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# Attrition Effects in Mandarin-English Bilinguals of Varying Proficiency

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# Attrition Effects in Mandarin-English Bilinguals of Varying Proficiency

Sarah Elkinton, Jared Forman, Diana Yuen, Carolyn Quam, Ph.D.



## Previous Study and Background

Current research suggests that language systems in bilinguals are dynamic, constantly shifting how individuals store and access their languages. What are the implications then for an individual who speaks a tonal first language and a non-tonal second language? Experiment 1 is a replication of previous research (Quam and Creel, 2017) that found that English dominance was correlated with reduced tone processing speed and accuracy, even when Mandarin had been learned from birth. Experiment 2 builds on Experiment 1 and is designed to test two mutually exclusive explanations for the previous findings:

1. There is something unique about tone that makes it more prone to attrition effects.
2. Consistent use of English vowel categories reinforces the particular Mandarin vowel categories that were used in the 2017 study.

## Study Design and Participants

We have tested 58 participants in Experiment 1 (a replication of Quam & Creel, 2017) and 20 participants in Experiment 2 (a study designed to test vowel perception). Both groups consisted of individuals who spoke Mandarin and English with varying degrees of proficiency, as measured by the Multilingual Naming Test (MiNT; Gollan et al., 2012) and the Bilingual Dominance Scale (BDS; Dunn and Fox Tree, 2009).

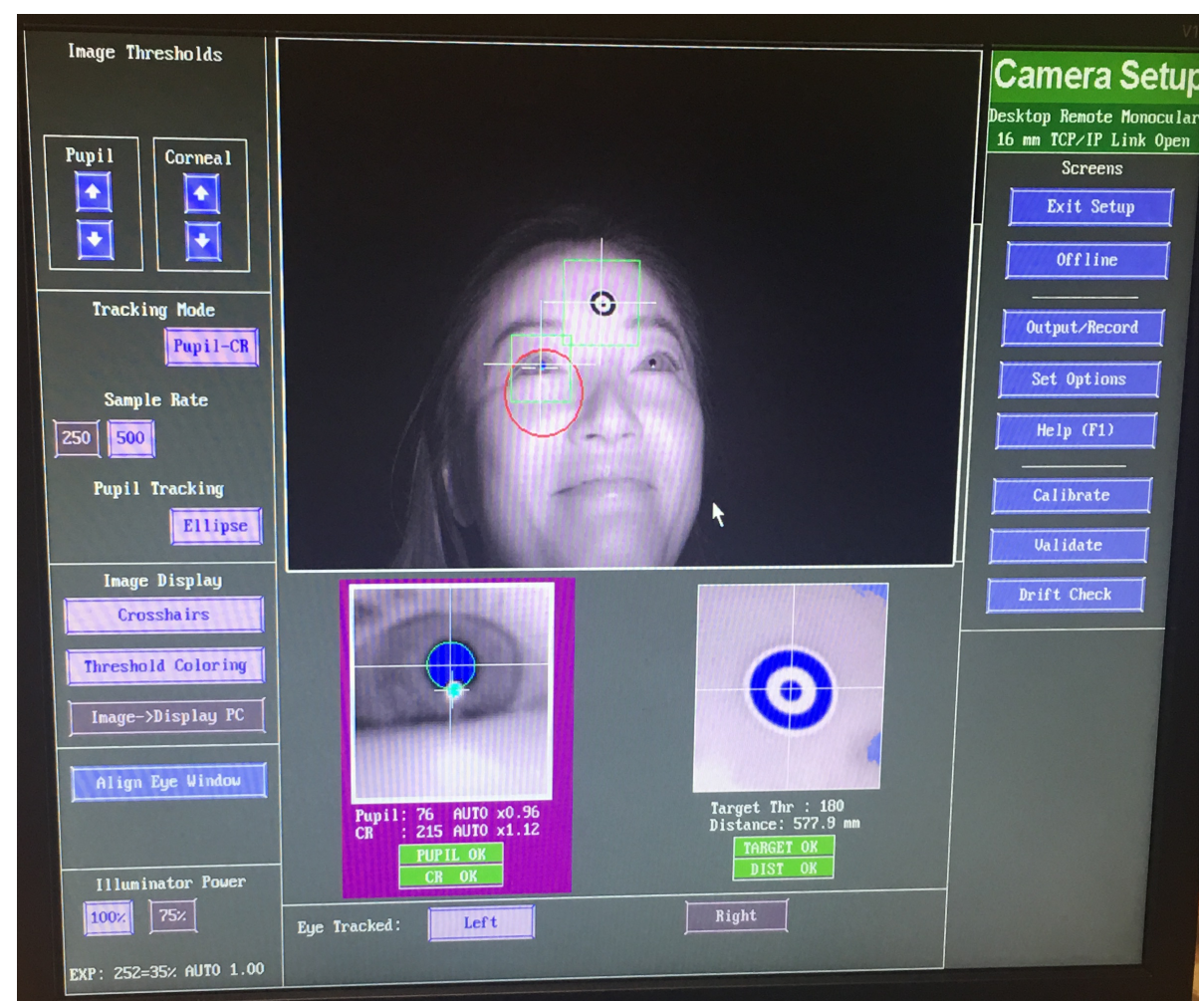
Measures of bilingual language experience:

