Children's interpretation of rising vs. falling intonation in declarative clauses

Early work on children's acquisition of prosody (e.g. CS87) suggested a paradox: children displayed adult-like production of prosody but were non-adult-like in their comprehension. Recent work has cast doubt on this paradox by showing that children have adult-like comprehension of various aspects of prosody, such as contrastive focus (Sz18), focus particles (BH12), and intonational contour for quantifier scope disambiguation (Su18). In this talk, we continue this trend by demonstrating preschoolers' adult-like comprehension of prosody in a previously untested phenomenon: using rising vs. falling intonation to distinguish types of speech acts.

Background: When and how do children learn the links between clause type, prosody, and meaning? We are interested in these questions because we suspect that children might use an early understanding of speech act types (e.g. assertion, question, request) to categorize utterances, and then discover syntactic regularities within those categories. This pragmatic bootstrapping might be aided by prosody, if children first notice prosodic regularities within speech act categories and use them to augment the categorization process. Having these categorizations could aid in acquisition of various syntactic properties, including basic word order, argument structure, dependencies, etc.

Consider the following examples based on stimuli from our experiment:

(1) Horsie works at the school. (2) Does Horsie work at the school? (3) Horsie works at the school?

Previous work demonstrates that infants are sensitive to purely formal distinctions among the syntax and prosody of sentences like these. E.g. GM11 demonstrate that 7 month olds can distinguish declaratives with falling intonation like (1) from polar interrogatives with rising intonation like (2) (see also GM15 for declarative syntax vs. polar interrogative syntax with prosody held constant, So10 for falling declaratives like (1) vs. rising declaratives like (3), and Fr14 for assertions vs. polar interrogatives in European Portuguese). However, these results do not speak to infants' understanding of the *link* between clause type, prosody, and semantic/pragmatic meaning.

As a first step in the larger project sketched above, our experiment probes whether English speaking children can use prosodic contour to determine whether an utterance of a declarative clause is meant as an assertion or a question. In other words, we test children's interpretation of falling declaratives as in (1) vs. rising declaratives as in (3).

Experiment: We designed a game task in which children help the experimenter and a forgetful puppet to place 29 animals in 6 workplaces throughout a village. In each trial, the child was handed an animal, and then heard the puppet say something about where that animal works. The puppet's lines were recorded by a female linguist and presented via video on a computer to maintain consistent prosody across participants. During training, the child heard 4 imperatives as in (4), 3 WH interrogatives as in (5), and 3 polar interrogatives as in (2), for 10 training trials total.

(4) Put Horsie in the school.   (5) Where does Horsie work?

When hearing imperatives, the child directly placed the animal in the corresponding location. When hearing interrogatives, the child was taught to check a book that contains information about where each animal works. If the child passed training, they moved on to the test phase which consisted of 8 target trials (4 falling declaratives as in (1) and 4 rising declaratives as in (3)), plus 8 control trials (4 imperatives and 4 polar interrogatives). This made for two target conditions, falling declarative (FD) and rising declarative (RD), and two control conditions, imperative (Imp) and polar interrogative (PQ). In each trial, the puppet made a thinking sound "mmm" before uttering the sentence, so as to ensure the felicity of each sentence type in the context of the game. The dependent variable was whether the participant placed the animal directly or checked the book before placing the animal.

