



**EARLY CHILDHOOD SCREENING
RESEARCH & EVALUATION UNIT**

Pre-literate markers of dyslexia:

Exploring the eye movements of BC kindergarten children

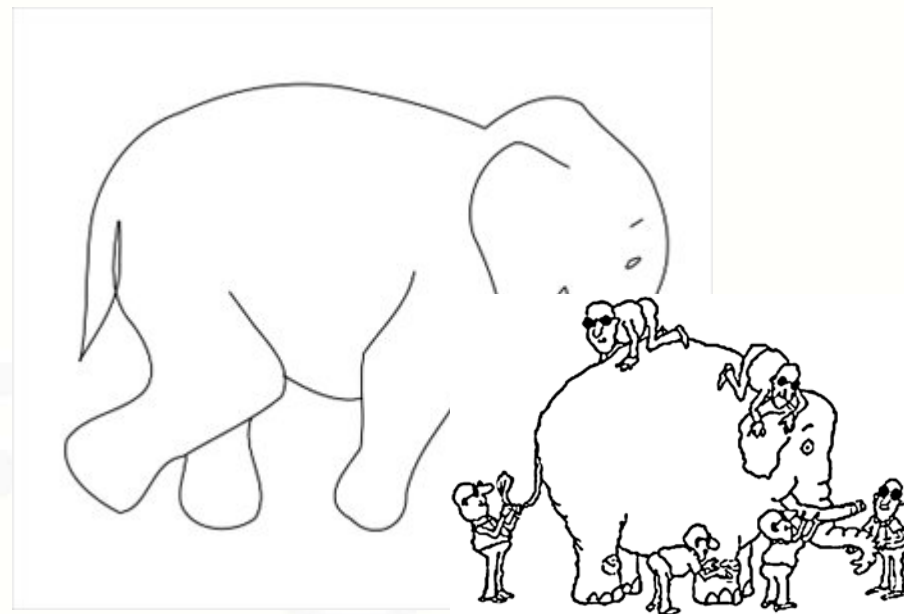
Brenda Poon, Assistant Professor
Human Early Learning Partnership (HELP)

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Outline

- What is dyslexia
- Pre-literate markers of dyslexia
- The Researchers
- Our proposed study
- Expected outcomes
- Potential implications




Background: Dyslexia

- A learning disability is characterized by difficulties with reading, writing, spelling, and the alphabet
- Not explained by sensory or cognitive deficits, lack of motivation, inadequate instruction
- Correlated with: Intellectual Giftedness, Artistic Talent, Visual-Spatial Learning Style



Background: Dyslexia

- Affects 5 to 17% of children
- Students from lower socioeconomic backgrounds have higher rates of dyslexia
- The effects of dyslexia are persistent:

