Nuffield Foundation

UNIVERSITY OF LEEDS

DART
Dynamic Assessment of Reading Test

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?

Vs

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

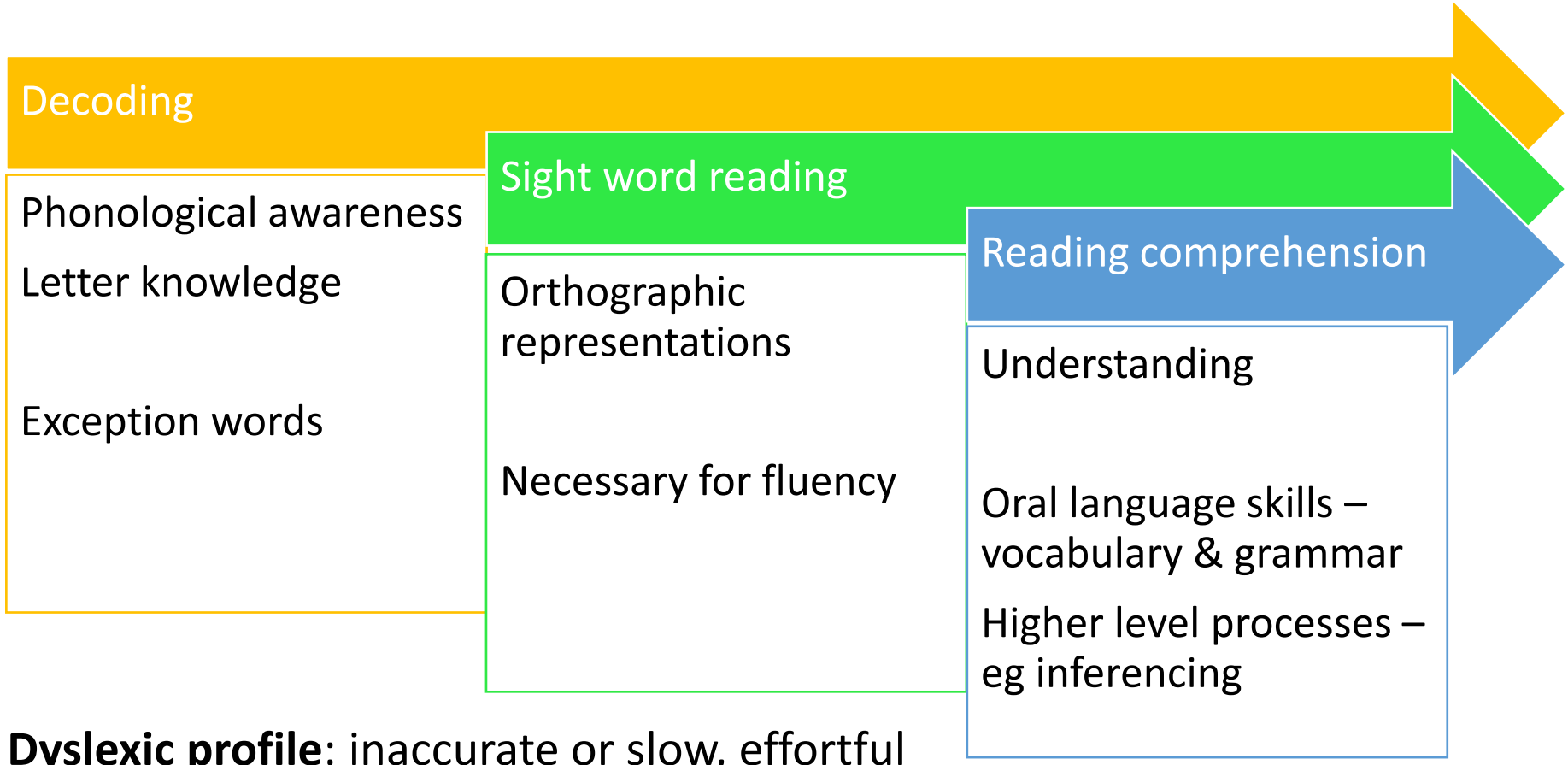
Example:

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



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?