Results for 11 children age 3;6 to 4;6 (mean = 3;11; an additional 5 failed training), and 15 adults can be seen in Figure 1 (data collection is ongoing, target *n* for both groups is 32). An ANOVA with a single four-level factor for clause type revealed that clause type had a significant effect on how frequently the book was checked for both children (F(3, 172) = 68.2, $p < .001$) and adults (F(3, 236) = 290.2, $p < .001$). Post hoc Tukey tests showed significant differences among all pairwise comparisons of clause types ($p < .001$), except for Imp vs. FD for both children and adults. So not only were children and adults more likely to check the book when hearing RDs than FDs, both groups also checked the book more frequently for PQs than RDs.
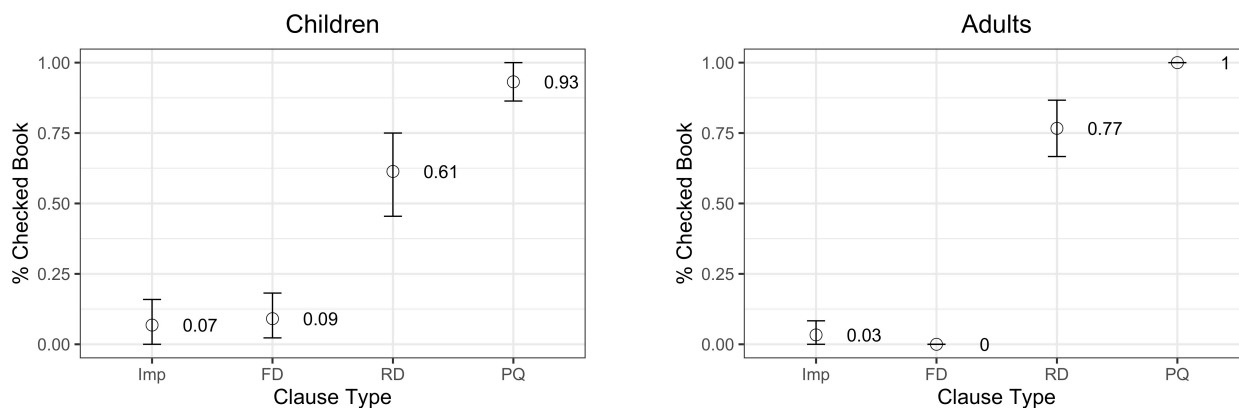

Figure 1: Frequency that children and adults checked the book in each condition

Discussion: These preliminary results suggest that preschoolers are adult-like in their ability to interpret the effect of a polar question-like rising intonation on matrix clauses with declarative syntax. In particular, the stark increase in book-checking for RDs as opposed to FDs shows that, while both children and adults interpret FDs as standard assertions (St78), neither interpret RDs this way. Beyond asserting p, our game contexts might enable FDs to be interpreted as indirect requests to place the animal in the named location. Children are adult-like in this regard.

Given our results, RDs may have been interpreted in three ways: First, RDs are interpreted as self-addressed questions, with the puppet trying to remember whether, e.g., Horsie works at the school. Second, RDs are interpreted as signaling uncertainty about the proposition without asking a question. Neither possibility involves a direct request for information from the participant, thus could explain why children and adults checked the book less frequently for RDs than for participant-addressed PQs. A third possibility is that the declarative syntax of RDs sometimes leads to a standard assertion interpretation, but more often the rising intonation leads to a participant-addressed question interpretation, like PQs. This could also explain the contrasting results for RDs and PQs, however it requires ignoring well-attested discourse restrictions on the use of RDs in English compared to PQs (Gu03), restrictions that the first two options respect. This is possible if children have a non–adult-like understanding of RDs, and perhaps even for adults in the context of the experiment, since they are required to make a binary choice after the puppet's utterance. We plan to tease apart these possibilities in future work by exploring preschoolers' sensitivity to the unique discourse restrictions of RDs. We are also preparing a study that builds on this work by testing infants' comprehension of the link between prosody, clause type, and speech act.

REFERENCES: BH12 **Berger & Höhle**, Restrictions on addition. CS87 **Cutler & Swinney**, Prosody and the development of comprehension. Fr14 **Frota**, Infants' perception of intonation. GM11 **Geffen & Mintz**, Seven-month-olds' Discrimination of Statements and Questions. GM15 **Geffen & Mintz**, Can you believe it?. Gu03 **Gunlogson**, True to form. So10 **Soderstrom et al.**, It's a question?. St78 **Stalnaker**, Assertion. Su18 **Sugawara et al.**, Children Know the Prosody-Semantic/Pragmatic Link. Sz18 **Szendröi et al.**, Acquisition of prosodic focus marking...