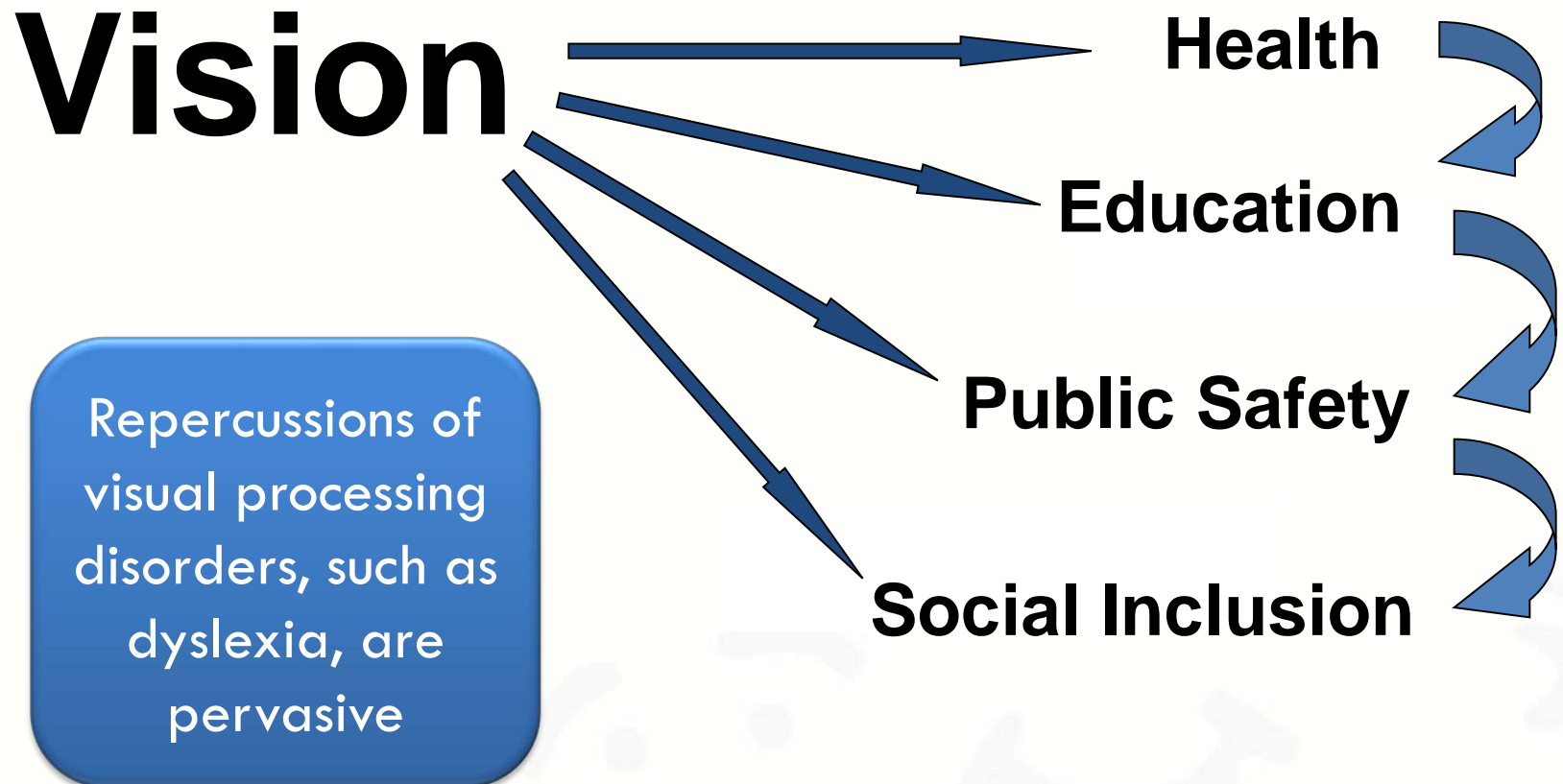


If I have reading difficulties in grade 1 ...

I have 90% probability of difficulties in grade 4 ...

leading to a 75% chance in high school

Why catch dyslexia early?



Diagnosis of Dyslexia

- Commonly diagnosed at 7 to 8 years old, when difficulty with reading is observed at school or at home
- Potential to detect dyslexia earlier through pre-literate markers:
 - Phonological awareness (sound structure of words)
 - Saccade control (small, involuntary eye movements)



Pre-literate Markers of Dyslexia:

Phonological awareness

letter names
letter sounds
speed of naming

Which letter doesn't belong

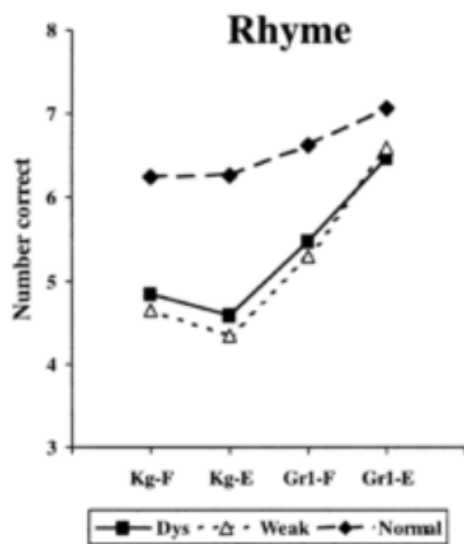
b b d b
1 2 3 4

Please read aloud the
following letters

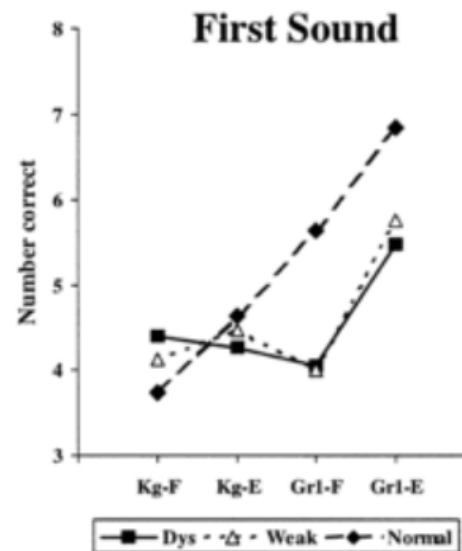
b p j d p q i

Phonological awareness: Evidence suggests...

(a) Phonological Awareness



(b) Phonological Awareness



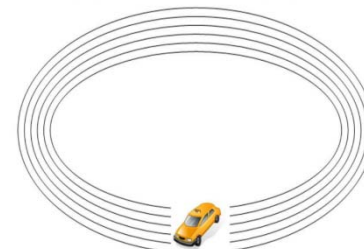
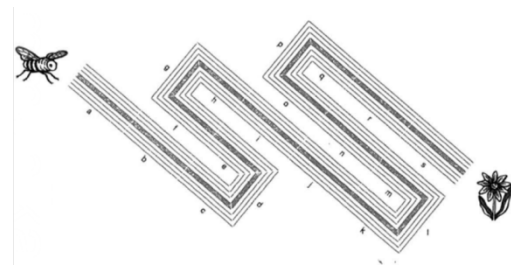
* the above graphs are from 57 children aged 4-6

Pre-literate Markers of Dyslexia: Eye movements

Eye tracking technology



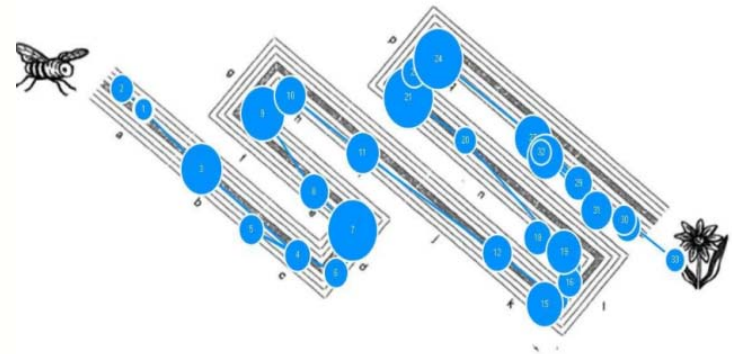
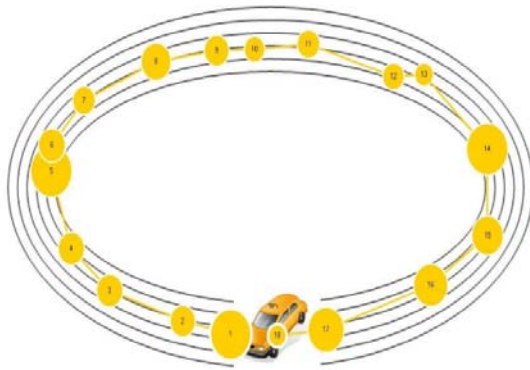
Eye tracking tasks:
follow the path of the truck
follow the path of the bee