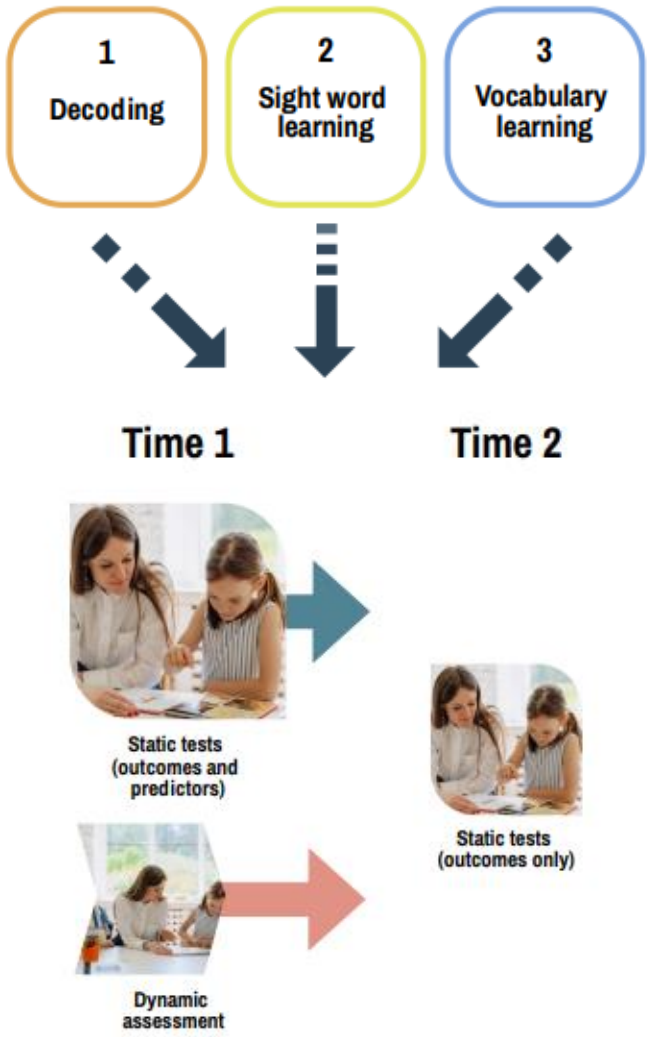
15 studies were included: Dynamic assessments can achieve good classification accuracy of reading difficulties, when used alone or when used in combination with traditional static tests.

(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

Work packages



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

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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

10 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

Reading ability outcomes
Reading accuracy (YARC EWR & DTWRP)

Static predictors of reading
Phonological awareness; Letter knowledge; Rapid automatised naming; Vocabulary; Nonverbal ability.

Dynamic assessment of decoding

Number of children at risk of dyslexic reading profile

47 Total
24 EAL
23 Monolingual

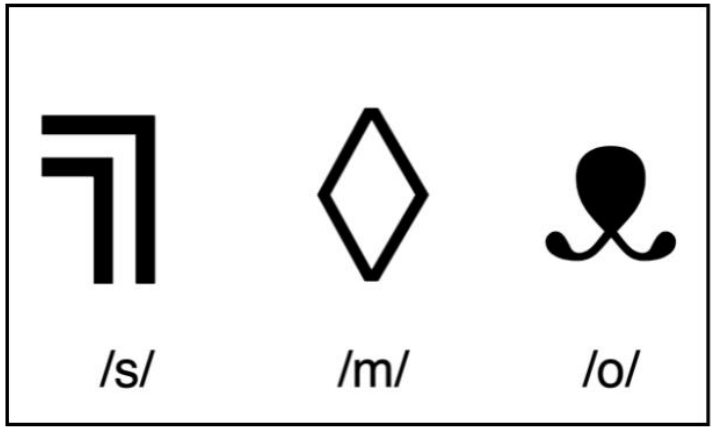
Attrition

10%

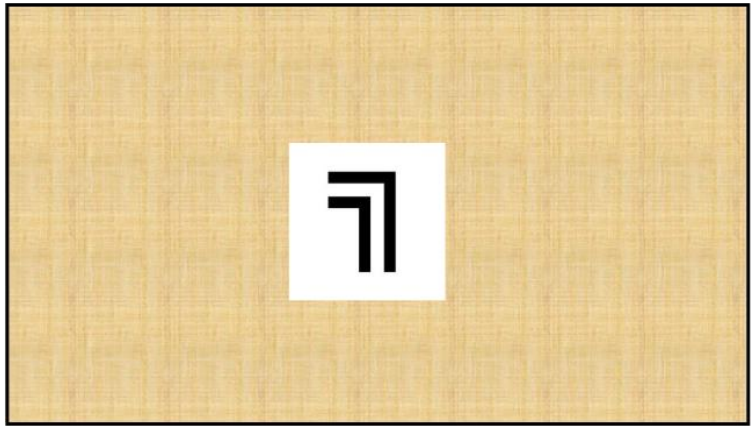
Moved school: 11
Absent: 17
Other: 1

Reading ability outcomes
Reading accuracy (YARC EWR & DTWRP)

