Identifying children at risk of reading disorder

**Dynamic Assessment of Reading Test (DART) project**

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How should we screen for reading difficulties?

**Static**
- Assesses existing knowledge which is the product of a child's capacity to learn plus their learning experiences
- Captures developed ability i.e. what a child has learned up until the day of the test

**Example:**
Letter Knowledge: How many letters can a child provide the accompanying speech sounds for?

**Dynamic**
- Assesses a child's capacity to learn and their learning potential
- Captures latent capacity i.e. what a child can achieve with assistance during the test

**Example:**
Learning novel letters: How well can a child learn to pair novel letter-like shapes with speech sounds?
Why should we measure learning potential?

• **Opportunities** to learn the spoken language foundations for reading in English vary greatly between children (EAL, disadvantaged children)

• Reducing the impact of **learning inequalities**

• Static assessments can be **too difficult** when used at or shortly after onset of formal reading instruction, resulting in floor effects (Catts et al., 2009)

• Dyslexia is a disorder of **learning** to read, so why not assess learning?
Learning to read and reading difficulties

Decoding
- Phonological awareness
- Letter knowledge
- Exception words

Sight word reading
- Orthographic representations
- Necessary for fluency

Reading comprehension
- Understanding
- Oral language skills – vocabulary & grammar
- Higher level processes – eg inferencing

**Dyslexic profile:** inaccurate or slow, effortful word reading

**Poor comprehender profile:** accurate word reading but difficulties understanding what has been read
Our reviews of the existing evidence

*(Dixon et al., 2022a)*: How well can dynamic assessments of reading and reading-related constructs accurately identify children who have, or who at risk of having, reading difficulties?

15 studies were included: Dynamic assessments can achieve good classification accuracy of reading difficulties, when used alone or when used in combination with traditional static tests.

*(Dixon et al., 2022b)*: How well can dynamic assessments of reading and reading-related constructs accurately predict growth in reading?

18 studies were included: Dynamic assessments of phonological awareness and decoding explain unique variance (1-21%) associated with growth in reading accuracy.
DART project aims & overview

Research questions

1) Do dynamic assessments correlate less strongly with SES and English language proficiency?

2) Does learning in each dynamic task predict growth in reading ability over time?

3) Can dynamic assessments accurately screen for later reading difficulties?
   a) How do they compare to static assessments?
   b) Do they improve screening accuracy when added to static measures?
Dynamic assessment of decoding

**Time 1**
- **May-June 2021**
  - n=317
  - Male: 167 (53%)
  - Female: 150 (47%)
  - SEN: 47 (15%)
  - EAL: 75 (24%)
  - Average age: 5 years 3 months

**Time 2**
- **March-April 2022**
  - n=286
  - Male: 146 (51%)
  - Female: 140 (49%)
  - SEN: 41 (14%)
  - EAL: 65 (23%)
  - Average age: 6 years 0 months

**Number of children at risk of dyslexic reading profile**
- Total: 47
- EAL: 24
- Monolingual: 23

**Attrition**
- 10%
  - Moved school: 11
  - Absent: 17
  - Other: 1

**Reading ability outcomes**
- Reading accuracy (YARC EWR & DTWRP)

**Static predictors of reading**
- Phonological awareness; Letter knowledge; Rapid automated naming; Vocabulary; Nonverbal ability.
Dynamic task

1. Initial presentation / training
   (max. 30 trials with feedback)

2. Blending (4 training trials; 20 test trials with feedback)

3. Reading (1 practice; 12 test trials with no feedback)
DA of decoding: predicting growth in reading

- DA of decoding post test scores predicted an additional 6% of variance in word reading growth in the **whole sample** after the predictive value of the static assessments had been accounted for.

- **Monolingual children** DA of decoding post test scores predicted an additional 6% of unique variance in word reading growth.

