

# Word learning in different age groups: Does emotional prosody have an effect on fast mapping?

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## Introduction

To learn a new word requires the ability to map a novel word onto a novel referent. Between 12 and 14 month, children start to accomplish this process after a few presentations. Around the age of 18 months, children use this faculty to enlarge their lexicon up to 10 words per day (vocabulary spurt).

To date, no study has answered the question to which extent emotional factors support fast mapping and whether it varies during early development (e.g., Doan, 2009).

In the present study, we aim to answer the following questions using event related potentials (ERP) and a behavioural task:

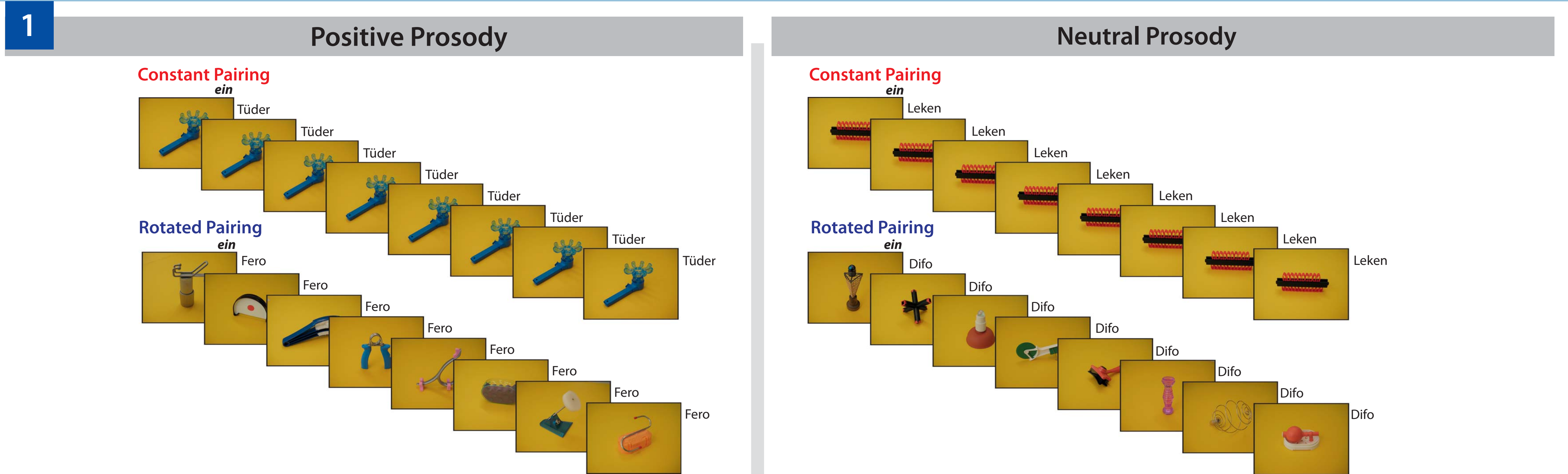
1. Does fast mapping benefit from affective prosody?
2. Do the neurophysiological correlates of word learning differ between words presented with either neutral or positive affective prosody?

## Methods

During the ERP training phase 14- and 26-month-olds were repeatedly presented with pairs of 32 novel objects and 32 novel words. Half the stimuli occurred in a **constant pairing condition**, in which object-word mappings can be learned, and half occurred in a **rotated pairing condition**, in which the mappings cannot be learned (Figure 1).

In both conditions, half the words were spoken with emotionally positive and half with neutral intonation. Each stimulus was repeated eight times.

The training phase was followed by a **test phase** to evaluate word learning at the behavioural level. Children were shown four previously presented objects, which were selected from the same prosodic condition (two from the rotated condition, one from the constant condition, and the target object) and they had to choose one by name.



## Results & Discussion

The ERP results show different patterns for neutral and positive spoken words:

**Neutral condition:** a long lasting parietal negativity, which decreases during the 5th to 8th presentation (N400 priming effect) in both age groups (Figure 2a, 3a).

**Positive condition:** a fronto-central negativity (200-500ms) in 26-month-olds (Figure 3b).

The behavioural results show no differences between the learning of neutrally and positively spoken words for both age groups. Independent of the emotional prosody, 26-month-olds chose the target object significantly more often than any other object (Figure 5). In contrast, 14-month-olds show no learning effects. They identified the target object as often as the distractors in both emotional conditions (Figure 4).

