

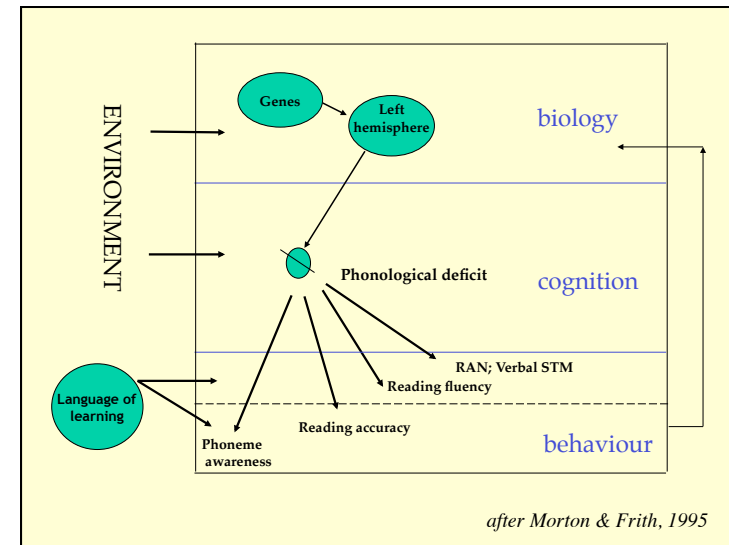
Dyslexia and Language Impairment: Risk and Protective Factors

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<http://www.york.ac.uk/res/crl/>



wellcome trust



Developmental Disorders of Language, Learning and Cognition

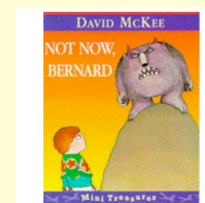
Charles Hulme and Margaret J. Snowling



Growing recognition of co-morbidity and continuities between dyslexia and other learning disorders

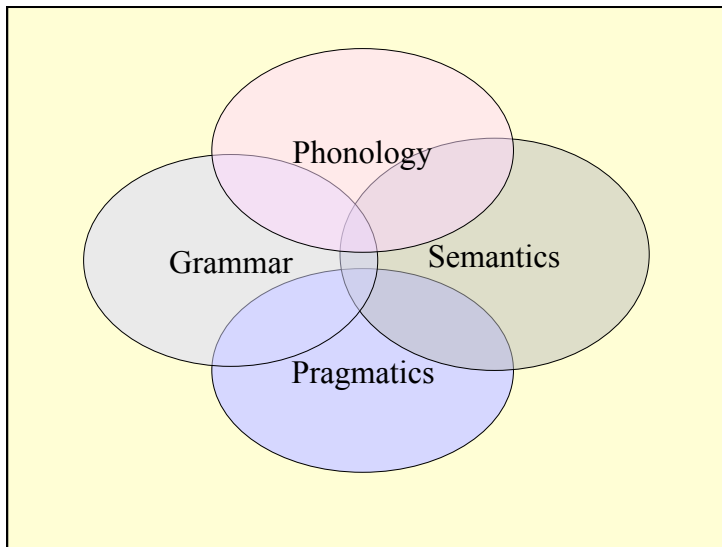
Specific Language Impairment

Characterized by significant language delay in the preschool years, **poor lexical learning (vocabulary)** and persistent difficulties with **grammar** despite normal non-verbal ability



and, when 'dad was reading the newspaper, Bernard bite- the monster bite.....that dad 'leg but the- but dad never took any notice

From Bishop, 1997

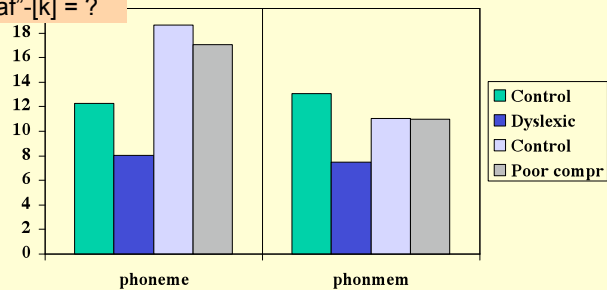


Learning to decode depends
on phonological skills:

Phoneme awareness
Phonological memory
Phonological representations

Phonological Skills: Dyslexia vs Poor Comprehender






Phoneme Deletion
"bice" - [b] = ?
"cleaf" - [k] = ?