	Experiment 1	Experiment 2
<b>MiNT dominance</b>		
<b>Mean (SD)</b>	-1.85 (16.36)	10.65 (7.03)
<b>Range</b>	-39 - 27	0 - 26
<b>BDS dominance</b>		
<b>Mean (SD)</b>	-4.78 (12.05)	18.10 (9.32)
<b>Range</b>	-28 - 16	1- 36

Dominance scores are computed by subtracting the English score from the Mandarin score. A positive number indicates Mandarin dominance. A negative number indicates English dominance. The magnitude is indicated by the absolute value.

## Eye-tracking Task

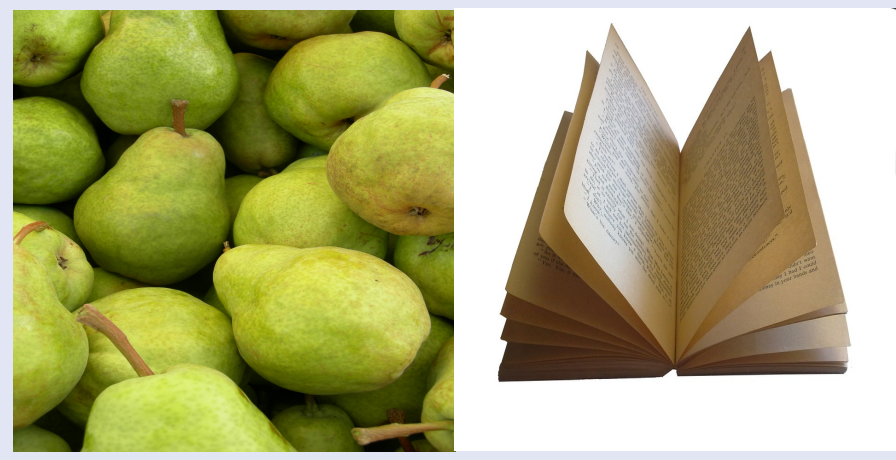
We use an eye-tracked familiar-word recognition test consisting of familiarization and test phases. A computer driven camera tracks where participants are looking (target, competitor or not in either zone). We analyze where participants look for “target fixation”, or looks to the target picture minus looks to the competitor picture.



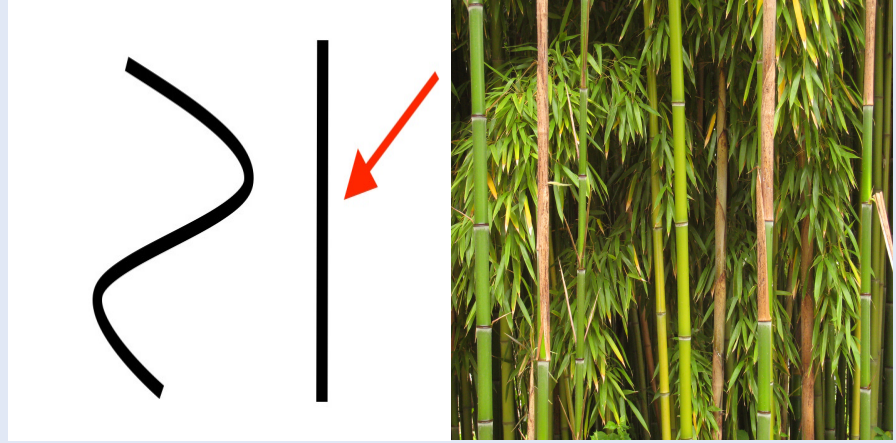
## Trial Types

Stimulus words were presented in trials that differed by tone, vowel or both.