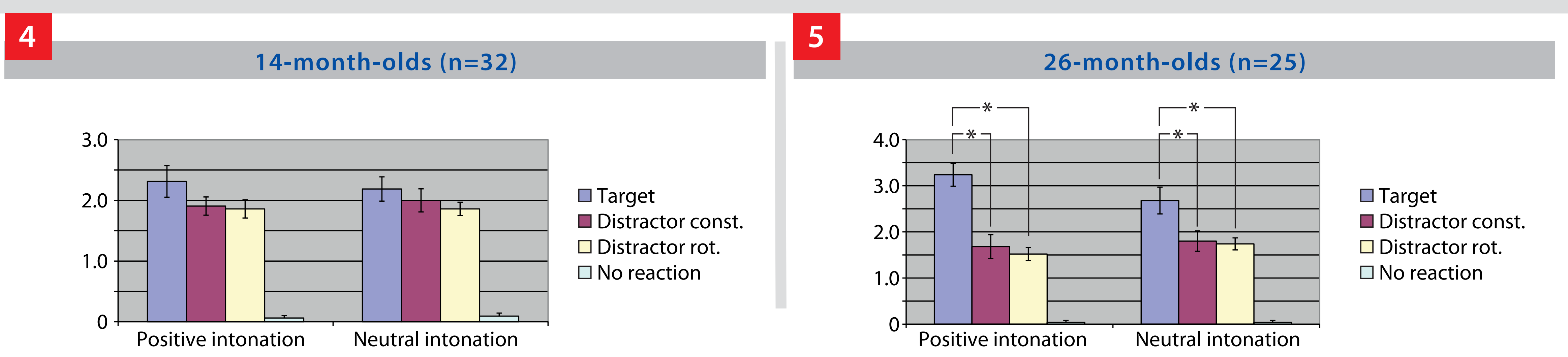
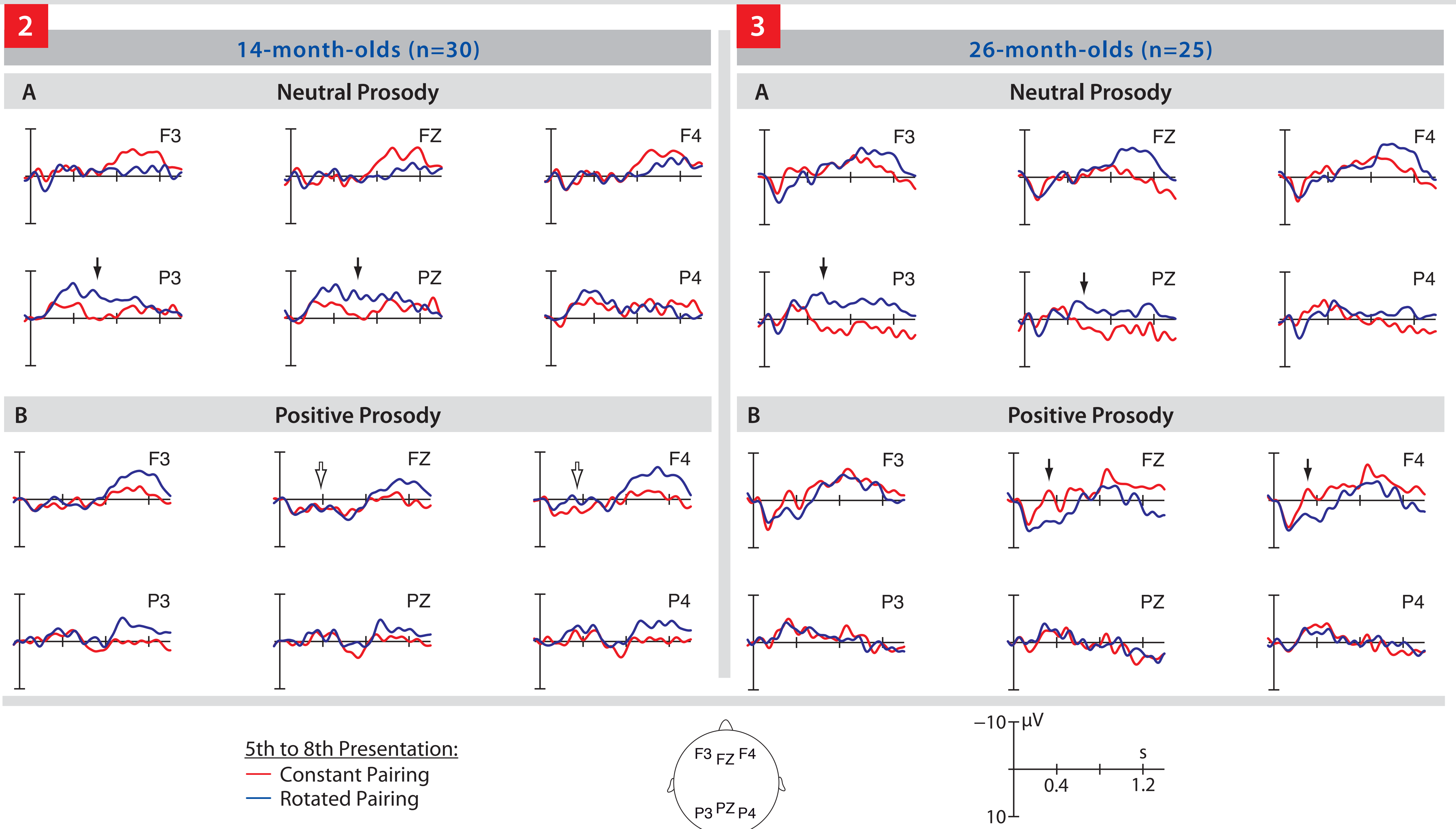
In view of these findings two ERP-learning-effects seem to emerge:

**N400 priming effect:** Indexes that toddlers' expectation of a word meaning facilitates semantic processing of a word shortly after initial learning (Friedrich & Friederici, 2008). This effect is present independent of toddlers' behaviour.

**Fronto-central negativity:** Indexes learning effects for words with positive intonation. This effect is present only in 26-month-olds and is in accordance with the toddlers' behaviour.

## Conclusion

Both age groups show neurophysiological correlates of lexical-semantic processing. However, only in 26-month-olds, this is reflected also in the behavioural results. Additionally, it seems that the N400-priming effect represents a default processing for neutrally spoken words, whereas the fronto-central negativity is dependent on emotionality and thereby in accordance with behaviour.



## References

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- Friedrich, M. & Friederici, A.D. (2008). Neurophysiological correlates of online word learning in 14-month-old infants. *NeuroReport*, 19 (18) 1757-1761.