

## BACKGROUND

Around 3rd grade, children shift from learning new words via explicit teaching to learning from context. In this case, the child has only linguistic information to find the boundaries of a new concept and attach a label to that concept. As such, it is an incremental process <sup>(1)</sup> that is difficult to assess using traditional behavioral measures. Previous work has used ERPs to study this process in adults, but to date it has not been applied to children.

This study uses ERPs to examine the online process of learning from context in 13-14-year olds, an age at which learning from context accounts for a large portion of vocabulary growth <sup>(1,2)</sup>.

## RESEARCH QUESTIONS

### Behavioral question

Do adolescents differ from adults when learning new words from context?

### EEG questions

1. Does the N400 attenuate with exposure to novel words in **meaning-supportive contexts**? If so, how does the N400 amplitude compare to that of known words?
2. Does the N400 attenuation for **meaning-supportive contexts** differ from the N400 changes related to **non-meaning-supportive contexts**?
3. How do children compare to adults on research questions 1 and 2?

## PARTICIPANTS AND EQUIPMENT

### Participants

All right-handed, monolingual English speakers

Children

*N* = 7, 3 males

Age:

*M* = 14;1, *SD* = 5 months; *Range* = 13;6-14;9

Adults

*N* = 7, 1 male

College students

### EEG equipment

Neuroscan 62-electrode cap EEG system

## METHODS AND STIMULI

### Experimental task

Learning from context task (based on Mestres-Misse et al., 2007)

126 sentence triplets, each sentence presented word-by-word

Target word (novel word or real word) appeared in sentence-final position

Contexts	Example sentence triplet (target word in <i>italics</i> )	Behavioral assessment
<b>Meaning-supportive</b>	Her parents bought her a <i>chut</i> . The sick child spent the day in his <i>chut</i> . Mom piled the pillows on the <i>chut</i> .	Identify the real word represented by the novel word
<b>Non-meaning-supportive</b>	His favorite toy of all time is the <i>vik</i> . He had a lot of food on his <i>vik</i> . Before bed, I have to take a <i>vik</i> .	Identify the real word represented by the novel word
<b>Control</b>	Before coming inside, please wipe off your <i>shoes</i> . If you go outside, put on your <i>shoes</i> . The child learned how to tie his <i>shoes</i> .	Provide a synonym for the real word

## RESULTS

### Behavioral results

Mean (SD) percent correct identification of target word in **meaning-supportive context**

Adolescents	78.9% (15.0)	Adults	73.5% (14.2)
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### EEG results

**Meaning-supportive context:** Both children and adults show significant N400 decreases between 1<sup>st</sup> (in red) and the 3<sup>rd</sup> presentation (in blue), all *p* < 0.02.