Baseline trials:  
li2 (“pear”) shu1 (“book”)



Vowel trials:  
zhi2 (“straight”) zhu2 (“bamboo”)

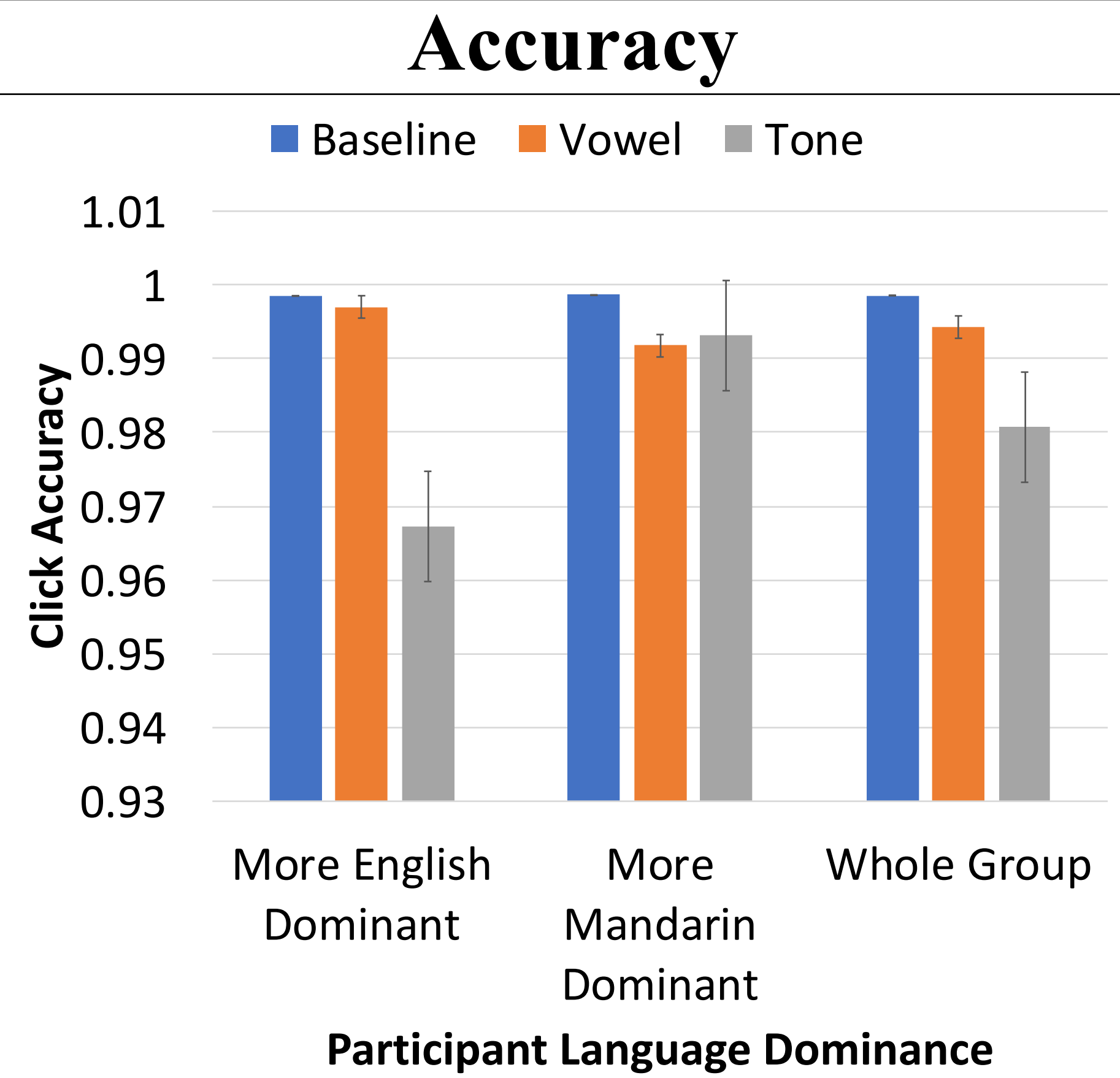
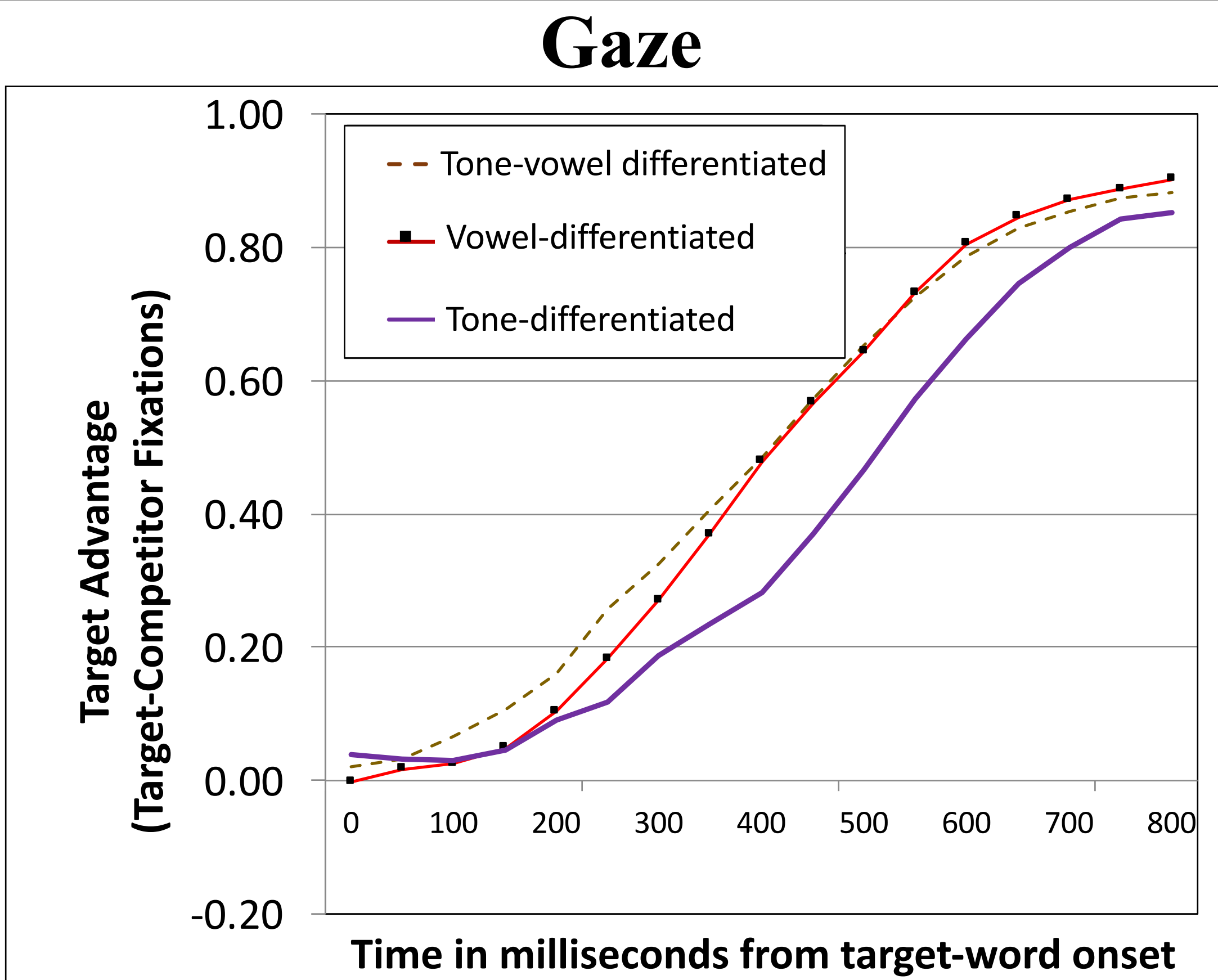


