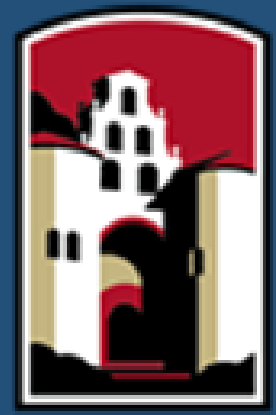


# Differences in Allocation of Attention During Word Learning in School-Aged Monolinguals and Bilinguals

Cristy Sotomayor<sup>1,2</sup>, Alyson D. Abel<sup>1</sup>, & Mandy Maguire<sup>3</sup>

San Diego State University<sup>1</sup>, University of California, San Diego<sup>2</sup>, University of Texas at Dallas<sup>3</sup>



UC San Diego



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## Background

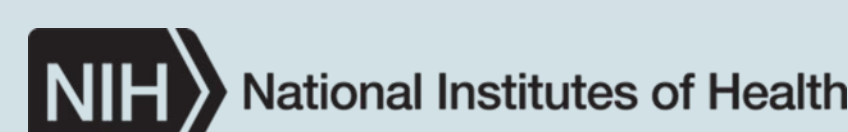
- Bilingual children exhibit differential neural commitment as a function of exposure to their two languages [1]
  - Bilingual children highly adaptive to increased variability of language input
- Bilingualism found to facilitate word-learning in adults [2] and infants [3]
  - Differences in underlying neural mechanisms during word learning
- Attention guides children's word learning [4]
- Gap in literature regarding differences in underlying neural mechanisms associated with attention in word learning between bilingual and monolingual children
- Purpose:** Identify if bilingual and monolingual children differentially engage in attention during word learning using a combination of behavioral and electrophysiological methods

## Research Questions

- Do school-aged bilinguals and monolinguals perform similarly on a word learning task?
- Do school-aged bilinguals and monolinguals exhibit similar levels of neural engagement related to attention during word learning?

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## Method

### Participants

- School-aged children part of larger study
  - 10-14 years of age
- 12 **English/Spanish Bilinguals** (M<sub>age</sub> = 12.50, SD = 1.57)
  - Exposure to both languages prior to 5
  - High language proficiency in both languages
- 11 **English Monolinguals** (M<sub>age</sub> = 11.93, SD = 1.49)
  - No significant exposure in another language
  - High language proficiency
- Typically-developing
- Matched on SES
  - Maternal education used as proxy
- Language proficiency
  - Parent report

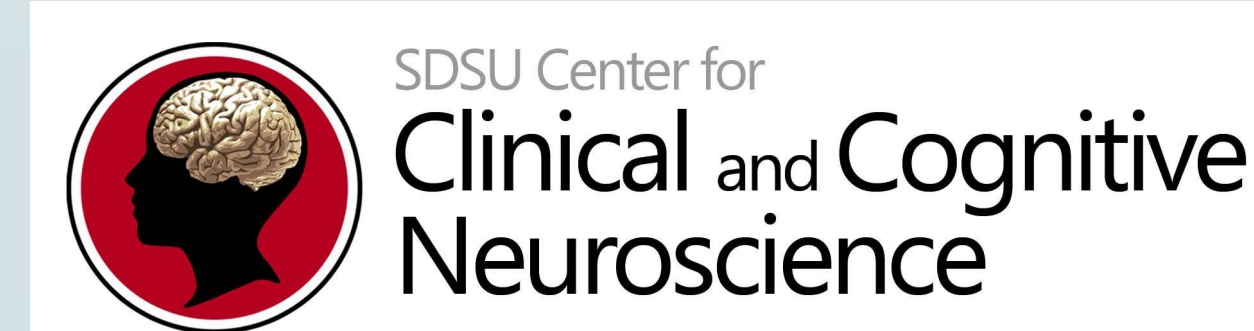
### Word Learning Task

- Participants read groups of 3 sentences introducing each nonsense word
- Sentence triplets supported a meaning of the nonsense word
- 50 total novel words were presented

