

# Learning from uncertainty: exploring and manipulating the role of uncertainty on expression production and interpretation

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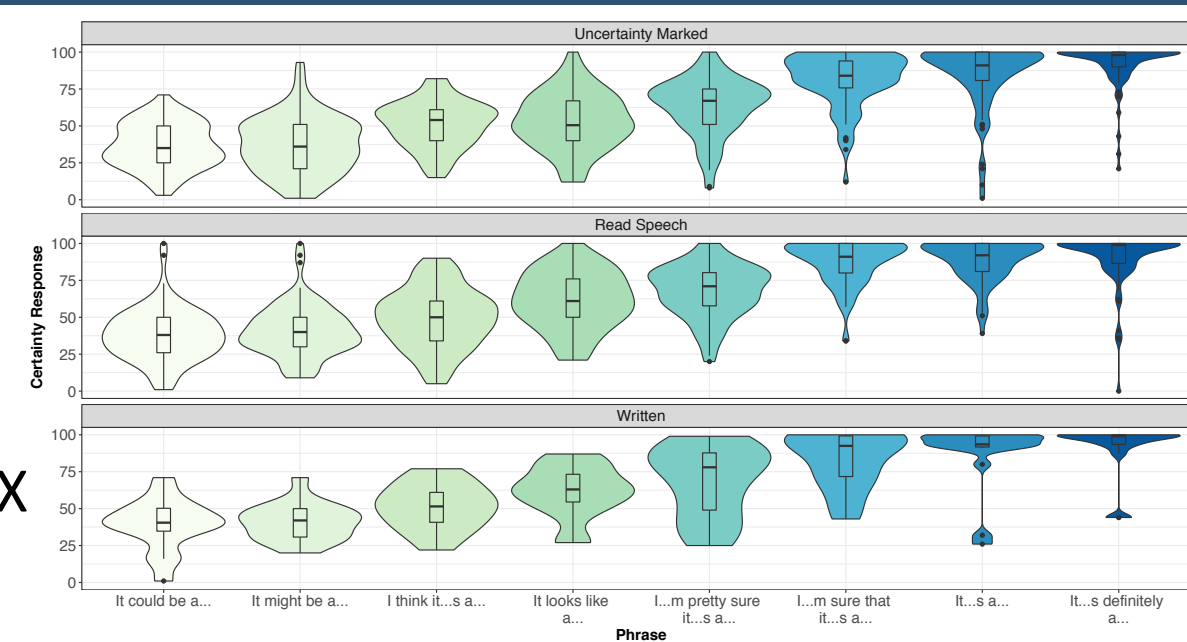


## Background & Main Questions

- Source reliability and commitment are important to pragmatics (Gunlogson, 2008; Bibyk, 2016; Brown-Schmidt, et al., 2015)
- Communicating reliability requires a speaker to appropriately mark her confidence, and for a listener to accurately interpret that reliability (Smith & Clark, 1991)
- We lay the groundwork for exploring how interlocutors convey uncertainty by:
  - Developing linguistic materials which mark relative degree of certainty (Exp 1)
  - Developing novel paradigms to examine how certainty is marked and conveyed (Exps 2 & 3)
- Establishing that:
  - Degree of certainty about visual information maps onto linguistic uncertainty (Exp 2)
  - Speaker certainty about a label affects word learning (Exp 3)
  - When evidence from speakers conflicts, learners take into account reliability (Exp 4)

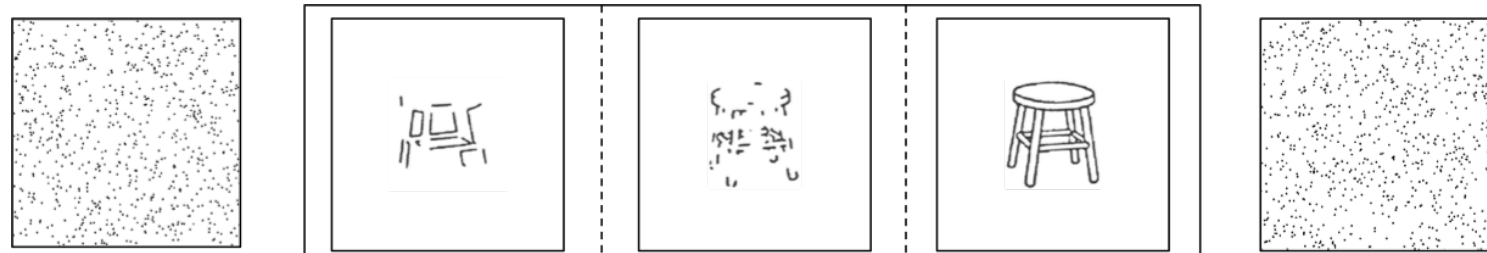
## Experiment 1: Pre-testing materials

- It could be an X
- It might be an X
- I think it's an X
- It looks like an X
- I'm pretty sure it's an X
- I'm sure that it's an X
- It's an X
- It's definitely an X