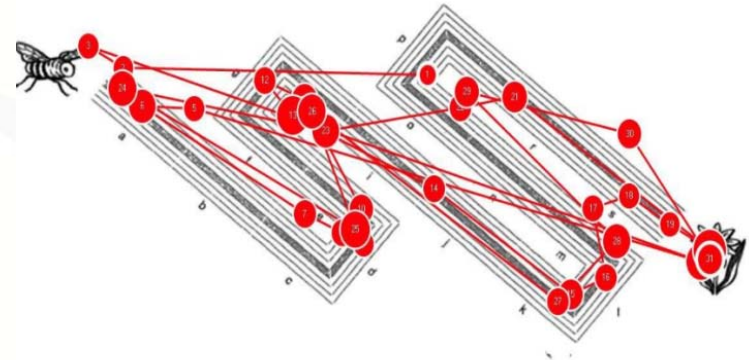
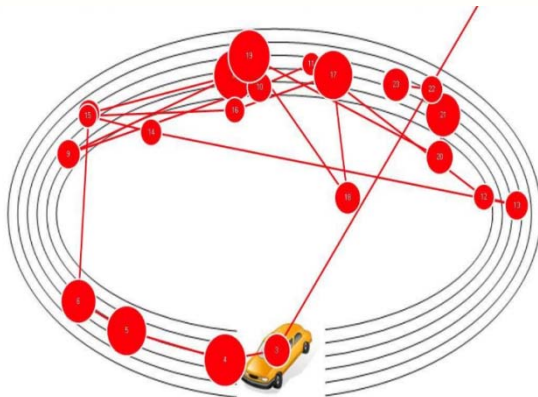
Eye movements: Evidence suggests

Eye movement irregularities are found in up to 70% of dyslexic children aged 7 to 17 years

Not Dyslexic



Dyslexic



Diagnosis and Intervention

What does the literature indicate?

- Other deficits occurring with dyslexia include:
 - visual number counting
 - low level auditory differentiation
 - language processing
- Unknown to what extent these problems did not exist in the past or remained undetected because of a lack of diagnostic and therapeutic methods.



Diagnosis and Intervention

- The particular pattern of symptoms and traits of dyslexia varies with each individual. It is important to use a multidisciplinary approach when trying to help children with dyslexia.
- Different types of interventions are provided according to the health professional (ophthalmologist, optometrist, occupational therapist, etc).



Example: Reading Intervention

56-92% of students enrolled in reading interventions increased their reading abilities to within an average range



Our proposed study – The People

HUMAN
EARLY LEARNING
PARTNERSHIP

The Principal and Co-investigators from UBC, specializing in early childhood development and screening



Dr. Brenda Poon



Dr. Clyde Hertzman



Dr. Ziba Vaghri



Our proposed study – International Collaborators



Our Brazilian Partners from University of Minas Gerais and Deferal University, specializing in eye tracking and visual processing disorders



Dr. Marcia Guimarães



Dr. Ricardo Guimarães



Dr. Marcos Pinotti

Our proposed study – Part 1

Screening

1. UBC team partners with Health Authority
2. UBC team accompanies public health staff to kindergarten classrooms
3. After vision screening, researchers conduct a short eye tracking activity & phonological awareness task
4. A licensed BC optometrist will provide a vision check at the school.



* Children suspected of other vision problems will be referred to a comprehensive eye exam.

Our proposed study – Part 2

Follow up

5. UBC team will analyze the results. Individual child results will be shared with parents.

6. Children with:

- 1) irregular eye movement or phonological awareness results, and
- 2) normal or corrected-to-normal vision

will be referred for an appointment with a school psychologist for in-depth assessment during grade 1.



Our proposed study – Expected Outcomes

The pilot study results will contribute information about:

- The extent that eye tracking and phonological awareness screening measures at kindergarten can predict diagnostic outcomes at grade 1
- Whether results will differ by the socioeconomic status of a child's household or neighbourhood



Implications

- Develop technology and screening protocols to assess pre-literate markers of dyslexia
- Early identification of children with learning disabilities associated with eye movement and phonological awareness irregularities



Project Timeline

- Sept-Oct 2011** Partner with School District & Health Authority
- Nov 2011-Feb 2012** Data collection in kindergarten classrooms
- Mar-Jun 2012** Analyze data
- Aug 2012** Contact parents of children with atypical results
- Sept 2012** Children with atypical results will see School Psychologist for diagnostic assessments
- Dec 2012** School Psychologist diagnostic data will be paired with eye tracking and phonological awareness data to determine accuracy of screening approaches related to the preliterate markers of dyslexia

Selected References

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