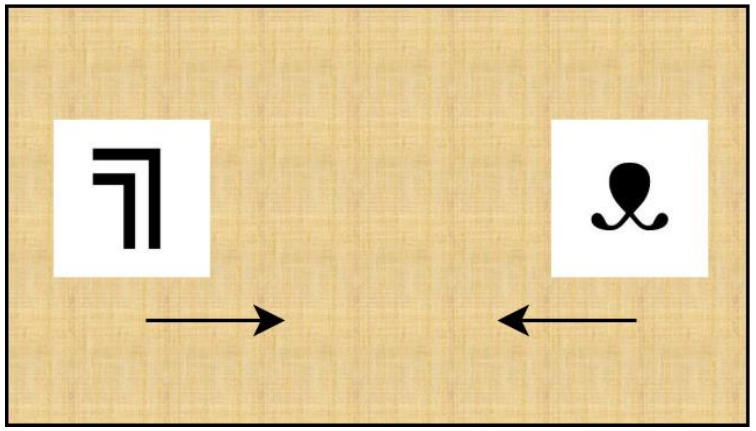
Dynamic task



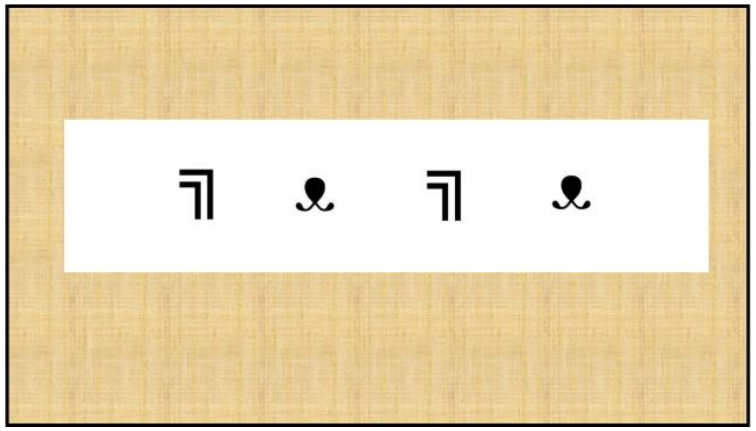
1. Initial presentation / training
(max. 30 trials with feedback)



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

	Sensitivity	Specificity	AUC
DA Training	.894	.715	.876
DA Post test	.872	.900	.946
Static EWR	.894	.895	.964
Static LK	.894	.929	.971
Static + DA Training	.894	.933	.971
Static + DA Post test	.957	.858	.972

Whole sample

Monolingual

	Sensitivity	Specificity	AUC
DA Training	.913	.747	.870
DA Post test	.957	.758	.926
Static EWR	1.00	.793	.956
Static LK	.957	.848	.963
Static + DA Training	.913	.904	.958
Static + DA Post test	.913	.899	.959

EAL

Sensitivity	Specificity	AUC
Not applicable as not significant		
1.00	.902	.976
.958	.902	.984
.958	.927	.985
Not applicable as not significant		
1.00	.927	.989

Dynamic assessment of vocabulary

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Dynamic Assessment of Reading Test

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

15 months

Time 2

Nov - Dec 2020

n=320

Male: 173 (54%)
Female: 147 (46%)

SEN: 43 (14%)
EAL: 123 (39%)

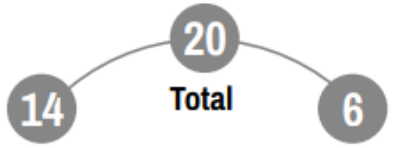
Average age: 10 years 8 months

Outcomes
Reading comprehension ability;
Receptive vocabulary.

Static predictors of reading comprehension
Nonverbal ability; Vocabulary;
Reading accuracy.

Dynamic assessment of vocabulary learning

Number of children at risk of poor comprehender reading profile



Attrition

22%

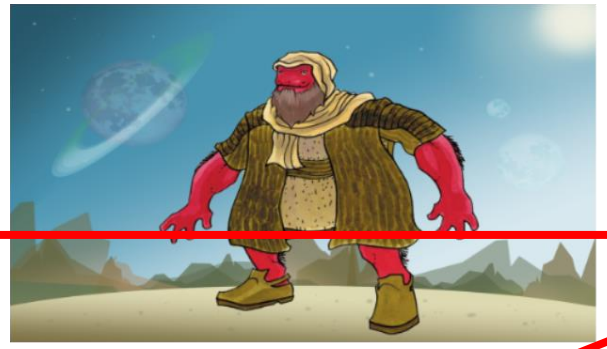
Moved school: 25
Absent: 11
Lockdown: 56
Other: 2

Outcomes
Reading comprehension ability;
Receptive vocabulary

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)



Phonological factor

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

Semantic factor

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

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

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 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

	Sensitivity	Specificity	AUC
DA Phonology	.750	.820	.843
DA Semantic	.850	.727	.864
Static Reading Accuracy	1.000	.607	.862
Static Reading Comprehension	1.000	.623	.878

Whole sample

Monolingual

	Sensitivity	Specificity	AUC
DA Phonology	*Not applicable as not significant*		
DA Semantic	*Not applicable as not significant*		
Static Reading Accuracy	.833	.864	.902
Static Reading Comprehension	1.000	.770	.928
Static + DA Phonology	*Not applicable as not significant*		

EAL

Sensitivity	Specificity	AUC
.929	.615	.825
Not applicable as not significant		
.714	.881	.841
Not applicable as not significant		
1.000	.697	.873

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 o 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