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

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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

(1) Do school-aged bilinguals and monolinguals perform similarly on a word learning task?

(2) Do school-aged bilinguals and monolinguals exhibit similar levels of neural engagement related to attention during word learning?

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NIH National Institutes of Health

Method

Participants

- School-aged children part of larger study
  - 10-14 years of age
- 12 English/Spanish Bilinguals (M_{age} = 12.50, SD = 1.57)
  - Exposure to both languages prior to 5
  - High language proficiency in both languages
- 11 English Monolinguals (M_{age} = 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

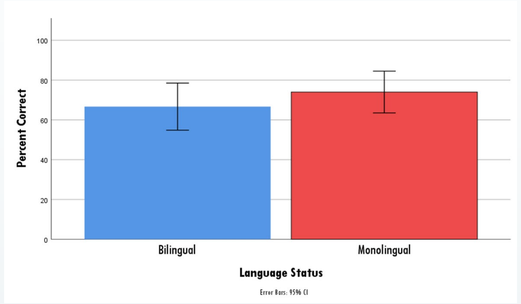
Sentence Order	Example Stimuli of Sentence Triplet
Sentence 1:	The bird pooped on my ***shap.***
Sentence 2:	My brother let me borrow his ***shap***.
Sentence 3:	I like to drive my ***shap.***
Examiner:	What does ***shap*** mean?

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).

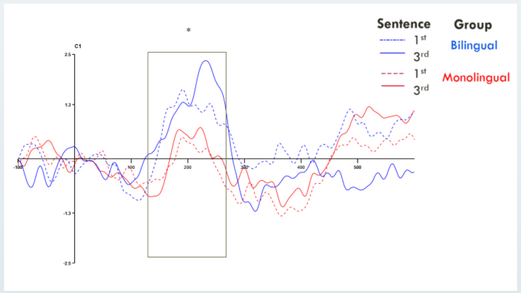
SDSU Center for Clinical and Cognitive Neuroscience

Behavioral Results



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

EEG Results

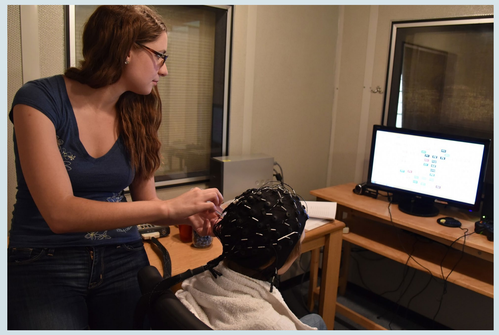


No group x sentence interaction, F(2, 63)=0.037, p=.963

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 leaning
- 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

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