

How Should We Use Words like Could? Children's Developing Understanding of Epistemic Modal Verbs

Epistemic modal verbs are a special class of verbs used to express the possibility of events. As listeners, these words are important for calibrating our expectations and actions: if someone tells you that it *might* rain, you will be less likely to grab your raincoat than if you're told that it *should* or *will* rain. Using others' modal expressions to inform our behavior requires an understanding of (1) how modal verbs relate to one another (i.e., *will* is stronger than *should*, which is stronger than *might*), and (2) how modal verbs relate to real-world event probabilities. Previous studies suggest that older preschoolers understand that modal verbs can be ordered on a continuum, but have left open how they map that scale onto events of different probabilities (Hirst & Weil, 1982; Noveck, Ho, & Sera, 1996; Ozturk & Papafragou, 2015). Here, we use a child-friendly task to present children and adults with probabilistic events at varying levels of uncertainty, and elicit their preferences across a range of epistemic modal verbs (*could*, *can*, *should*, and *will*).

Method. Children ($N=44$, 4-7 years, $M_{age}=5.5$) and adults ($N=21$, $M_{age}=20$) were familiarized with images of a gumball machine containing proportions of green and purple marbles. Each critical trial displayed a machine with 20%, 80% or 100% green marbles (Figure 1). Two characters described the chance of getting a green marble using contrasting modal statements (e.g., a green marble "*should* come out" versus "*could* come out"), and children pointed to which character "got it right."

Results. Both adults and children showed a tendency to prefer weaker modals (*could*, *can*) for lower probability events and stronger modals for higher probability events (e.g., selecting *could* over *should* more often for 20% events, and vice versa for higher 80% and 100% events). A mixed effects logistic regression on children's stronger modal selection revealed a significant effect of probability ($\chi^2(1)=28.77$, $p<.001$), age ($\chi^2(1)=6.25$, $p=.01$) and an interaction between probability and age ($\chi^2(1)=21.14$, $p<.001$), such that older children exhibited a greater stronger-modal preference to describe high-probability events--though at less than adult levels even at age 7. Children also diverged from adults in their understanding of *will*. While adults reserved *will* exclusively for 100% probability outcomes, children often applied it to 80% probabilities, a tendency that was even stronger in older compared to younger children. For example, 70% of 6-year-olds chose *will* over *should* to express an 80% probability, compared to <10% of adults. Together, our results demonstrate that although even 5- and 6-year-olds show some understanding of the relative strengths of different modal verbs, they may have difficulty distinguishing whether these verbs express certainty (e.g., *will*), or high probability (e.g., *should*). In ongoing research, we are replicating these findings with a broader age range, and assessing whether children's apparent difficulty with distinguishing how language expresses certainty vs. probability extends to other verbs (e.g., the use of *won't* for a low-probability vs. impossible event). Connections between communicative development and current work on children's developing understanding of probability will be discussed.

