the P + R pro-	72
17	gramme did significantly better than those who received the	73
18	OL programme on tests of phoneme awareness, letter-sound	74
19	knowledge and reading and spelling skills at the end of the	75
20	intervention. The gains were maintained after the interven-	76
21	tion had stopped. Furthermore, it appeared that the P + R	77
22	intervention programme had ‘lifted’ many of the children	78
23	from the ‘at risk’ to the typical range of reading skills for	79
24	their age such that, while 68.1% of the OL group remained	80
25	at risk for literacy difficulties, this was only the case for	81
26	50% of the P + R group. In fact, 7.1% of children in the	82
27	P + R group now had above average reading scores.	83
28	Of course, no intervention programme benefits all children,	84
29	and inevitably there is variation in children’s response. We	85
30	found that one factor which predicted progress was non-	86
31	verbal IQ, such that children with more specific language	87
32	impairment tended to do better than children with general	88
33	13 language delay (Bowyer-Crane et al., in press). However,	89
34	our sample size was small for exploring predictors of	90
35	response, and it is important at this stage to be cautious	91
36	about such findings.	92
37	<i>Treating dyslexia</i>	93
38	Beyond the early years, there are now many evidence-based	94
39	interventions for children with reading difficulties/dyslexia	95
40	(Duff and Clarke, 2011; Fletcher et al., 2007; Snowling and	96
41	Hulme, 2011). A good starting point for developing an inter-	97
42	vention is understanding the causes of a disorder. Indeed,	98
43	targeting of impaired processes provides the theoretical	99
44	motivation for the design and content of an intervention.	100
45	Unfortunately, the field of dyslexia is plagued with sup-	101
46	posed ‘cures’ that have no proper evidence base. It is	102
47	therefore important for professionals to critically review	103
48	the content of available programmes to ensure their suit-	104
49	ability. A useful website developed to complement the	105
50	Rose Review is <a href="http://www.interventionsforliteracy.org.uk/schools/">http://www.interventionsforliteracy.org.uk/schools/</a> .	106
51		107
52	However, to choose an effective programme or approach,	108
53	what professionals require is good understanding of the	109
54	principles of interventions and their suitability for different	
55	children. Snowling and Hulme (2011) reviewed the ingre-	
56	dients of evidence-based interventions for language and	
	literacy difficulties. They concluded that it is a good prac-	
	tice to ensure that interventions are systematic, well struc-	
	tured and multi-sensory, and that they incorporate direct	
	teaching, learning and time for consolidation, with frequent	
	revision to take account of the likely limited attention and	
	learning difficulties of the child. For dyslexia, effective	
	interventions should include training in letter sounds,	
	phoneme awareness, and linking letters and phonemes	
	through writing and reading from texts at the appropriate	
	level to reinforce emergent skills. In contrast, poor compre-	
	henders require a different ‘diet’ attuned to their needs	
	and can benefit from training in oral language skills par-	
	ticularly vocabulary training (Clarke et al., 2010: <a href="http://readingformeaning.co.uk/">http://</a>	
	<a href="http://readingformeaning.co.uk/">readingformeaning.co.uk/</a> ). Of course, it is important to	
	bear in mind that many children will have problems with	
	decoding and comprehension, in which case a mixed	
	approach is needed.	
	More generally, there is still typically too long a lag	
	between the identification of children’s reading difficulties	
	and the implementation of interventions. It is also the case	
	that many interventions are short and do not take account of	
	the ongoing needs of children who have dyslexia. Given	
	this, there is an urgent need for the evaluation of approaches	
	to the education of children with special education needs	
	who receive school-based intervention programmes.	
	<b>Conclusions</b>	
	As knowledge of dyslexia and related difficulties has	
	increased, not only in readers of English but also other	
	languages (Caravolas, 2005), there remains a pressing need	
	for theory to influence practice. This paper has attempted to	
	demonstrate how an understanding of dyslexia can be used	
	to ensure that children in our school systems who are at risk	
	of dyslexia can be identified early before a sense of failure	
	sets in. The emphasis has been on dyslexia as a dimensional	
	disorder rather than a discrete diagnostic category. Finally,	
	evidence showing that children with dyslexic difficulties	
	can be helped by specific interventions underlines the need	
	for timely action rather than waiting for diagnosis.	
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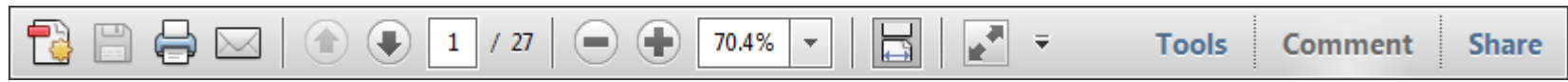
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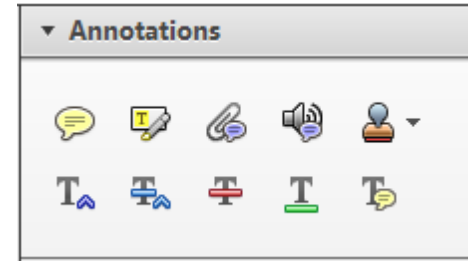
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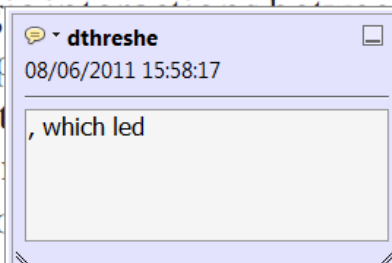