Marshall, 1998

Learning to spell depends on
phonological skills:

Phonological representations
Phoneme segmentation
Phonological memory

edit mfn mAEeiOi r	loicno pneh rcoo F	Agsng chf cotv mioieAs	btte cresl Dvol	Ammioi lbesste tghlml
				
dog bog dag doe	cup cop kup	tet tent ten	buk bok book	hat hrt hart

Spelling to dictation

“Dorothy was looking closely into the face of the scarecrow. She was surprised to see one of the eyes wink at her”

TD

- Dorofy was looking cloly into the face of the scrow she was sprised to see one of the eyses wink at her

DYS

- dought was look consly in to the face of the starrow she was sowlt to see one of the eye winck at her

SLI

- balfiy was locin down into the fisr of ure sear she was spad too see one of the isr wick at hrr

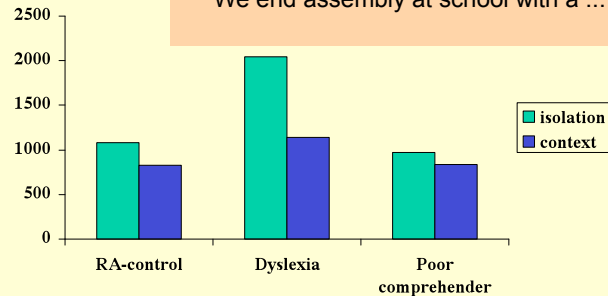
Use of context in reading depends on grammatical skills

Dyslexia = normal sentence context effect

Poor comprehender = reduced context effect

Contextual Facilitation: Dyslexia vs Poor Comprehender

Low constraining contexts
I went shopping with my mother and my..
We end assembly at school with a ...



Nation & Snowling, 1998 Child Dev

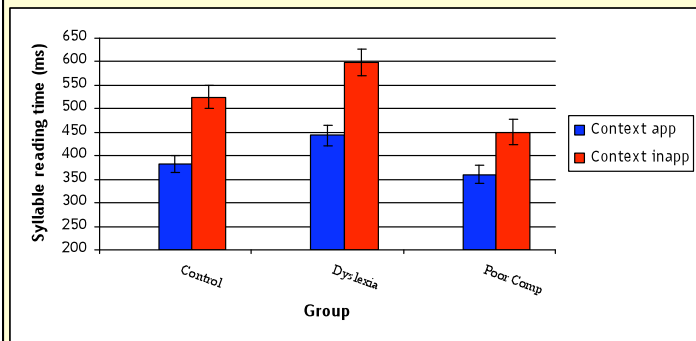
Text comprehension requires inferencing skills

Dyslexia = automatic on-line inferencing

Poor comprehender = fewer on-line inferences

Holly was on a school trip. Her class were going to the zoo as part of 'wild week'. They saw elephants, monkeys, zebras and tigers. Holly wanted to see the lions most of all. She could see them, but they were all asleep. "Wake up!" shouted Holly. Suddenly, one of the lions jumped up and ran towards her. The lion ran up to the fence where Holly stood and made a huge roar! Holly had never been so scared. She ran away fast. "He didn't want to be woken up!" said her teacher

Effects of Text-level Context on Reading Time: Dyslexia vs PC



L. Clarke & Snowling

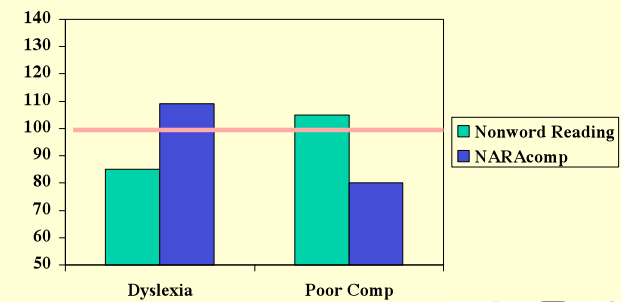
Language Skills and Literacy Development

