**Do 2-year-olds understand epistemic maybe?**

**Maybe!**

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**Introduction**

- Epistemic language is often argued to be absent until age 3 [1,2]
- Studies rely on syntactically complex forms (e.g., modal or belief verbs: must, know) & taxing behavioral tasks

**But, by age 2:**

- Children exhibit possibility and belief reasoning
- Precursors to epistemic reasoning [3,4,5]
- Children productively use epistemic adverbs like maybe [6]
- Syntactically less complex than modal or belief verbs [7]
- So epistemic adverb ‘maybe’ & an implicit online comprehension task reduce complexity & allow us to probe children’s understanding of epistemic possibility.

**Research Q:** Do 2-year-olds understand that maybe expresses epistemic possibility?

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**Methods**

**Figure 1. Example Trial with ROIs**

- **Stimuli:** To test 2-year-old comprehension we rely on partially-observed animals, where epistemic uncertainty is linked to category membership [3].
- Videos of 10 animal pairs sharing one common feature (Figure 1).
- **Conditions:** Positive, Negative, & Modal.
- Prompt: “Who’s hiding?”
- Probed again (after 2500 ms) with: “Who is it?”

**Participants:** 13 2-year-olds, M = 2.04; SD = 0.04 (5 excluded, projected N=25)

**Procedure:** Visual world eye-tracking

- Adapted preferential looking paradigm [8]
- Guessing game
- Reveal hidden in negative and positive condition
- Animal pairs pseudo-randomized across participants (max 2 same pair)
- Balanced screen and introduction order

**Hypotheses:**

1. Proportion of looks to mentioned animal highest in positive condition (mentioned lowest)
2. Proportion of looks to unmentioned animal lowest in negative condition (unmentioned highest)
3. Modal condition split — both animals open possibilities, given the available cues
4. Secondary, expect more looks to hidden in modal — search for disambiguating cues

**Table 1. Sample Auditory Stimuli**

<table>
<thead>
<tr>
<th>Sample Trial (Beet and Ant)</th>
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</thead>
<tbody>
<tr>
<td><strong>Trial set-up:</strong> Look, this is a beet! (bee bounces) Look, this is an ant! (ant bounces) Who’s hiding?</td>
</tr>
<tr>
<td><strong>Conditions:</strong> Positive</td>
</tr>
<tr>
<td>Negative</td>
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<tr>
<td>Modal</td>
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</tbody>
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**Figure 2. Proportion of Looks to Regions of Interest per Condition**

1. **Descriptive preliminary results:**
   - Greater proportion of looks to unmentioned in negative condition (expected)
   - Greater proportion of looks to mentioned in positive (expected) and modal condition (unexpected)
   - Trend clearer for modal condition

**Results**

1. **Main finding:** Looking behavior does not suggest consideration of multiple possibilities for maybe!
2. **Increased looking to unmentioned animal and no expected back-and-forth looking behavior**
3. **But more looks to hidden animal suggests consideration of evidence or anticipation of (unknown) reveal
4. **Reverse asymmetry between production and comprehension of epistemic verbal component**
5. **Why:** Still an open question. Some possibilities:
   - They don’t understand that maybe expresses epistemic possibility.
   - They understand maybe as an item that prompts guessing [Leahey & Carey 2019]
   - They understand maybe but prematurely close.
   - Avoid the cognitive load and endorse one possibility [14,16,17]; if so, the time-course suggests this happens rapidly (c.f.17)
6. **Clearer results emerging for negative condition:
   - More looks to unmentioned vs mentioned animal
   - Corroborates previous findings that 2-year-olds understand negation (e.g., Carvalho et al. 2019)
7. **Trending results emerging for positive condition:
   - Slight increase in looks to mentioned vs unmentioned

**Limitations and Future directions**

- Complete data-collection (N = projected >25)
- Our sample of 2-year-olds skewed young (mean 2.4)
- Skewed trial loss for also condition (and less trials POS/NEG than MOD)

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