**General Findings:** listeners systematically interpret these phrases as differing in certainty

## Experiment 2: Mapping Visual Uncertainty onto Linguistic Uncertainty

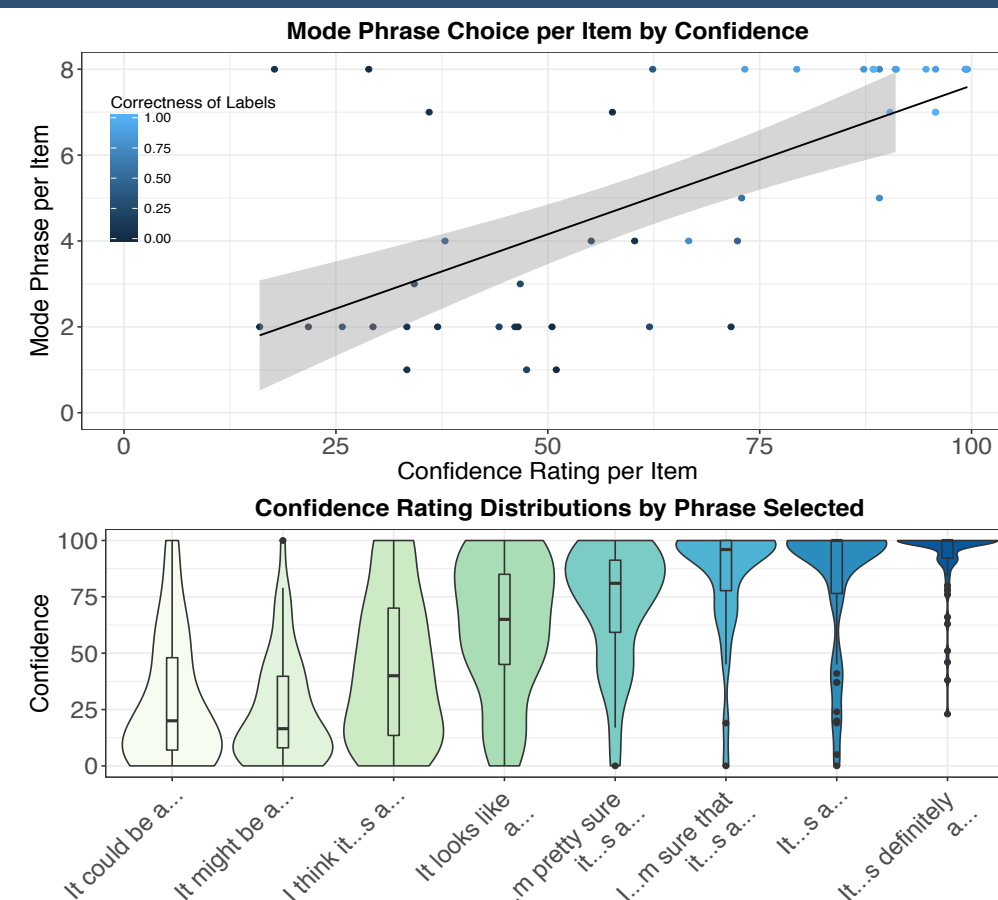


What did you see?

How confident are you that you correctly labelled the image?

Not at all confident 0 10 20 30 40 50 60 70 80 90 100 completely confident

## Experiment 2: Results



### General Findings:

- We can measure empirically how certain a speaker should be
- We can then investigate how speaker certainty maps onto their linguistic choices
- Allows us to ask how this influences listener behavior

## Experiment 3: Behavioral Effects of Certainty on Learning

**Learning:**

12 novel objects

That could be a rato

I think that's a tuli

That's a klamen

klamen

**Test:**

6 matching labels

6 mismatched labels

tuli (match)

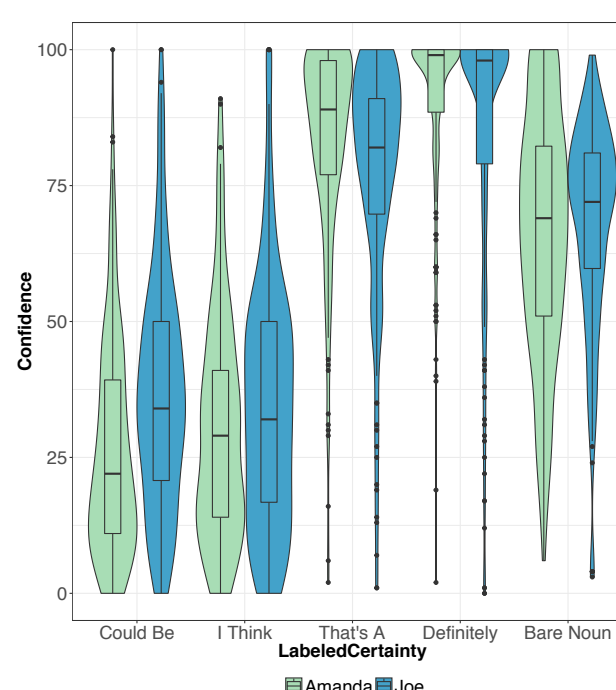
klamen (mismatch)