Literacy builds on a foundation of oral language skills

- Phonological skills
 - Foundation for the creation of mappings between letters and speech sounds : decoding and spelling
- Language skills (beyond phonology)
 - Grammar, vocabulary, syntax
 - Required in order to read for meaning and for text comprehension



Two Distinct Forms of RD Dyslexia vs Poor Comprehender



Dyslexia and Language Impairment

Becky Larkin & Maggie Snowling



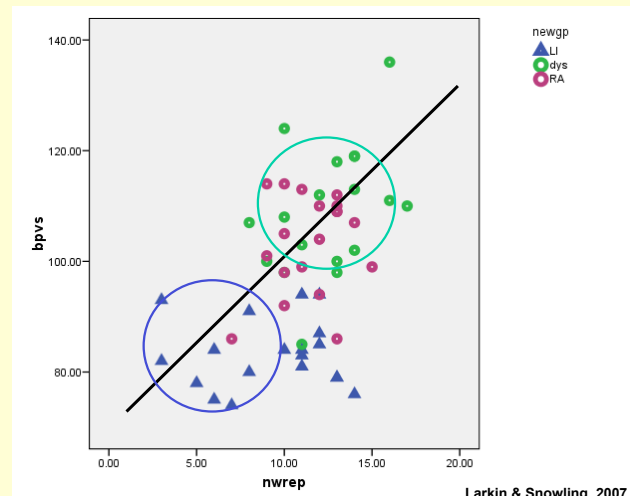
What is the relationship between dyslexia and SLI?

- SLI = dyslexia + additional co-morbid impairments in grammar and vocabulary
- SLI = more severe form of dyslexia



Phonological Skills and Phonological Spelling

	Dyslexia	LI	RA control
% Phonetic Spelling Errors	84.5 (9.5)	75.7 (18.5)	85.3 (10.0)
Phoneme deletion (/15)	6.2 (3.8)	6.0 (3.5)	6.3 (3.7)
Phonological memory (/18)	12.4 (2.6)	8.5 (3.6)	11.0 (2.0)

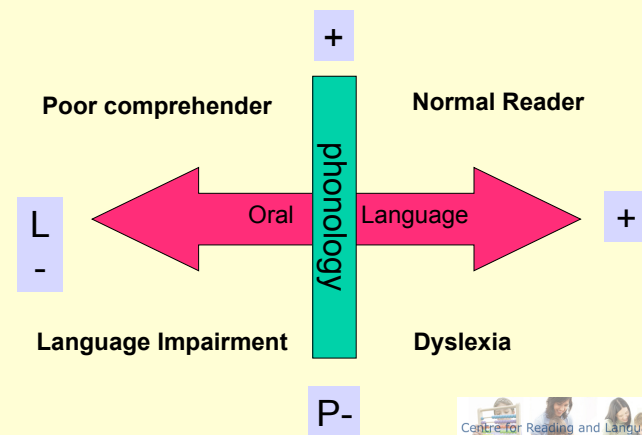


Variants of LI

- Some children with SLI fall on a continuum of skills with dyslexia
 - Low PM and low vocabulary
 - 'SLI-dyslexia subtype'
- Others show a discrepant profile
 - High PM and low vocabulary
 - 'SLI-poor comprehender' subtype
- Consistent with variations in language dimensions underpinning a spectrum of reading disorders (Bishop & Snowling, 2004)



Spectrum of Reading Disorders (Bishop & Snowling, 2004)

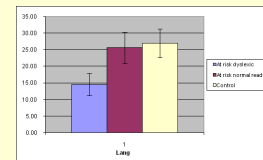


Family-Risk Study

- Children with a parent with dyslexia
 - seen at 4, 6 and 8 years (Snowling, Gallagher & Frith, 2003)
 - follow up at 12-13 years (Snowling, Muter & Carroll, 2007)
- Controls from families with no history of dyslexia, similar SES
- >40% persistent literacy difficulties (dyslexia); compare with at-risk normal readers and controls

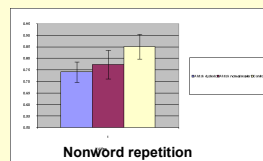
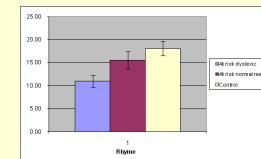