- **Children with EAL** DA of decoding post test scores predicted 3% additional unique variance but to a lesser extent.
DA of decoding: screening accuracy

47 children identified as at risk of developing the dyslexic reading profile
23 monolingual children and 24 children with EAL
Dynamic assessment of vocabulary

**Time 1**
May - July 2019
n=414
- Male: 226 (55%)
- Female: 188 (45%)
- SEN: 58 (14%)
- EAL: 145 (35%)
- Average age: 9 years 2 months

**Outcomes**
- Reading comprehension ability
- Receptive vocabulary

**Static predictors of reading comprehension**
- Nonverbal ability
- Vocabulary
- Reading accuracy

**Time 2**
Nov - Dec 2020
n=320
- Male: 173 (54%)
- Female: 147 (46%)
- SEN: 43 (14%)
- EAL: 123 (39%)
- Average age: 10 years 8 months

**Number of children at risk of poor comprehender reading profile**

- Total: 20
- EAL: 14
- Monolingual: 6

**Attrition**
- 22%
- Moved school: 25
- Absent: 11
- Lockdown: 56
- Other: 2

**Outcomes**
- Reading comprehension ability
- Receptive vocabulary

Nuffield seminar
Dynamic task

1. Initial exposure:
Child repeats name and attributes: "Goni: a red, bearded, lazy alien."

2. Vocabulary training:
"What was the name of this alien?"
Corrective feedback given (max. 10 trials)

3. Definition knowledge:
"How would you describe Goni?"
No feedback given.

4. Immediate recall:
"What was the name of the red, bearded, lazy alien?" No feedback given.

5. Recognition:
"Can you point to Goni?"

Phonological factor
Semantic factor
At ceiling
DA of vocabulary: predicting growth in vocabulary

- Semantic and phonology scores both predicted additional variance (2% and 4% respectively) in vocabulary growth in the whole sample after the predictive value of the static tests had been accounted for.

- **Monolingual children** DA of vocabulary scores continued to predict an additional unique variance in vocabulary growth (semantic 2%, phonology 3%).

- **Children with EAL** DA of vocabulary scores continued to predict an additional unique variance in vocabulary growth (semantic 2%, phonology 3%).
DA of vocabulary: predicting growth in reading comprehension

- Semantic scores predicted additional variance (<1%) in reading comprehension growth in the **whole sample** after the predictive value of all the static tests had been accounted for (SES, nonverbal ability, vocabulary knowledge, reading accuracy)

- **Monolingual children** DA of of vocabulary scores did not predict unique variance in reading comprehension growth

- **Children with EAL** DA of vocabulary semantic scores predicted a small but significant amount of additional unique variance (1%) in reading comprehension growth after the predictive value of all the static tests had been accounted for
DA of vocabulary: screening accuracy

20 children were identified as having a poor comprehender reading profile, 14 of these were children with EAL and 6 were monolingual.
Key findings

Both dynamic assessments predicted unique growth in reading ability after controlling for demographic factors and traditional, static predictors:

- The dynamic assessment of decoding predicted growth in early word reading.
- The dynamic assessment of vocabulary learning predicted growth in reading comprehension.

Both dynamic assessments achieved excellent or outstanding levels of accuracy as screeners for later reading difficulties and showed potential to add value to a battery of static assessments for children with EAL.
Implications for practice

We have provided proof of concept: the computerised tasks have excellent accuracy and the potential to reduce inequalities in assessment.

We now need to work with educators to establish how the dynamic assessments fit within existing practice and with children to refine the presentation and delivery of the tasks on an accessible, stable and low-cost platform, suitable for use in schools.
Research Assistants
We would like to thank our team of research assistants who were involved in all three work packages.

Schools
This research was made possible by the fantastic group of schools who supported the project during the unpredictable and challenging circumstances of the COVID-19 pandemic.

Children
In total, 1118 children took part in the DART project. Their enthusiasm and energy was wonderful, and we thank them for all their hard work.

Advisory Board
Prof. Cecile De Cat (University of Leeds); Dr Yvonne Griffiths (University of Leeds); Prof. Beaton, Mhairi (Leeds Beckett University); Kevin Smith (PATOSS); Pat Payne (Yorkshire Rose Dyslexia); Dr Hazel Trotter (Leeds City Council).

https://dart.leeds.ac.uk