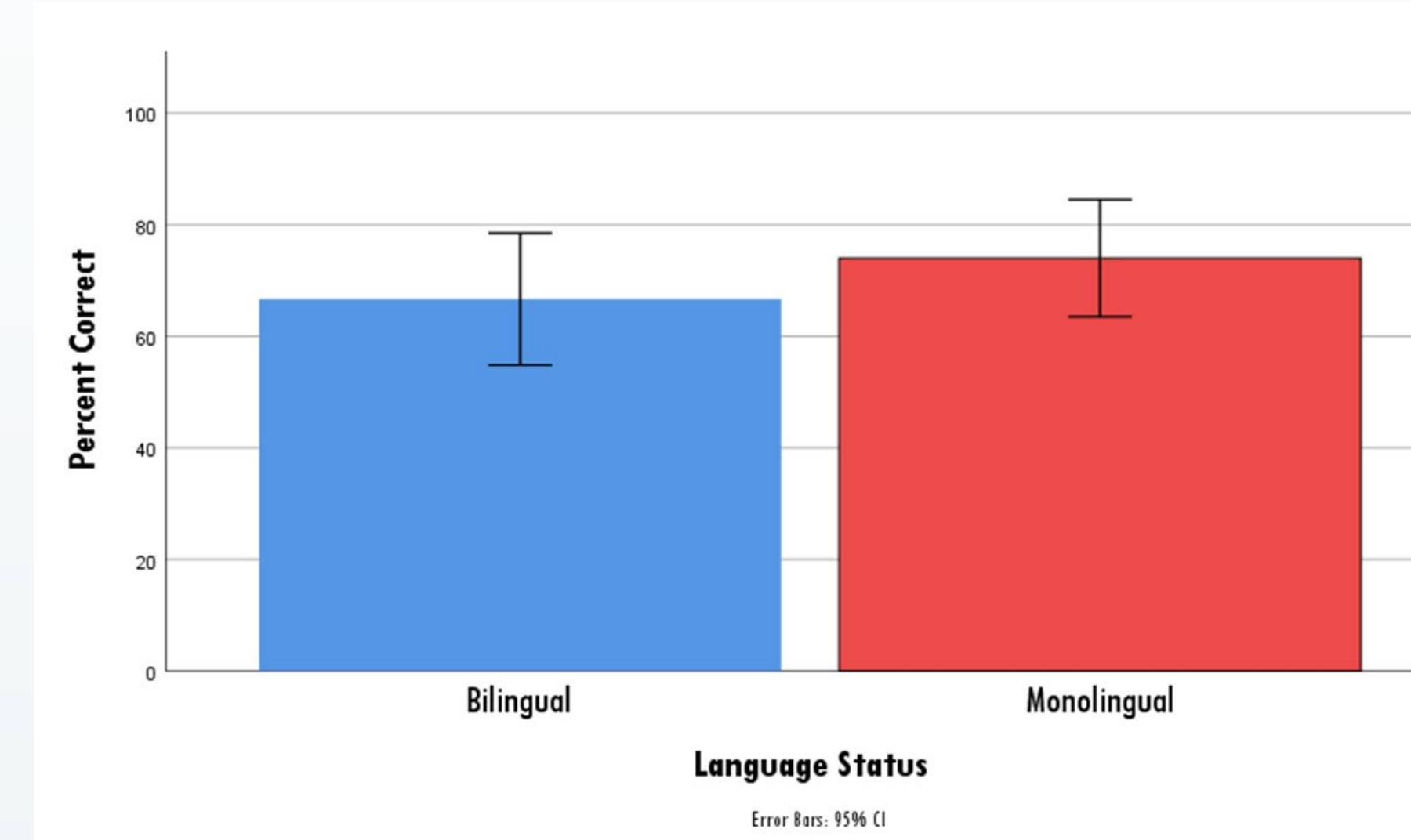
Sentence Order	Example Stimuli of Sentence Triplet
Sentence 1:	The bird pooped on my <i>shap</i> .
Sentence 2:	My brother let me borrow his <i>shap</i> .
Sentence 3:	I like to drive my <i>shap</i> .
Examiner:	What does <i>shap</i> mean?

### Electroencephalography (EEG)

- P200 amplitude [5]
- Widespread frontal and central electrodes
  - FC1, FCZ, FC2, C1, CZ, C2
- Design
  - 2 group (**Bilingual**, **Monolingual**) x 3 sentence (1st, 2nd, 3rd).

