History of the Reading Dysfunction
Speech phone perception is comorbid
MARC-Springfield IL

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The history of reading disability

- Is it: Brain damage, disorder, dyslexia, or a learning dysfunction?
History of reading dysfunction (RD)

- “It’s All in the Brain”?: An Invitation to Analyze the Discursive History of the Israeli Neurological Conceptualization of Learning Disabilities (Katchergin, 2015)
  - A terminology crises (2015):
  - Broad ranging opinions about sources of RD
    1. Brain damage? (1960)
    2. Learning disability? (1965)
    3. Special readers (1985)
    5. Confusion and more politics (present)
“Learning disabilities (LD): An Historical and conceptual overview” 
Scholarly article: (Torgesen, 2004) 
- A terminology crises (2004):
  1. Statistics on reading LD programs: 50% of special education
  2. 2.9 million children (1999-2000)
  3. Fastest growing population for all high-incident LD’s
  4. From 1976-1982: annual growth rate of 130%
  5. LDs: 9.5% in Massachusetts and RI; 3% in Kentucky and Georgia
  5b. >50% of the incarcerated population have RD of varying degrees
    RD is a ticket to jail
  6. No LD input from psychology, medical, linguistics and speech research

- 12 RD children; 10,000 trials per child over 1-2 mos of testing

Consonants Ranked by Sorted Probability of Error

Sorted Probability of Error

Reading Controls

Reading Disabled

Consonants Ranked by Sorted Probability of Error

Anton
Bob
Carly
Evan
Miguel

Alina
Angela
Edward
Latisha
Laura
Norene
Shauna
Teddy
Tony
2 typical RD children to RD and RC mean scores

- Solid blue: means of 9 RD children; Solid gray: RC means; Dashed: two typical RDs

Cl of RD subjects: Alina, Angela
Consonant Initial: Top RC, Bottom RC

- Points are individuals: Top RC, Bottom RD
- Solid lines are means of RD; Dashed lines means of RC
Fletcher’s AI model Allen (2005)

- RD have normal hearing, but cannot decode all the phone features
- RD children are highly idiosyncratic in their phone feature decoding

Measure: \( A_l \propto \text{snr}_k \)  
\( e_k \)  
\( s \)  
\( S \)  
\( W \)

Analog objects  
"Front–end"

Discrete objects  
"Back–end"

AI \( k \)  
\( \alpha \)  
\( s, W \)  
\( \text{t} \)
Conclusions

We have:

- Reading disabled children are similar to hearing impaired, but with no cochlear loss
  - for ≈9 RD subjects
  - $N > 10,000$ trials per child
  - CI, CF, VI, VF
  - Highly idiosyncratic results across RD subjects
- To label consonants, in 2005 we have shown that normal listeners use:
  - plosive timing, frequency edges & pitch modulated frication, and
  - across-frequency timing coincidences
- RD have not mastered: phonemic awareness skills
- These should be learnable
Thank you for your attention

http://auditorymodels.org/ [Talks, Demos]
Bibliography