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standard framework for the analysis of microeconomics. Nevertheless, it also led to the emergence of strategic behavior in the number of competitors in the industry. This is that the structure of the industry, which led to the emergence of strategic behavior, are exogenous to the industry. Important works on this by Shirasaka (henceforth) we open the 'black b



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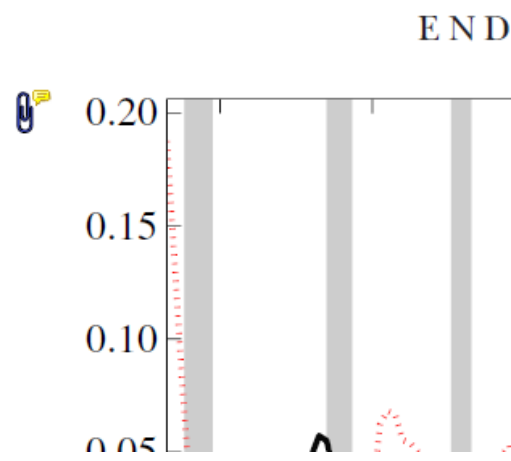
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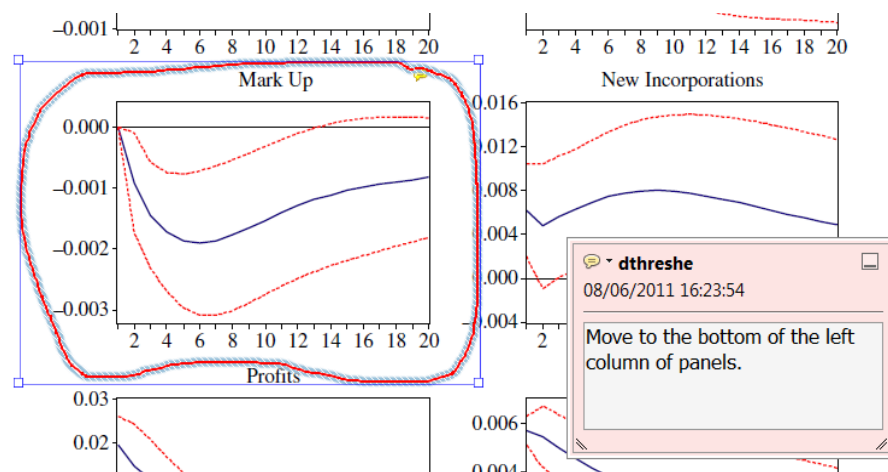


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