

Our Sensory Experiences with Words Affect How We Read

Introduction

- How quickly we read a word is affected by various linguistic characteristics, from its frequency of use to its meaning. Past research on nouns and verbs shows that people process words faster when the meaning of the word has a clear physical or mental representation (Juhasz et al., 2011). The cause is believed to be the activation of related sensory systems.
- In this study, SER and imageability ratings (1-7 scale) for 248 adjectives were gathered to examine whether sensory effects seen in the eye-tracked reading of nouns apply to the reading of adjectives.
- Eye movement data used for analyses were taken from the Ghent Eye-Tracking Corpus (GECO) recorded by Cop et al. (2017) as participants read an entire novel.

Variable Terms

- Imageability** rating measures how easy it is to visualize the meaning of a word.
- Sensory experience rating (SER)** captures how a word can be perceived through senses unlimited to sight, such as taste and touch.
- Concreteness** (1-5 scale) assesses the tangibility of a word's concept. Ratings were exported from Brysbaert (2014)'s dataset.
- Age-of-acquisition (AoA)** refers to the order by which a word is learned. Each adjective's AoA was taken from Kuperman (2012)'s corpus.

Methods

Sample

- SER was collected from a convenience sample of 29 Wesleyan undergraduates who completed an online survey in Spring 2021. Psychology 105 course credit was offered as compensation.
- Imageability ratings came from 25 other Wesleyan students who took the survey over the summer. All participants received a \$5 Amazon E-Gift card.

SPSS Analysis

- Using bivariate Pearson Correlation, SER shows a significant moderate correlation with imageability.
- SER has a significant mildly positive correlation with concreteness, while Imageability has a strong positive correlation.
- SER and imageability both have a significant negative correlation with AoA and total fixation duration (GECO).

Table 1 : SER SPR21Participants Demographic Information

Variable	M (SD)	Range
Demographics		
Age	18.76 (0.95)	18.0 – 22.0
Biological Sex	67.0% Female	
Year of Study	62.1% First year 20.7% Sophomore 13.8% Junior 3.4% N/A	
English as First Language	41.4% Yes	
Formally Diagnosed Reading Disability	93.1% No	

Table 2 : Imageability SUM21Participants Demographic Information

Variable	M (SD)	Range
Demographics		
Age	19.84 (1.03)	18.0 – 22.0
Biological Sex	88.0% Female	
Year of Study	12.0% First year 60.0% Sophomore 20.0% Junior 8.0% Senior	
English as First Language	52.0% Yes	
Formally Diagnosed Reading Disability	96.0% No	

Table 3 : Correlations Between Predictor Variables and Eye-Tracked Data from GECO corpus

	1	2	3	4	5	6	7	8
1. SER	-							
2. Imageability	.655**	-						
3. FFDGECO	-.030	.011	-					
4. GDGECO	-.049	-.061	.639**	-				
5. TFDGECO	-.128*	-.168**	.380**	.713**	-			
6. Length	-.117	-.318**	.008	.396**	.510**	-		
7. Concreteness (Brysbaert)	.316**	.705**	.019	-.065	-.133*	-.389**	-	
8. AoA (Kuperman)	-.454**	-.520**	.112	.345**	.435**	.573**	-.413**	-

Note: SER= sensory experience rating; FFDGECO = average first fixation duration for each adjective obtained from the GECO corpus; GDGECO = average gaze duration from the GECO corpus; TFDGECO = average total fixation duration from the GECO corpus.

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Discussion

- As expected, SER and imageability are positively moderately correlated. Sight is a dominant part of our senses, but not the only way by which we perceive the world. Some words high in SER (e.g., words with a specific taste) may not be as high in imageability. SER and imageability thus capture different word qualities.
- Negative correlations with AoA imply words with higher SER, imageability, and concreteness are learned earlier in life. This supports our hypothesis that having stronger experiences with a word shortens its processing time.
- Total fixation time significantly correlates with all predictor variables, suggesting they all affect word processing during natural reading.
- The GECO corpus averages eye-tracked data across all occurrences of a word in the novel. A larger sample or a more controlled eye-tracking study may find significant effects on more time-sensitive measures (e.g., First Fixation Duration or Gaze Duration), giving more insight into when sensory information is accessed.

Conclusion

- This study is unique in that we collected SER and imageability ratings for adjectives, which have not been extensively studied in current literature.
- Results support the validity of SER and imageability as distinct variables affecting eye movement. A more controlled experiment is needed to parse their influences on reading.

Bibliography and acknowledgements

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