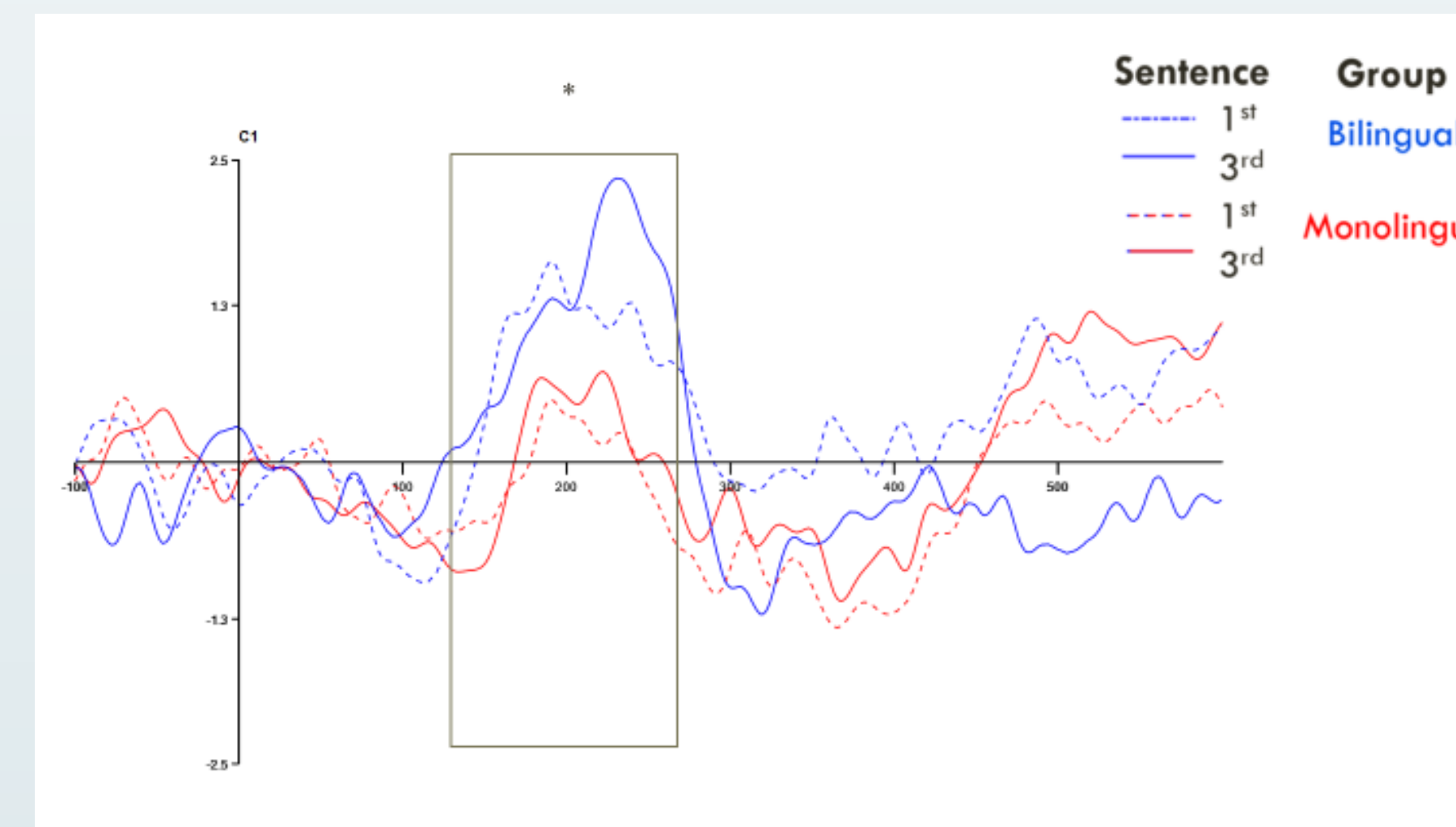


## Behavioral Results



No group difference,  $t(21) = -1.02, p = .320$

## EEG Results



No group x sentence interaction,  $F(2, 63) = 0.037, p = .963$

Significant effects of :

Group,  $F(1, 63) = 165.43, p = .036$   
 Sentence,  $F(2, 63) = 43.17, p = .048$



## Discussion

- School-aged bilinguals and monolinguals performed similarly on word learning task
- Groups show no behavioral differences on word learning task
- School-aged bilinguals and monolinguals exhibited similar levels of neural engagement related to attention during word learning
- Distinct differences in P200 component
  - Attention allocation varies during word learning
  - Bilingual children allocate more attention during word learning
- Findings suggest ERP differences not due to differences in behavioral outcomes
- No cost in accuracy
- No evidence for a word facilitation effect
- Bilingual school-aged children
- Future Directions
- Examination of errors
  - Include greater variation of bilinguals
    - Variation of language proficiencies
    - Typically developing and atypically developing

## Conclusion

Bilingual children allocate more attention to word learning than monolingual children with commensurate behavioral outcomes

Language experience associated with differential engagement of neural mechanisms during vocabulary acquisition

## References

- Garcia-Sierra, A., Rivera-Gaxiola, M., Percaccio, C. R., Conboy, B. T., Romo, H., Klarman, L., ... & Kuhl, P. K. (2011). Bilingual language learning: An ERP study relating early brain responses to speech, language input, and later word production. *Journal of Phonetics*, 39, 546-557.
- Kaushanskaya, M., & Marian, V. (2009). The bilingual advantage in novel word learning. *Psychonomic Bulletin & Review*, 16, 705-710.
- Singh, L., Fu, C. S., Tay, Z. W., & Golinkoff, R. M. (2018). Novel word learning in bilingual and monolingual infants: evidence for a bilingual advantage. *Child development*, 89, e183-e198.
- Samuelson, L. K., & Smith, L. B. (1998). Memory and attention make smart word learning: An alternative account of Akhtar, Carpenter, and Tomasello. *Child Development*, 69, 94-104.
- Astheimer, L. B., Berkes, M., & Bialystok, E. (2016). Differential allocation of attention during speech perception in monolingual and bilingual listeners. *Language, Cognition and Neuroscience*, 31, 196-205.