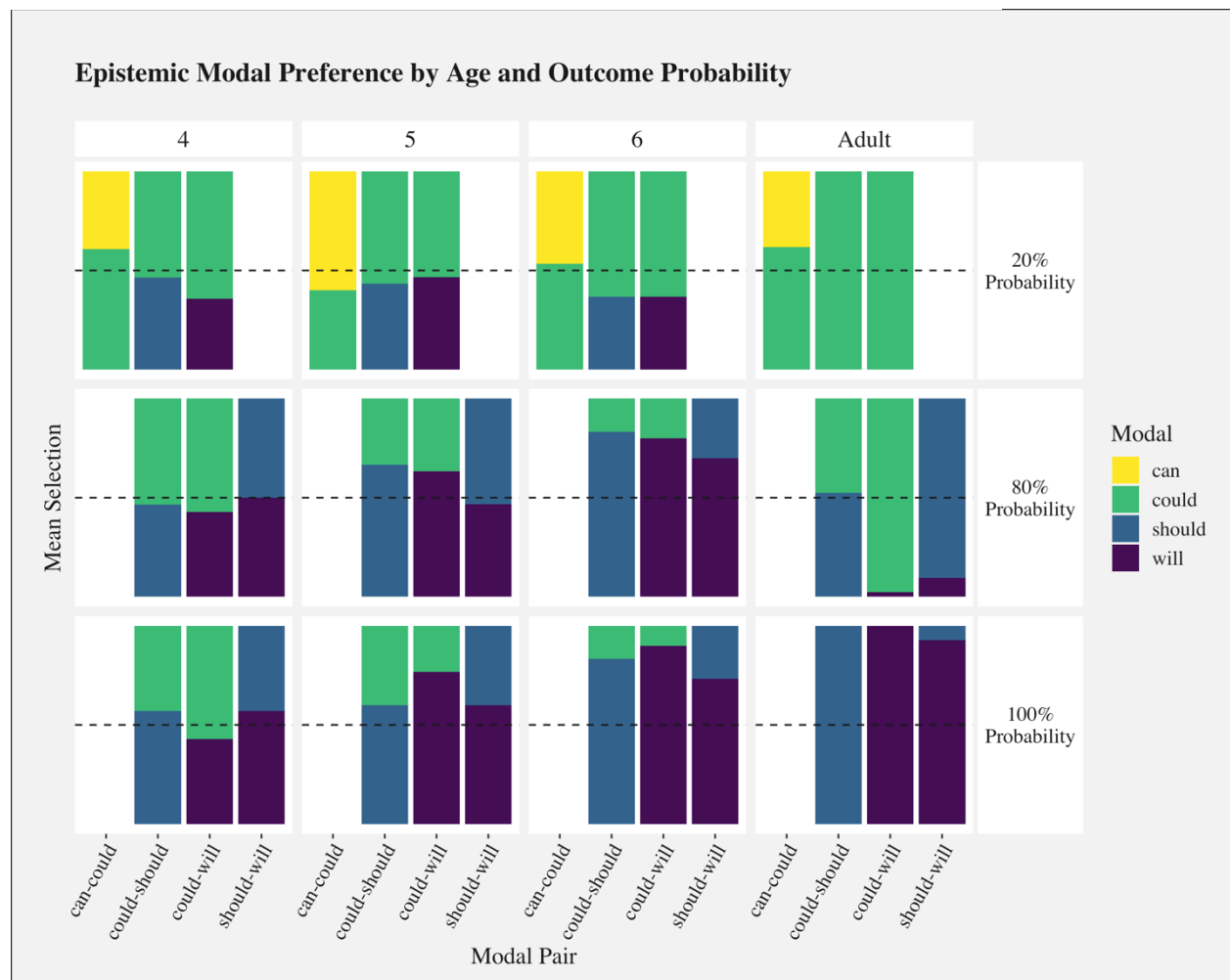
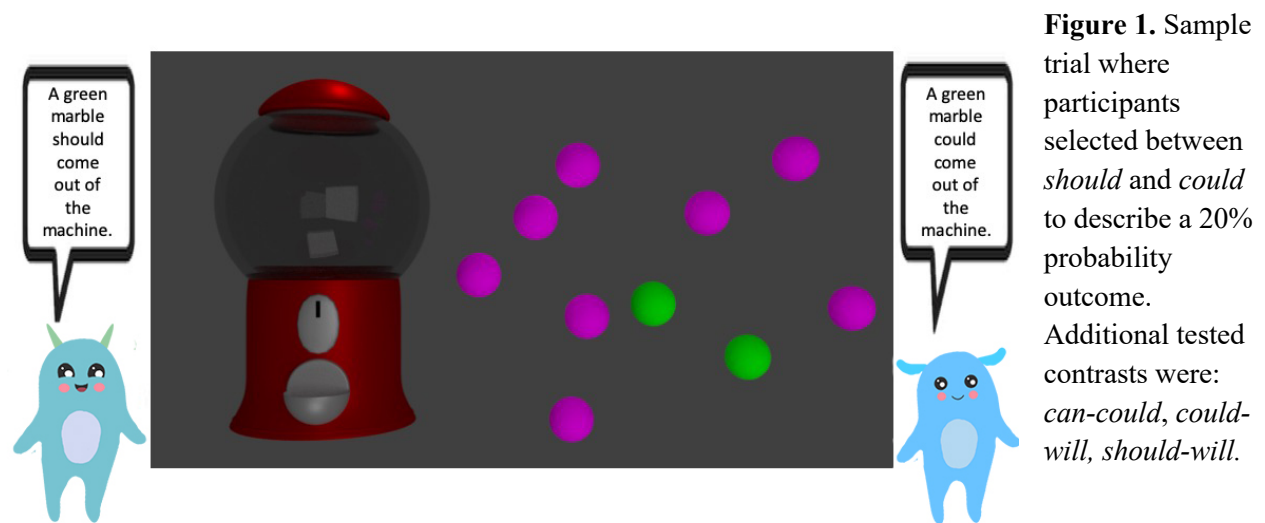


Figure 2. Modal selections by age group (panel columns) and outcome probability (panel rows). Bars are color coded to reflect proportions of selections of each modal verb in the tested contrast, while the dotted line marks chance responding (50%).