

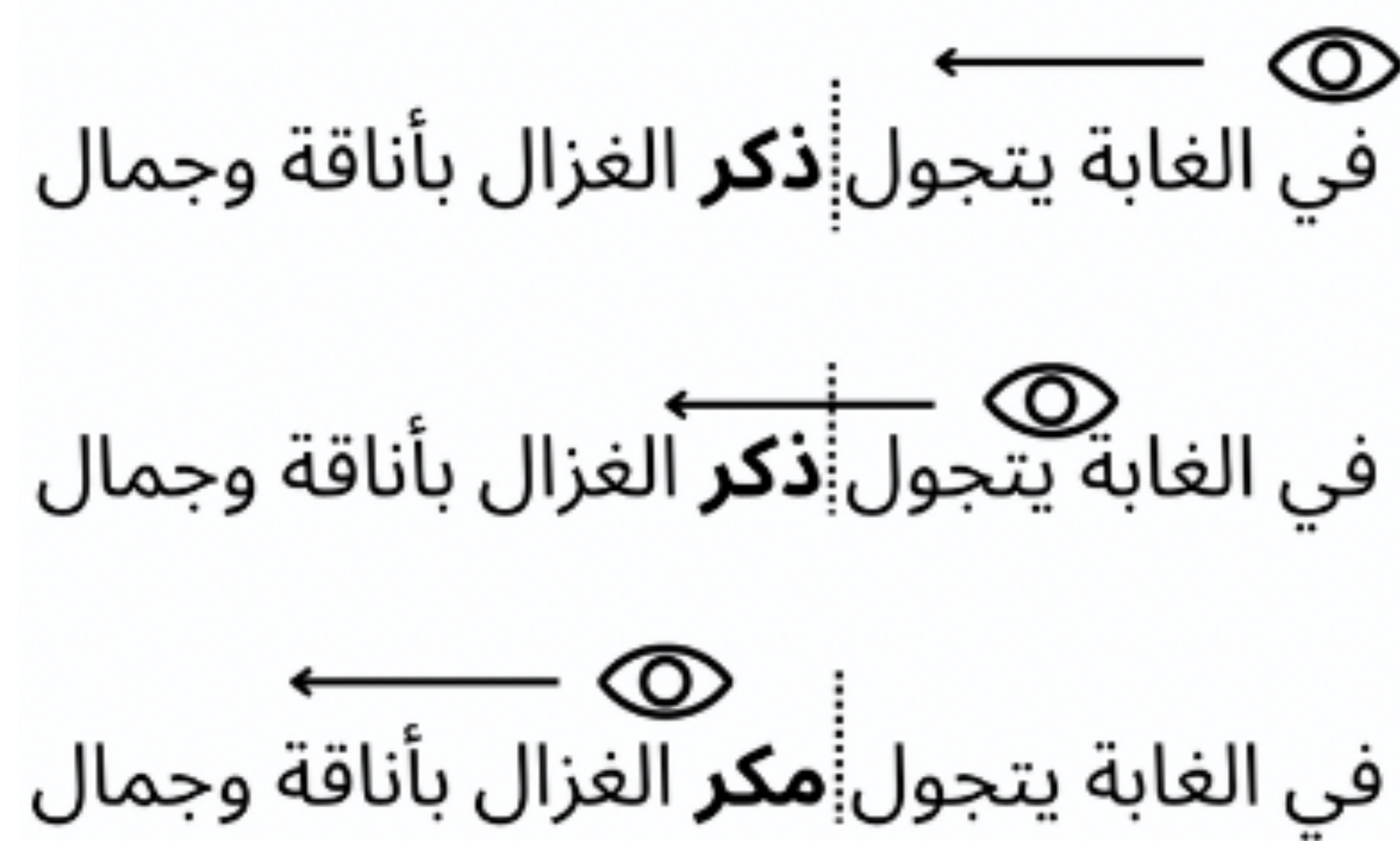


# Decoding Arabic Sentence Reading: Analyzing the Impact of Root Manipulation on Parafoveal Processing in Non-native Readers

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## Introduction

Examining the link between language proficiency and preview benefits in Arabic is a compelling research area. Current studies in this field have identified gaps, particularly in understanding how varying levels of Arabic proficiency impact preview benefits during reading. For my Neuroscience honors thesis, I aimed to address these gaps by investigating whether language proficiency influences reading strategies based on morphological cues.



We hypothesized that participants would exhibit longer gaze durations when the last letter of the word root was manipulated, indicating a reliance on morphological cues akin to native speakers. Discovering similarities in reading patterns between native and non-native speakers would highlight the relationship between language proficiency and reading skills, particularly relevant for second language learners.

## Methods

### 01: Participants

Participants are not native speakers of the Arabic language and are either heritage or educational learners.