Language and Phonology

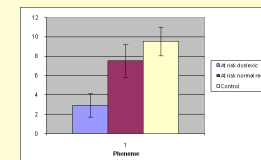


Expressive language

Age 4



Nonword repetition



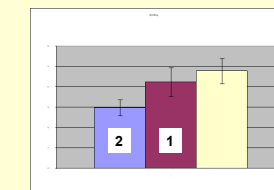
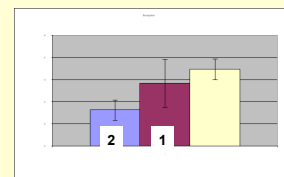
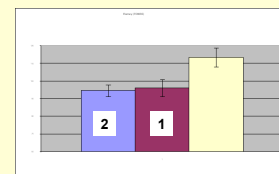
Age 6

Characteristics of family-risk sample

- Two 'sorts' of phonological deficit in pre-school
 - Poor phonology + delayed language (P-/L-) Two risk factors
 - Poor phonology + normal language (P-/L+) One risk factor
- Developmental consequences vary:
 - P-/L- fulfil criteria for dyslexia at 8 years
 - P-/L+ do not fulfil criteria for dyslexia

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Literacy Skills in Adolescence



At-risk 'normal' show weak reading and spelling skills, relative to

Broader phenotype of dyslexia

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Frequency of ADHD in 'at-risk' families

	Attention
Dyslexia	55%
No-dyslexia	64%

- Implies there is a genetic basis to the co-morbidity of dyslexia and ADHD
- In line with parental reports of 'educational concerns' in relation to the broader phenotype

Snowling, 2008

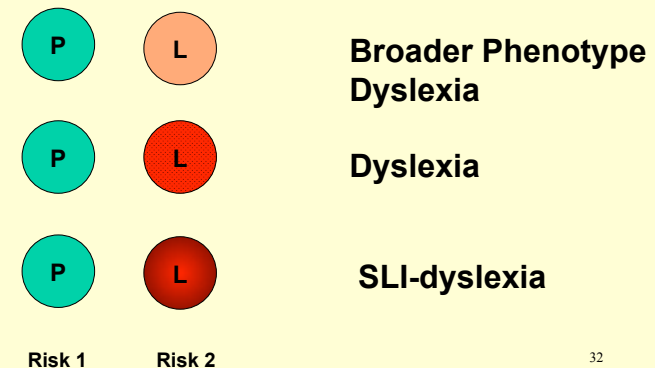
Summary: Family Risk Study

- Two risk factors for reading impairment (P; L)
- Affected and unaffected individuals display some of the same risk factors:
 - Poor phonology (P-)
 - Poor attention (A-)
- Children differ in their ability to compensate
 - Good language is a protective factor (L+)
- Children who have poor literacy through adolescence:
 - More likely to experience multiple deficits (P- / L- / A-)

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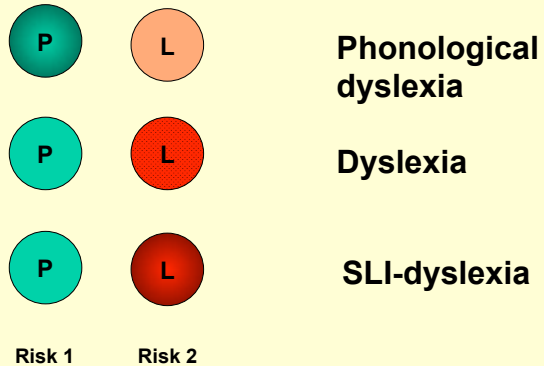
- Dyslexia is not as 'specific' or selective as once thought
- Two 'routes' to dyslexia:
 - Specific phonological deficits (PD)
 - Downstream effect of poor language mediated by PD
- Need to think of causes of disorders in a different way
- Dimensional view emphasizes continuous risk factors that may accumulate to lead to a 'diagnosis'