**Non-meaning supportive context:** No significant differences between exposures.

Figure 1. **Meaning-supportive** and control contexts

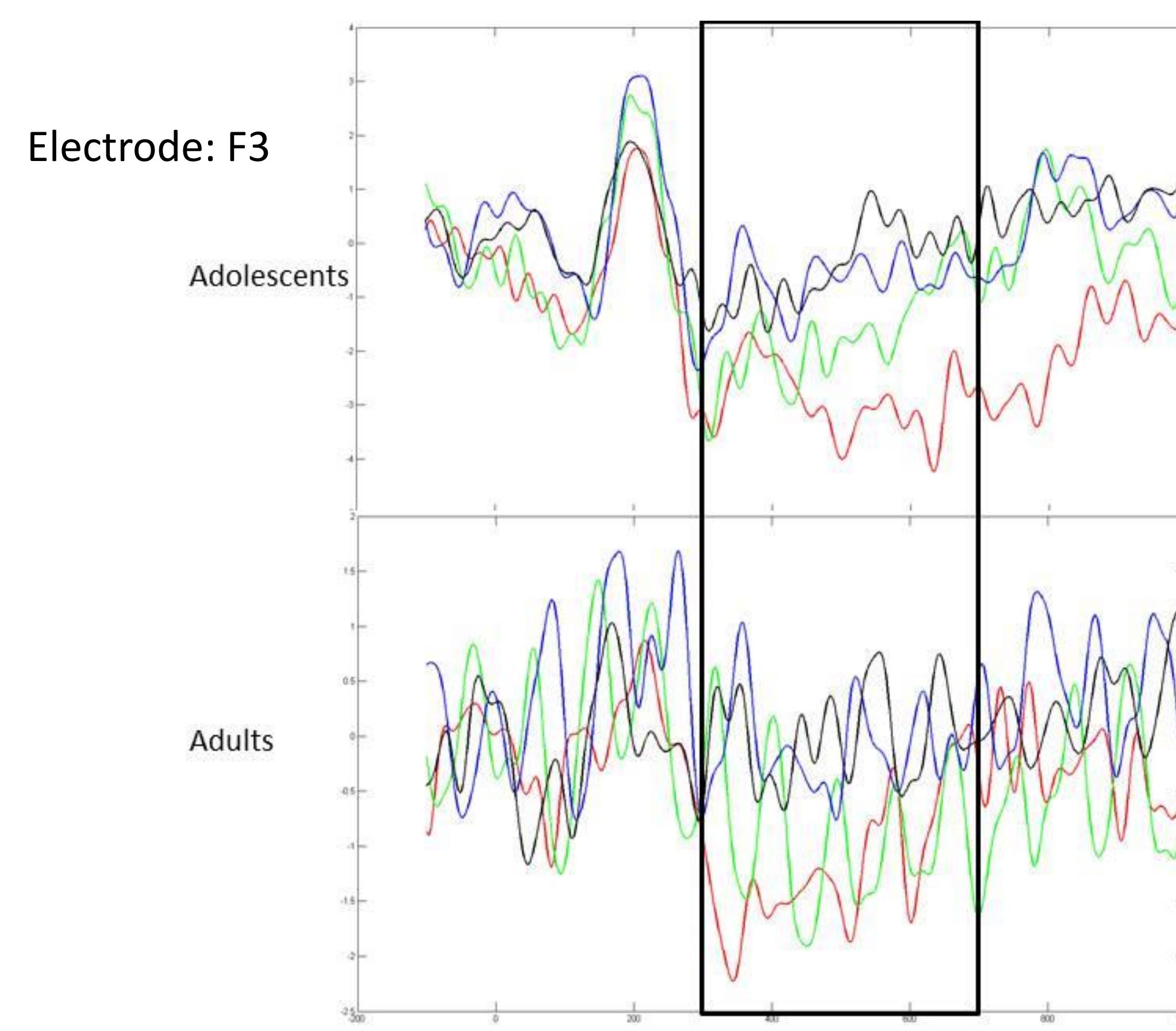
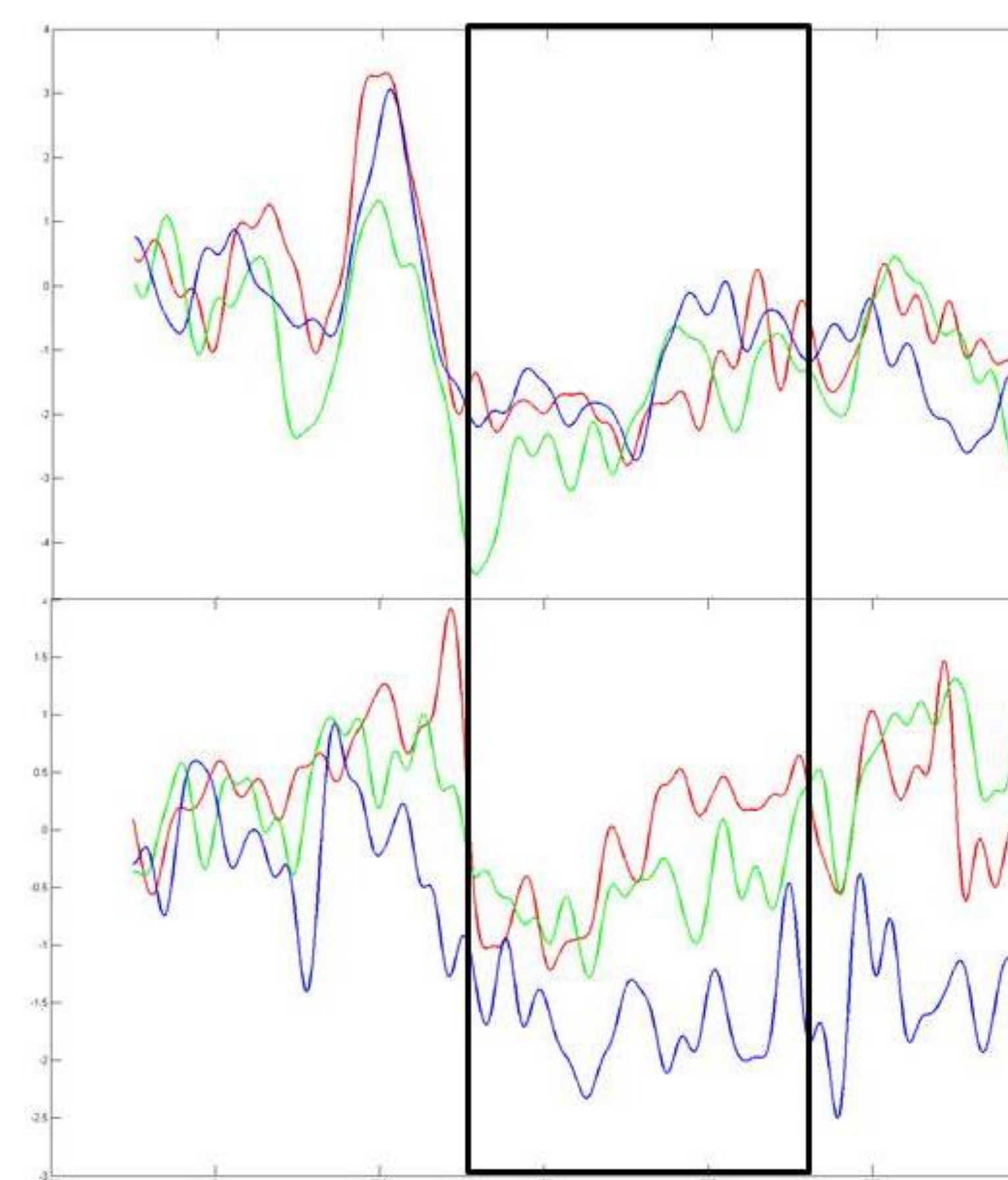


