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Timing in turn-taking: Children's responses to their parents' questions

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Abstract
In this study we track the development of timing in children's answers to their parents' questions. We find that over the ages of 1;8 to 3;4, children's response timing decreases, converging to adult norms. Overall, their responses are faster to simpler questions (e.g. yes/no questions vs. wh-questions) and when the answer includes information that was stated in the preceding two utterances. Parents, on the other hand, remain relatively stable over this period, showing similar response times to all types of questions their children ask them.

1 Introduction

When adults converse, they observe a convention of 'one speaker at a time' (Sacks et al, 1974; Stivers et al. 2009), and when one speaker's turn ends and another's begins, the transition time is minimized with little resulting overlap in speech (e.g., Levinson 1983).
By contrast, young children are chronically late in turn-taking. This is particularly apparent in triadic conversations where two-year-olds often come in up to two turns too late (e.g., Dunn & Shatz 1989). We hypothesized that it requires considerable practice to retrieve the words and structures needed in planning an appropriate turn, and that children should therefore become faster with age until they match adult timing. We also expected that in responding to questions, children would be able to respond more quickly to simple questions (yes/no) than to more complex ones (wh-).

2 Methods

We analyzed patterns of turn-taking in the recordings of five mother-child pairs from the Providence corpus of the CHILDES database (MacWhinney 2000; Demuth et al., 2006). The five children and their parents were filmed and audio recorded approximately twice per month while performing their daily activities at home from the ages of one to three years of age. Sampling at six evenly-spaced time periods from 1;8 to 3;4, we extracted from the recordings the first 15 questions asked by the child and answered by the mother, and the first 15 questions asked by the mother and answered by the child. Our data constitute a total of 180 question-answer (Q-A) pairs per mother-child group, with 900 Q-A pairs overall.
The duration of silence (or overlap) between the end of the question and the onset of the response was measured from the audio recording using Praat acoustic analysis software (Boersma & Weenink, 2011). Measurements were made by a phonetically trained undergraduate naïve to the purpose of the study.
Each Q-A pair was coded for a range of properties hypothesized to affect response timing, including question length (in clauses and morphemes), question familiarity (has it already been stated, part of a sequence, or part of a routine?), and question complexity (question type, e.g. yes-no, X or Y, wh-, etc.)

3 Results

Our results show that adults' response timing to child questions remains consistent regardless of the child's age[1], while children gradually reduce in the time it takes them to respond to questions (See Figures 1a and 1b). By 3;4, children approach adult Q-A response timing, but their timing is not uniform: they took longer to answer more complex questions, so were slower replying to wh- questions than to yes/no questions ($p<.05$). Within wh-questions, they were slower to answer *who* questions than *what*/*where* (Figures 2a-b). This is consistent with children's order of acquisition for wh-question words (Ervin-Tripp, 1979). These results were confirmed using a linear mixed model for gap duration, with child's age, question type (wh-, yes/no, X or Y), and informational overlap of the answer with the preceding two utterances as fixed effects, and the child as random effect. Both question type and informational overlap in the preceding two utterances were found to be significant predictors of gap duration (t=5.062 and -2.15, respectively), with age coming out marginally significant as well (t=-1.891). This indicates that with age, children's gap durations in responding to their parents' questions shrank, but that the duration of their response was significantly affected overall by the complexity of the question type—wh-

1 If anything, the adults' response times are slightly increasing with time, averaging above norms for adult-adult conversation (Stivers et al., 2009).

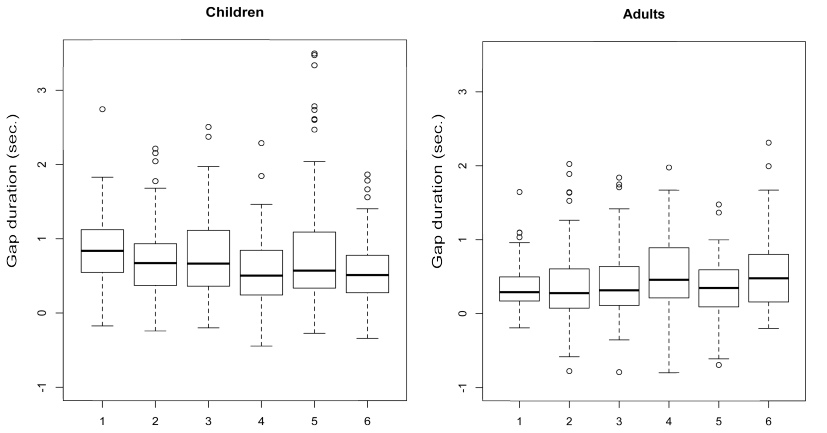

Figure 1: Average gap durations of (a) children and (b) adults at each of the evenly-spaced six time slices from 1;8 to 3;4. Children's responses over time begin to decrease, while adults stay stable, possibly with a slight increase over time.

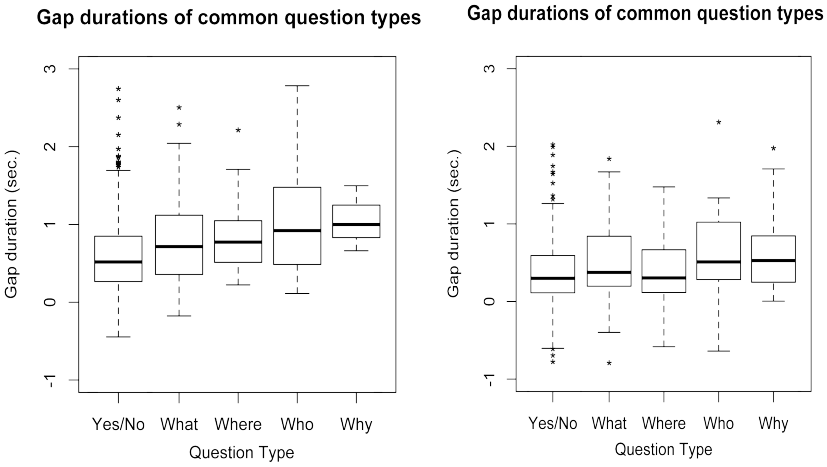

Figure 2: Average gap durations of (a) children and (b) adults for the common question types in our data (tokens >20). Children's responses show differentiation between yes/no and several different wh-question types, while adults do not. When yes/no and wh- types are compared as groups, the difference in timing is significant for children but not for adults.

questions take longer to respond to than yes/no questions—and the informational overlap of the answer—it takes longer to respond when the child has to come up with all new material.

We hypothesize that these findings support the view that children's ability to take turns on time is largely determined by their ability to retrieve the right words for the information that they wish to convey as they plan an utterance for the next turn.

In yes/no questions, and answers in which the relevant information has been recently stated, response access needs are minimized, but in wh-questions, children must find the relevant information outside the actual question itself. Moreover, different wh-forms call for different kinds of information, e.g., what—category label, where—place label, who—person label, etc. Some kinds of answers appear easier to access than others, resulting in variable response timing by question complexity.

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