Dimensions, Risk, and Dyslexia Phenotypes 1

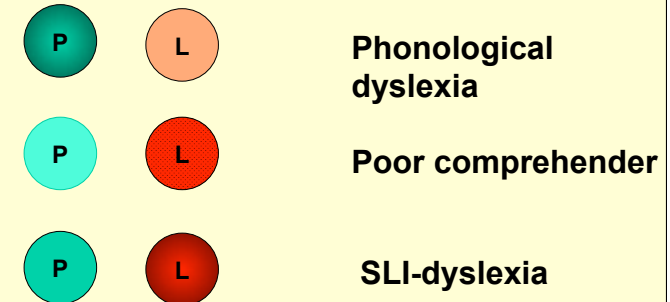


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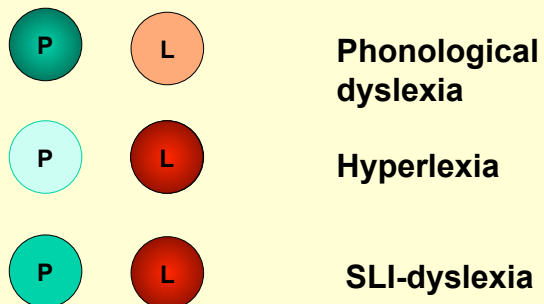
Dimensions, Risk, and Dyslexia Phenotypes 2



Dimensions, Risk, and Dyslexia Phenotypes 3



Dimensions, Risk, and Dyslexia Phenotypes 4



Implications For Intervention

- Dimensions represent important domains for development
- Children with **poor phonological skills** require intervention that includes training in phoneme awareness
- Children with **wider language difficulties** require intervention to foster reading comprehension

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Early Intervention at the Foundations of Reading

- To develop two theoretically motivated programmes of intervention for children who enter school with poor oral language development
- To compare the relative effects of a programme to promote phonological skills (P+R) with one to promote oral language (OL)



Intervention Programs

Phonology +Reading

- Letter-sound work
- Segmenting and blending
- Reading together and reading independently

Language

- Speaking and listening
- Vocabulary training
- Narrative work (oral)

Bowyer-Crane, Snowling, Duff, Fieldsend, Carroll, Miles, Götz, & Hulme (2008)

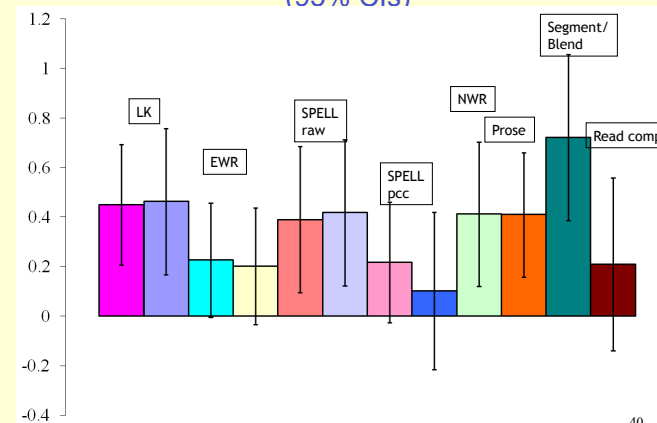
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Design of Study

- Evaluation of two 20-week programmes (P+R or OL) delivered by teaching assistants
- Randomised Controlled Trial (following the CONSORT guidelines)
- Investigators blind to group membership
- 4 test phases: pre-intervention (t1), mid-intervention (t2), post-intervention (t3), maintenance test (t4)
- Longer-term follow-up after one year (t5)

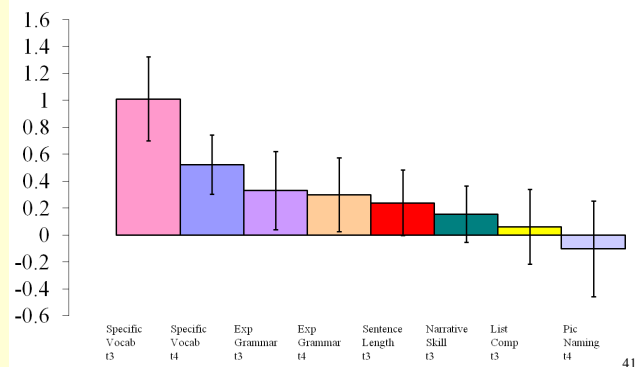
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Relative Advantage of P+R Group in z-score units (95% CIs)