Figure 2. **Non-meaning supportive context**



First presentation Second presentation Third presentation Real word

## FINDINGS

### Behavioral findings

Children and adults did not differ in accuracy and both showed surprisingly poor performance.

### EEG findings

1. The N400 amplitude attenuated with exposure in the meaning-supportive context such that the amplitude for the last presentation was similar to the real word.
2. The N400 amplitude did not attenuate in the non-meaning-supportive context.
3. Children and adults showed essentially the same pattern.

## CONCLUSIONS

- By 13-14 years of age, children perform like adults when learning from context (around 75%). This is surprisingly low, but indicates how challenging the task is.
- There is a clear attenuation of the N400 in meaning-supportive contexts in both groups that is not found with just exposure to the word without meaning support.
- These findings indicate strong neurological support for word learning despite relatively poor behavioral performance.
- This study can provide a basis to better understand the development of word learning and problems in word learning for children with language delays.

## REFERENCES

1. Nagy, W. E., Herman, P.A. & Anderson, R. C. (1985). Learning words from context. *Reading Research Quarterly*, 20, 233-253
2. Nagy, W. E., Anderson, R. C. & Herman, P. A. (1987). Learning word meanings from context during normal reading. *American Educational Research Journal*, 24, 237-270.
3. Mestres-Misse, A., Rodriguez-Fornells, A., & Munte, T. (2007). Watching the brain during meaning acquisition. *Cerebral Cortex*, 17, 1858-1866.