Tone trials:  
he1 (“drink”) he2 (“river”)



## Experiment 1 – Replication Study

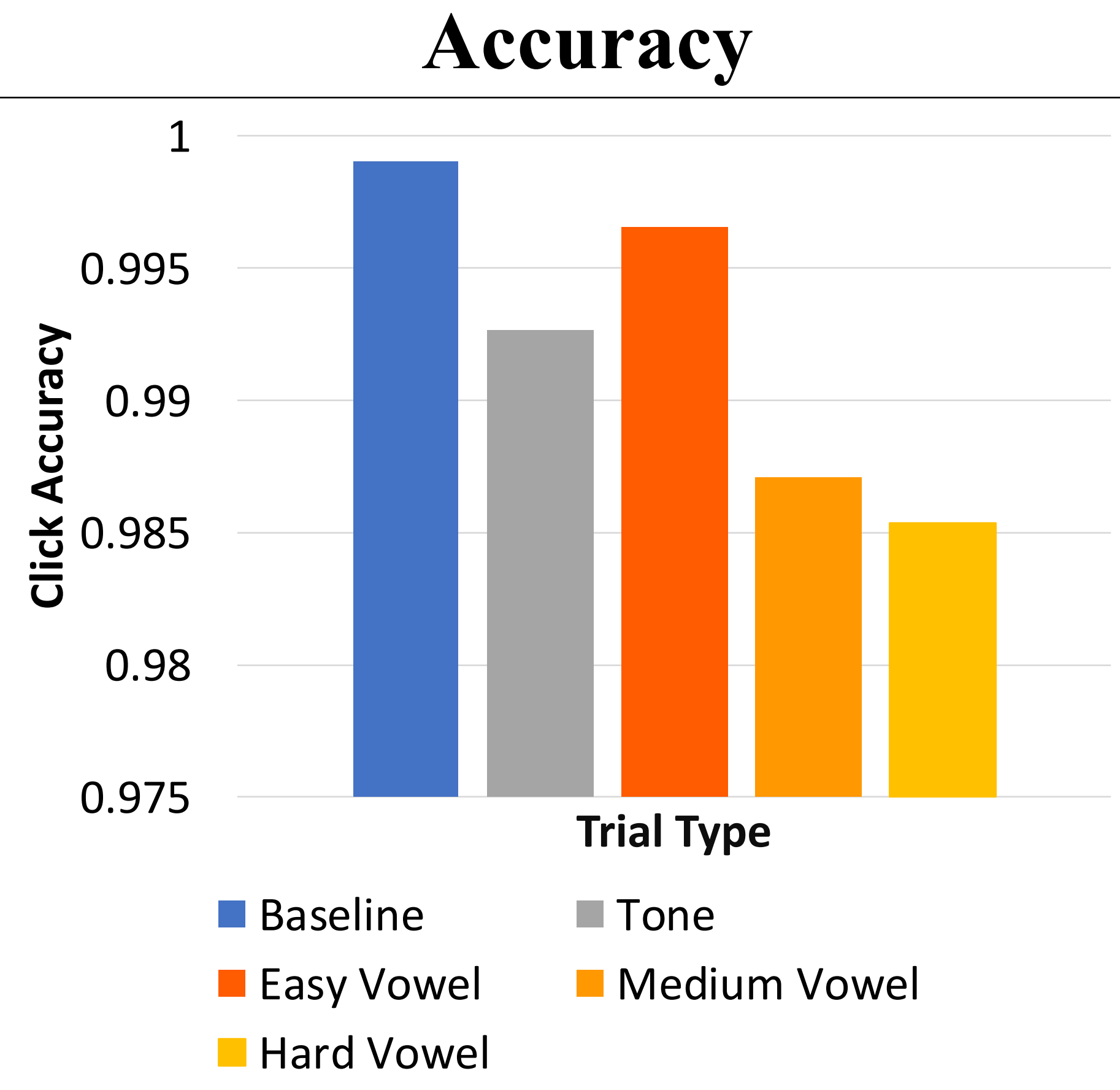
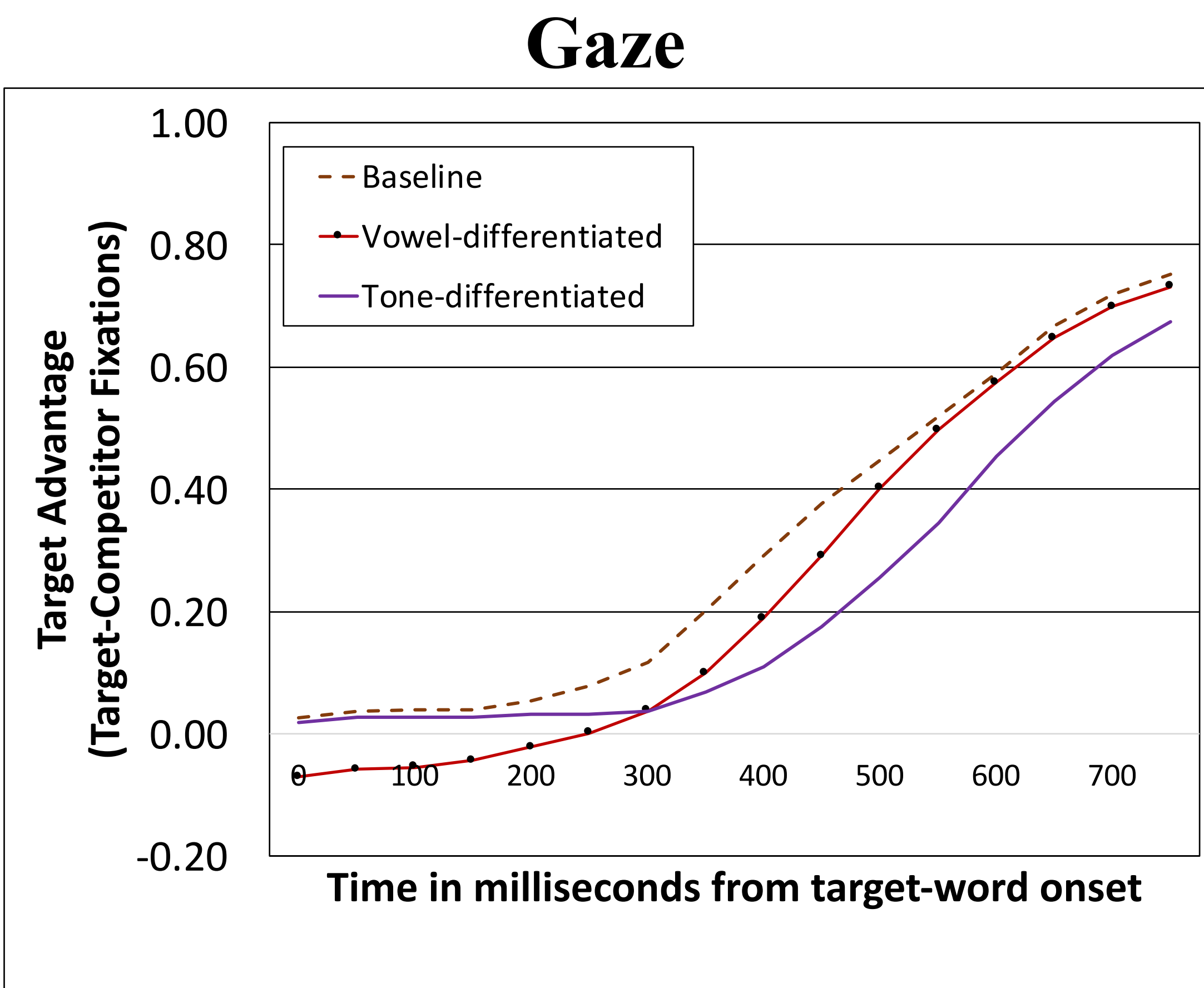
Participants identified the target picture fastest in tone-vowel differentiated trials. Gaze responses were slowest in tone-differentiated trials. These patterns confirmed the findings of Quam and Creel (2017).



Overall accuracy was highest in baseline trials and lowest in tone trials. The single lowest accuracy score among participants was .8571, so participants performed well overall. We replicated the particular impact of language dominance in tone trials (lower tone accuracy for more English dominant participants).

## Experiment 2 – New Study Design

Participants identified the target picture fastest in baseline trials. Gaze responses were slowest in tone-differentiated trials. Patterns look generally similar to Experiment 1.



Overall accuracy was highest in baseline trials and lowest in vowel trials. Within vowel trials, accuracy for easy vowels were significantly higher than medium and hard vowels. Accuracy for medium and hard vowels were not significantly different from each other.

## Discussion

Experiment 1 successfully replicates the findings of Quam and Creel (2017). Tone processing specifically is affected by English dominance.

Experiment 2 currently does not have an English dominant group to compare Mandarin dominant group performance to, but performance is similar to the previous Mandarin dominant group. Continued recruitment efforts will attempt to mirror the language dominance profile of Experiment 1. Looking specifically at Mandarin vowel contrasts that do not occur in English will answer which explanation in Quam and Creel (2017) is most likely.

## References

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## Acknowledgments

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