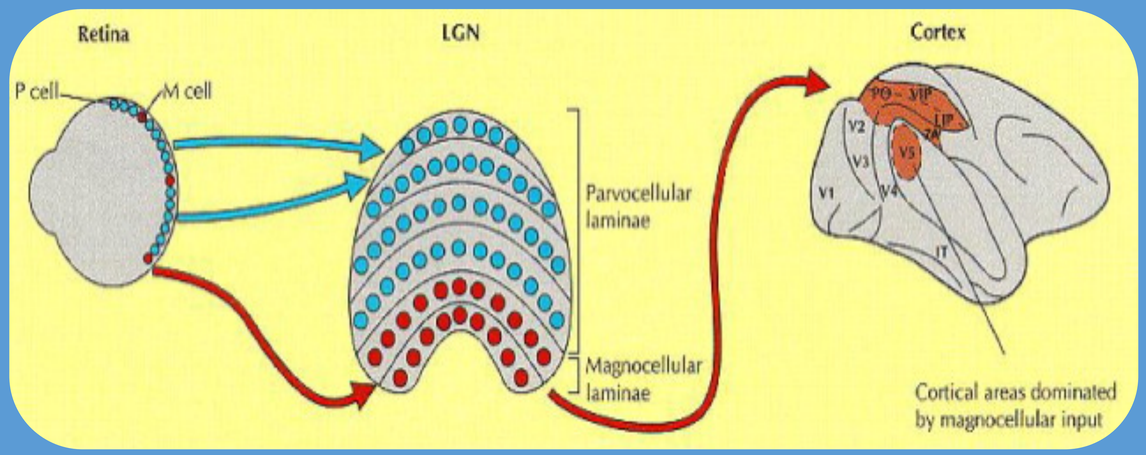
Magnocellular Deficiency: A Possible Explanation for Inefficient Attention Resolution

Victoria A. Tess & Dr. Richard S. Kruk
Department of Psychology, University of Manitoba, Winnipeg, Manitoba

What We Want to Learn

•How visual attention deficiencies influence developmental dyslexia (DD).This study will associate ineffective magnocellular (M) processing with poor Attention Resolution efficiency.



What We Already Know

•The dominant theory of DD is the Phonological (P) deficit theory.
•DD may be caused by an M deficiency.
•The M pathway focuses attention (Facoetti et al., 2000).

Reasons for Research

- P interventions are unhelpful for some (Gori & Facoetti 2015).
- Identifying DD at the pre-reader stage.
- Early intervention programs.
- Furthering the understanding of DD.

Hypotheses

1. **The Navon Task**: Good readers (GR) will experience a global precedence effect. Poor Readers (PR) will not. (Franceschini's et al., 2017). I expect a larger absolute timing difference between the global and local level for PR.
2. **The VS-18:** PR will have an atypical scanning pattern, GR will exhibit a usual scanning pattern (Ferretti's et al., 2008).
3. **The Tilt Discrimination Task:** PR will experience excessive visual crowding while GR will not (Cassim's et al., 2014).

Task Descriptions

The Navon Task:

- Large letters (global) are made up of smaller letters (local).
- Participants indicate if an H or O was present in a trial (Navon,1977).

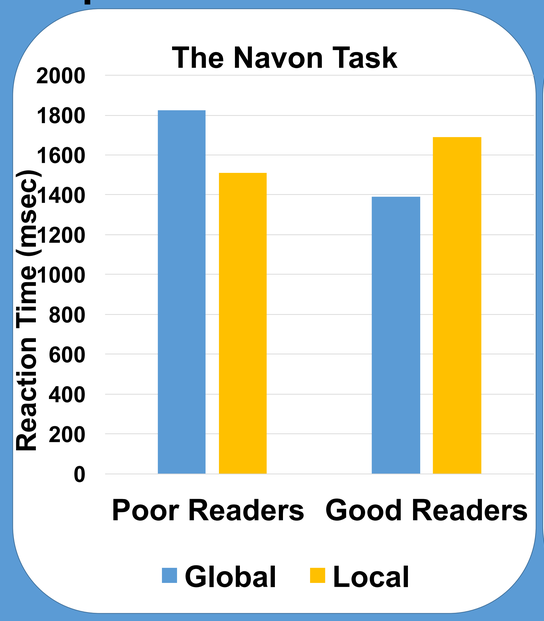
The VS-18 Task:

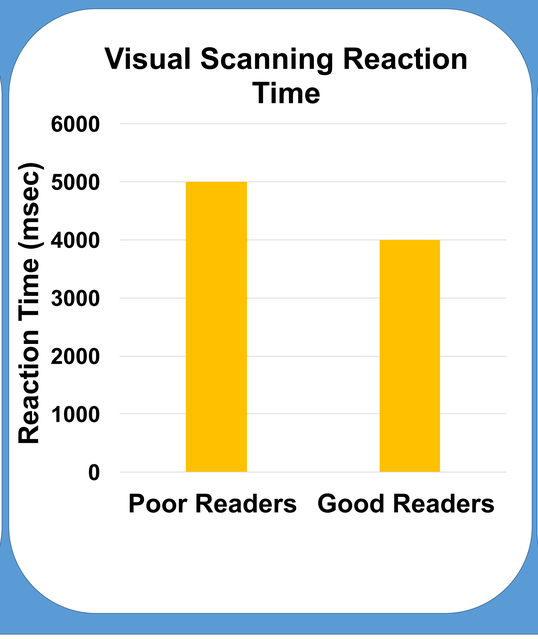
- The participants will specify the location of an orange triangle (Ferretti et al., 2008).
- The triangle could be located on the left, right or middle of the screen.

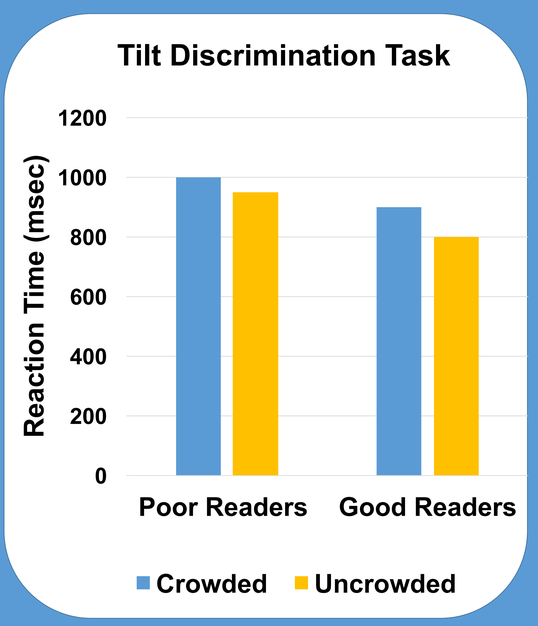
The Tilt Discrimination Task:

- Participants must identify the tilt of the target gabor as left or right.
- The distractor gabors can be crowded or spaced from the target gabor (Cassim, 2014).

Expected Results & Future Directions







- Future studies will correlate the findings above with known measures of M processing and AR efficiency to determine if the M pathway can influence AR efficiency.

References

Cassim, R., Talcott, J., & Moores, E. (2014). Adults with dyslexia demonstrate large effects of crowding and detrimental effects of distractors in a visual tilt discrimination task. PloS One, 9(9), e106191–. https://doi.org/10.1371/journal.pone.0106191
Ferretti, G., Mazzotti, S., & Brizzolara, D. (2008). Visual scanning and reading ability in normal and dyslexic children. Behavioural Neurology, 19(1-2), 87–92.
Franceschini, S., Bertoni, S., Gianesini, T., Gori, S., & Facoetti, A. (2017). A different vision of dyslexia: Local precedence on global perception. Scientific Reports, 7(1), 17462–10. https://doi.org/10.1038/s41598-017-17626-1
Gori, S., & Facoetti, A. (2015). How the visual aspects can be crucial in reading acquisition? The intriguing case of crowding and developmental dyslexia. Journal of Vision, 15(1), 8–8. https://doi.org/10.1167/15.1.8
Navon, D. (1977). Forest before trees: The precedence of global features in visual perception. Cognitive Psychology, 9(3), 353–383. https://doi.org/10.1016/0010-0285(77)90012-3
Stoet, G. (2018, November 5). Navon Figure [PsyToolkit Stimuli].https://www.psytoolkit.org/experiment-library/navon.html