The Role of Mother-Infant Emotional Synchrony in Speech Processing in 9-month-old Infants

Monica Vanoncini[1,2], Natalie Boll-Avetisyan[1], Birgit Elsner[1], Stefanie Höhl[2], Ezgi Kayhan[1,3]

[1] University of Potsdam, Germany, [2] University of Vienna, Austria, [3] MPI for Human Cognitive and Brain Sciences, Leipzig, Germany

INTRODUCTION

Rhythmicity characterizes both early interactions and spoken language

- **Mother-infant interactions** are characterized by regular and recurring cycles of behavior and affective expressions
- These rhythmic patterns might elicit interpersonal synchrony, such as the matching of emotional expressions (Feldman et al., 2011)
- Infants make use of speech rhythms to **segment words from fluent speech** (Jusczyk et al., 1999)
- Word segmentation is an early marker of language development (Junge et al., 2012)

Research Question

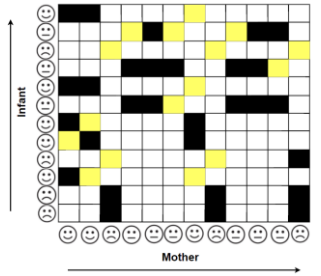
Does emotional synchrony between mothers and their 9-month-old infants correlate with infant's word segmentation ability at the same age? If so, how?

We **hypothesized** that higher levels of emotional synchrony are linked with better word segmentation.

METHOD

Participants: 9-month-old infants (*N*=26, 46% female) and their German-speaking mothers

Emotional synchrony measured in a 5-minutes free play interaction
It is defined as the time in which the dyad showed the same emotional expression (i.e., positive, neutral, or negative)
ENTR: degree of unpredictability characterizing the dyadic system



Word segmentation tested with eye-tracking

1. Familiarization: 2 test passages (6 sentences) repeated twice containing target words (based on Bartels et al., 2009)
   - Balken (*beam*), Kurbel (*crank*) or Pinsel (*brush*), Felsen (*rock*)
2. Test: 12 word lists (each containing a familiar or novel word repeated 30 times) -> we measured Looking Time (LT)

RESULTS

Mothers and infants spent on average 64% of the codable interaction time in emotional synchrony. ENTR ranged from 3.80 to 5.35 (*M*= 4.81; *SD*=0.38)

log(LT) ~ Trial type * ENTR + (1|Participant)

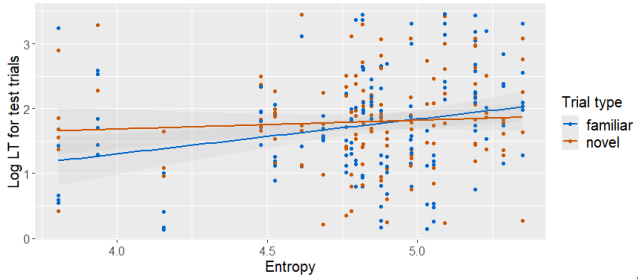
$\chi 2$ (2) = 7.123, *p*= .02

ENTR predicted LTs (β = 0.563; *p* = .01)

- higher entropy during interaction was associated with longer LT for test trials

ENTR interacted with trial type (β = -0.449; *p* < .05)

- the lower the entropy during interaction, the longer infants looked during presentation of novel compared to familiar words at test
  -> successful word segmentation



DISCUSSION

1. The association between emotional synchrony and word segmentation suggests that **rhythmicity**, as a common feature, **may be the linking element** in the often documented association of emotion exchanges and spoken language (e.g., Nicely et al., 1999)
2. The direction of the association is in line with previous studies on language development suggesting that **language acquisition benefits from low entropy conditions** (Lavi-Rotbain & Arnon, 2019)

Take-away

Caregiver-infant interactions characterized by predictable dynamics may help infants to detect rhythms in social exchanges as well as in the spoken language.

CONTACT AUTHOR

Monica Vanoncini: vanoncini@uni-potsdam.de

@MonicaVanoncini

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