Variability in caregiver productions and turn-timing in 1-to-2-year-olds

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Infant-directed speech has been shown to have shorter utterances, higher and more variable pitch (Fernald et al., 1989) which affects the child's language development (Golinkoff et al., 2015). In this project, we analyse whether caregiver's productions (speech act, prosody) impact turn-timing during joint picture book viewing, a frequent activity between caregivers and young children. Previous research shows longer gap durations in transitions to a child (median of 900-1200ms at 9-12-months (mo) and 500-600ms at 3-6mo and at 18mo) than to the mother (median of 400-600ms, independent of child's age), cf. Hilbrink et al., (2015). A case study showed that non-repeat verbal responses to where- and which-questions took around 1s between 1;4 to 3;5 (Clark & Lindsey, 2015). In an eye-tracking study, 2.5-year-olds anticipated turn-transitions earlier following questions than declaratives, but prosody played no role (Lammertink et al., 2015); in contrast, a flattened intonation reduced anticipation of turn-transitions in 3-year-olds (Keitel & Daum, 2015). Given this discrepancy, we investigate factors that affect the silent gaps during natural interactions, focusing on age, sentence type (interrogative, declarative, imperative, but also labels and tags) and prosody (boundary tones, nuclear tunes, variability in tonal events). We predict that children react more frequently and quickly after interrogatives than other speech acts and after final rises than after falls.

We collected audiovisual recordings of 50 caregiver-child dyads with children between 12 and 24 months. So far, we analyzed 21 dyads (mean age_{child}=19.5 months, SD=3.5). The data was collected during remote testing in the families' homes via iPads. The child sat in front of the tablet and the caregiver described a colorful picture (containing 3 persons and 6 animals) to the child for one minute. Recordings were segmented and categorized into children's utterances (separated by pauses), caregivers' utterances (complete nuclear tunes) as well as silences and (breathing) noises (1554 events). Overlaps were ignored. The caregiver's productions were coded for sentence type (e.g., declarative, label, interrogative, question tag (e.g., *hm?*)) and annotated using GToBI (Grice et al., 2005). Diacritics (* or +) were removed to operationalize tonal variability (Carcassi et al., 2019) for the entire utterance and the final two tones. Caregivers often (n>10) used high-rising *wh*-questions and falling declaratives to children aged ≤18mo and high-rising interrogatives, falling or rising labels, falling affirmations, and low-rising polar questions to children aged >18mo. Since age, sentence type, and prosody are not independent, we modeled responder (caregiver or child) and gap duration separately for syntactic and prosodic factors. We only included cases in which there were more than 4 instances per sentence type or boundary tone in the caregivers' turn. Increasing age positively influenced child (vs. caregiver) response (p=0.04), but not gap durations (p=0.09). Children responded more often after interrogatives than declaratives (p=0.001, Tukey-corrected) or labels (p=0.05). Gap durations were also shorter after interrogatives (580ms) than labels (1050ms, p=0.02). Children responded more often after high rises (H-^H%) than low tunes (L* L-%, p<0.01) and falls (H*L-%, p<0.01). Gap durations were however shorter following low rises (L* H-%/L-H%, av. 490ms) than low tunes (L*L-%, av. 1230ms, p=0.05), see Fig. 1. GToBI boundary tones and global tonal entropy (Carcassi et al., 2019) had no effects.

This suggests that in natural interactions, children react more often and more quickly after interrogatives than labels and more often to high-rises than low tunes/falls. Furthermore, latency was shorter after mid rising tunes. We plan to broaden the sample of caregiver-child dyads and sentence types, and include gestures to determine non-verbal reactions.
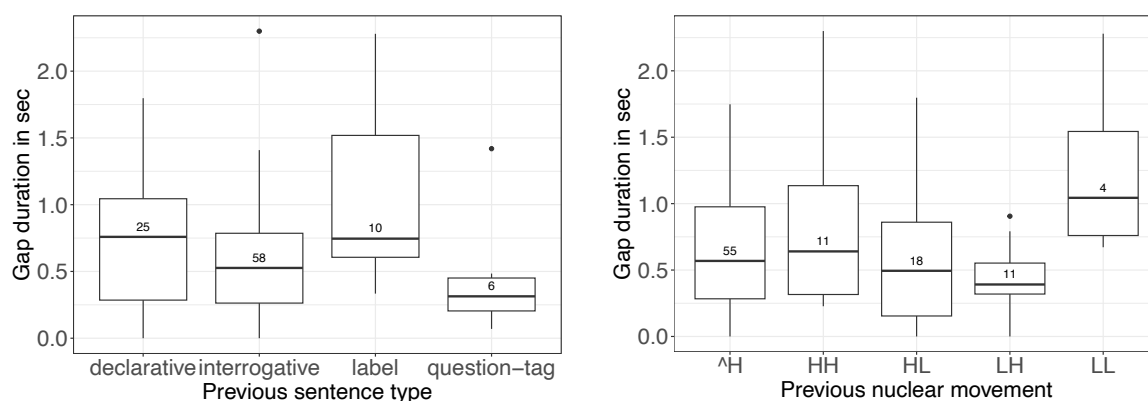
Fig. 1. Gap duration before child response as a function of sentence type and variability in nuclear tune of caregiver's preceding turn (^H indicates a high rise, HH a high-ending nuclear accent followed by a high plateau, HL a high-ending nuclear accent followed by a low edge tone, LH a low-ending accent followed by a high plateau or a low rise, LL a low-ending nuclear accent with a low edge tone). Number of child responses are added above the median.

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