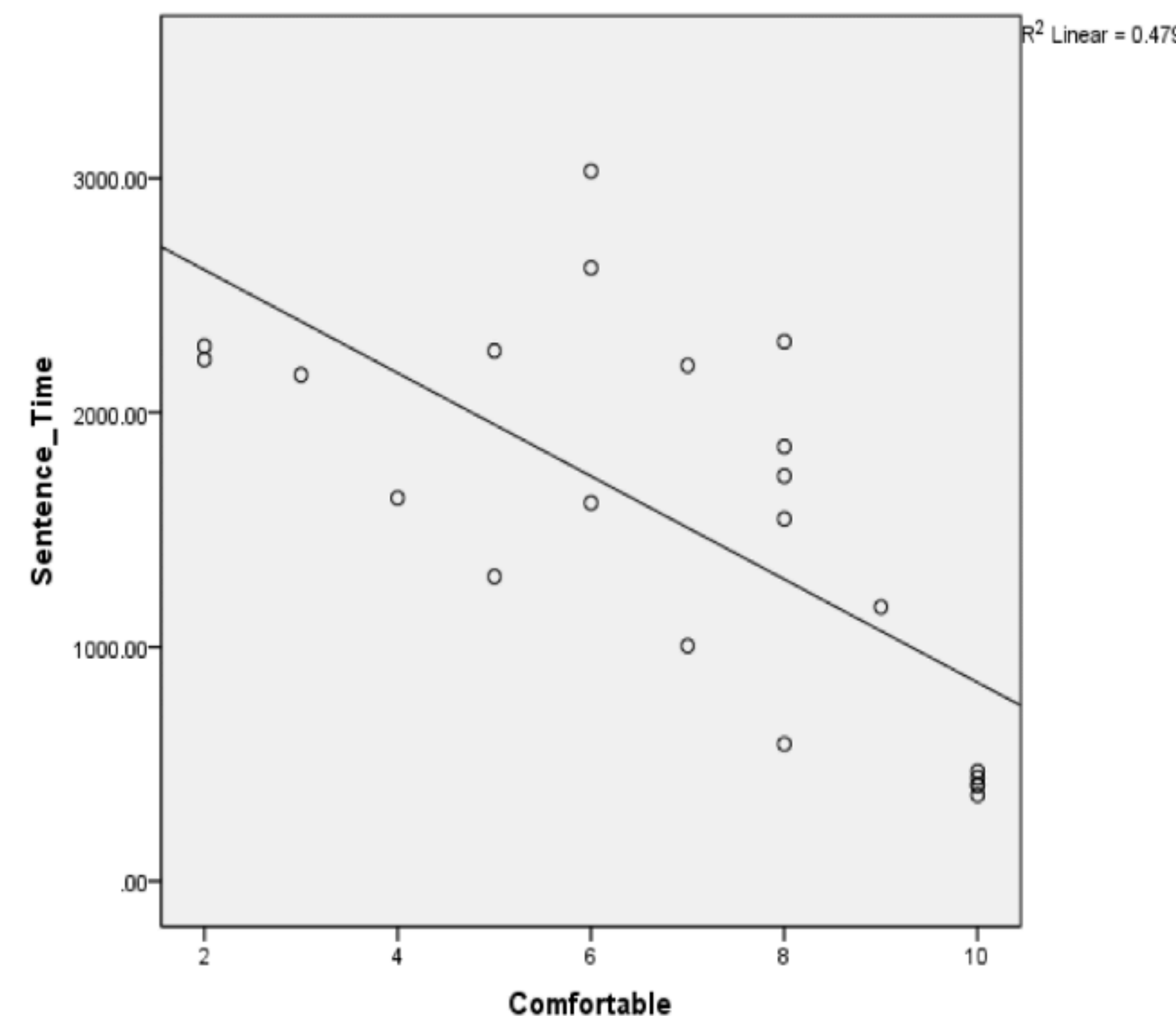
### 02: Stimuli/Masks

Each target word will consist of a unique 3 letter consonant root and will then be manipulated using 3 different previews: identical, 1st letter root segment change (RSC), and 3rd letter root segment change (RSC).

### 03: Apparatus

Gaze duration and pupil movements were tracked using an in lab eye tracker.

## Results



FFD				
Subject	Preview	Mean	N	Std. Deviation
1	Identical	360	7	198.5212
	First Root	280.1429	7	150.39329
	2	349.2857	7	180.69377
	Total	329.8095	21	172.39159
2	Identical	622.5556	9	558.30662
	First Root	271.125	8	99.541
	2	536.9167	12	460.99605
	Total	490.1724	29	441.93172
3	Identical	746.625	16	396.78405
	First Root	890.2222	9	489.81445
	2	871.3571	14	368.39122
	Total	824.5385	39	404.31266
4	Identical	280.8125	16	100.57715
	First Root	232.3333	15	70.76386
	2	292.1333	15	79.09927
	Total	268.6957	46	86.90451
5	Identical	593.5	12	301.68692
	First Root	672.875	8	682.08639
	2	622.0769	13	618.16644
	Total	624	33	526.59686

## Discussion

### Individual Differences:

Our study revealed a strong linear relationship between language proficiency and reading behaviors, particularly comfortability, among Arabic nonnative or heritage speakers. Comfortability, reflecting motivation, anxiety, and self-confidence, emerged as a more influential predictor of reading times than proficiency scores alone. Psychological factors like anxiety and self-doubt significantly impact language learning outcomes, highlighting the importance of subjective measures in predicting reading performance.

### Gaze Duration:

Analysis of gaze behavior using the invisible boundary paradigm with this population yielded inconclusive results in first fixation duration. The paradigm's limitations became apparent, suggesting a need for tailored methodologies to capture nuanced gaze behaviors in Arabic nonnative or heritage speakers. Future research should refine measurement techniques to better understand language processing in this diverse proficiency group.

### Further Limitations:

The study faced challenges due to a smaller-than-expected sample size (22 participants) and the diversity of participant backgrounds. The use of Modern Standard Arabic (MSA) as reading material posed additional difficulties, given participants' familiarity with regional dialects. To improve future studies, efforts should focus on standardizing participant pools with similar linguistic backgrounds and dialect familiarity for more controlled and meaningful research outcomes.

## Conclusion

Findings underscore the critical role of subjective factors like motivation and self-confidence in language processing, highlighting the need for future research with larger, standardized participant pools to advance our understanding of linguistic processing among diverse Arabic-speaking populations and inform tailored language interventions.