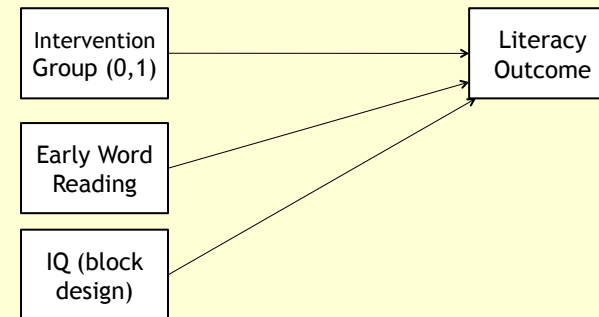


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Relative Advantage of OL group in z-score units
(95% CIs)

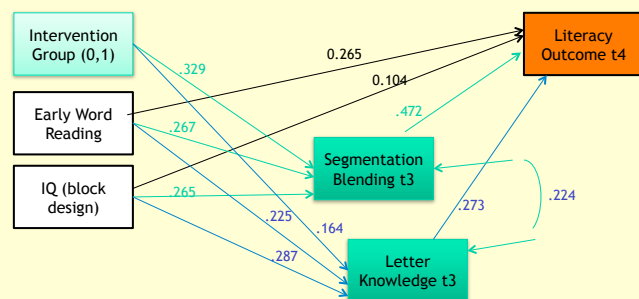


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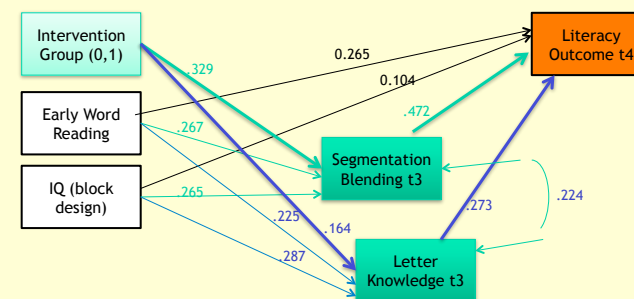


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What causes reading gains?



What causes reading gains?



Chi sq = .86, df. 1 NS; CFI 1.0; RMSEA 0.00 (0-.208)
 Literacy outcome is entirely mediated by these two variables . Dropping direct effect of group has no effect on fit indices of model
 R2 for Literacy 67% ; Total indirect effects on Literacy 4.0%; Indirect effect Grp->Seg/BL3-> Lit 2.4%; Indirect effect Grp->LK3-> Lit 0.2%. Both indirect effects are reliable

Summary

- Both P+R and OL intervention programmes were effective in promoting basic skills that underlie reading comprehension
 - Vocabulary and grammatical skills fostered better by OL program
 - Word-level reading skills, phoneme awareness and spelling fostered better by P+R programme
- Effects maintained 5 months after intervention ceased.
- Gains in phoneme awareness and LK generalized to nonword reading at t4
- Reading skills brought to within the average range for children given the P+R programme at t4

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Conclusions 1

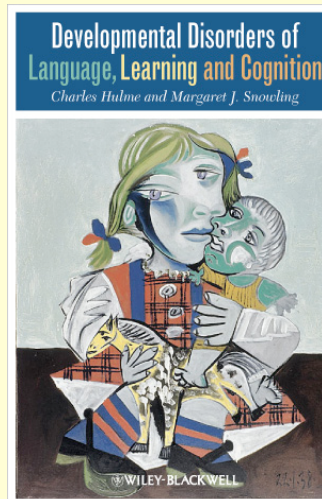
- Language and phonological skills – foundation of literacy development
- When one set of skills selectively impaired, 'compensation' is possible
- Intervention programmes targeted to improve language and/or phonological skills in 'at risk' children are effective
- For children with poor phonology in the context of poor language, response to intervention less good

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Conclusions 2

- Dyslexia is not a diagnostic 'entity' with clear-cut boundaries
 - Categories of developmental disorder are underpinned by dimensions and associated 'risk factors'
- Dimensional impairments interact during development to produce heterogeneity both within and between disorders

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