Are you asking me or telling me? Learning to identify questions in early speech to children

Infants seem to react to parents' questions from as early as 18 months old (Shatz 1979 a.o.), but what goes into recognizing a question in parents' speech? First, children can't rely solely on (interrogative) form. For one, the particular makeup of interrogative clauses is language specific. Moreover, while many languages have dedicated clause types for the same three types of speech acts (declaratives as assertions, interrogatives as questions, imperatives as commands/requests; Sadock and Zwicky 1985), this mapping is not inviolable. Zaitsu et al. (2020) report that child-directed speech exhibits a relatively robust association of declaratives with assertions, but the correlation between interrogatives and questions is weaker, because many questions are asked with rising declaratives and many interrogatives are used for indirect requests.

We hypothesize that children can make use of social and pragmatic cues to learn to identify questions. One challenge is that the primary function of questions is to solicit information (Searle 1975), but with pre-linguistic infants, parents cannot be expected to get answers to genuine information-seeking questions. We propose that children learn to identify questions via the expectation that questions are typically used to set up topics (Roberts 2012) and solicit responses (Duncan 1972). To test this hypothesis, we examined questions in infant-directed speech. We found that the role of questions as topic starters is evidenced from the fact that parents use questions more frequently than assertions to direct attention to new objects, and the expectation for a response is evidenced by parents pausing for longer after questions than assertions, and consistently looking at the child more while uttering questions than assertions.

We used data from dyadic interactions between parents and infants 18 months old or younger, sampled from the Providence Corpus (Demuth et al. 2006). In our pilot sample (four sessions from Lily and Alex; 500 turns each session), 59% of parents' questions are pedagogical questions where the answers are known. We further classified parents' utterances into eight social functions; Fig. 1 shows the distribution of speech acts within each social function. Parents tend to use questions to direct the infants' attention to new objects in their surrounding, while assertions are used to teach and express opinions. We examined the turn-changing properties of questions by identifying the consecutive turn sequences (both turns initiated by the same speaker on the same topic) such as (1). Parents are equally likely to ask another question as they are to answer their own questions, but as shown in Fig. 2, parents tend to pause longer after questions (mean $= 1861ms$) than assertions (mean $= 1216ms; t = 2.08, p < 0.05$): parents wait for responses after asking a question but proceed with the conversation after an assertion. Additionally, we coded, on a second-by-second basis, parents' attentional behaviors toward their addressee (the child); Fig. 3 shows the proportion of looks to the child before and after uttering a sentence; when the utterance is a question, the proportion of looks to the child is higher (0.47) than when it is an assertion ($0.39; t = 2.53, p < 0.05$) or a request ($0.35; t = 4.55, p < 0.001$); in the post-utterance region, the proportion of looks to the child is higher when the utterance is a question (0.53) than when it is an assertion ($0.37; t = 4.4, p < 0.05$) or a request ($0.35; t = 13.2, p < 0.001$): parents look at the child for responses. Thus, despite parents asking questions whose answers they know, the characteristic turn-changing properties of questions are observable in speech pauses and speaker attention.

(1) TURN (i). Alex's mother: What is that?   **Consecutive Turn Sequences**
     TURN (ii). Alex's mother: Is that the postman?   from: Alex subcorpus, Session 01;05.12, Providence Corpus

In conclusion, the hypothesized signatures of questionhood, topic-setting and response solicitation, are present in the early speech to children, even though parents' questions to pre-linguistic children are often ones where the speaker knows the answer. As children are extremely sensitive to signals expressing intentions to communicate (Casillas et al. 2017, Csibra 2010), it is likely that they could use these social and pragmatic cues initially to identify questions.
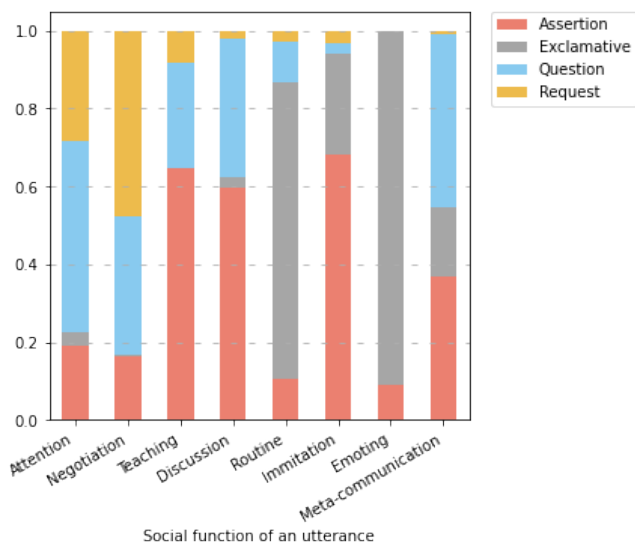

Fig. 1. Proportion of assertions, questions, requests performing each social function
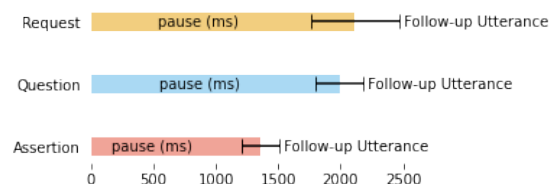

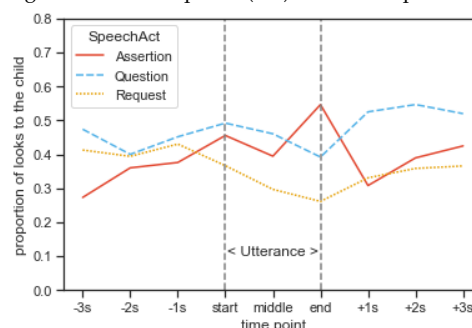Fig. 2. Duration of pause (ms) after each speech act

Fig. 3. Proportion of parents' looks to the child before, during, and after an utterance

Casillas et al. 2017. The development of children's ability to track and predict turn structure in conversation. **Csibra. 2010.** Recognizing communicative intentions in infancy. **Zaitsu et al. 2020.** Clause types and speech acts in speech to children.