**Bet:**

Up to \$0.05 that you're correct

**Norming:**

How certain does the speaker sound about their label?



## Experiment 4: Effects of Talker-Specific Certainty on Word Learning

**Learning:**

12 novel objects, 2 speakers

That could be a tuli

klamen

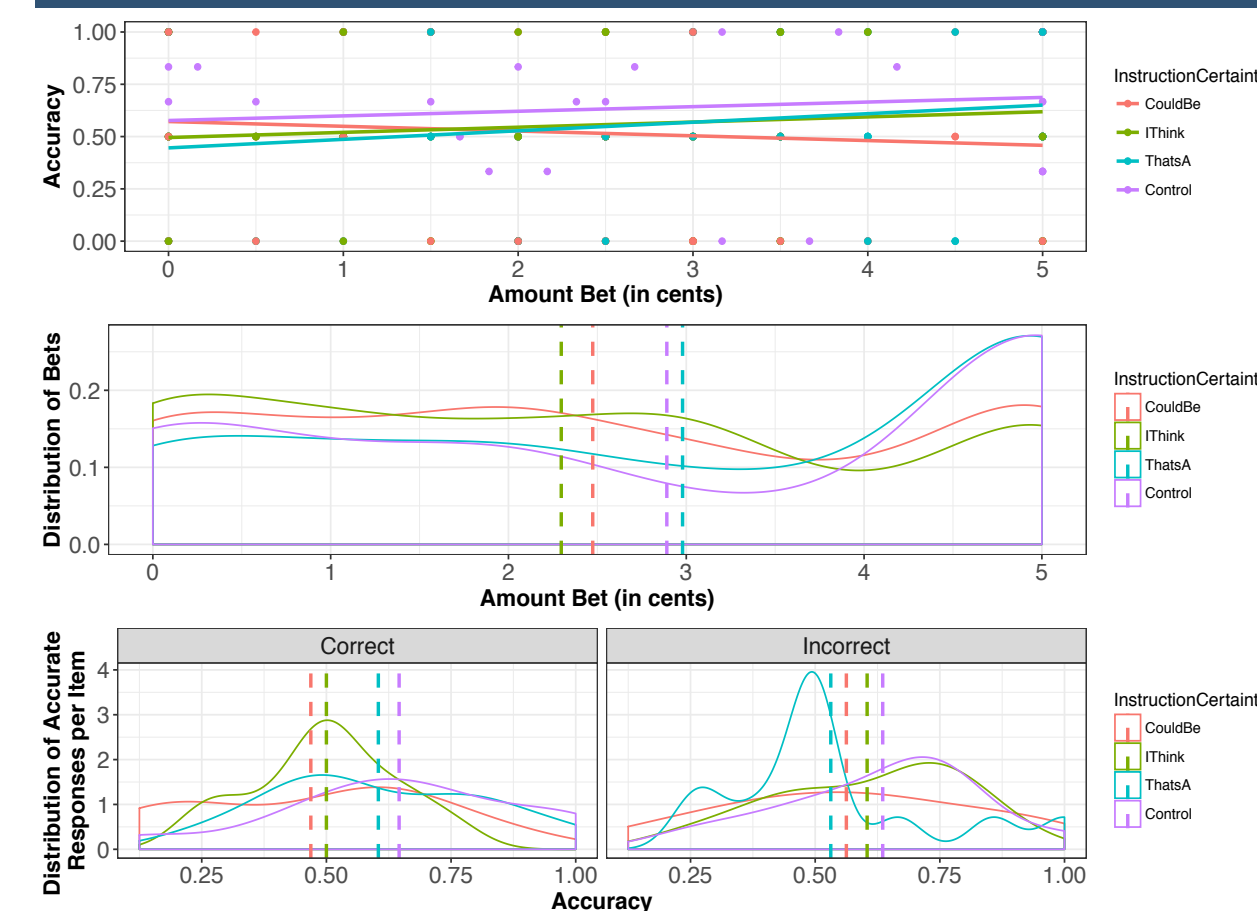
**Test:**

Which label is the correct label?

tuli

klamen

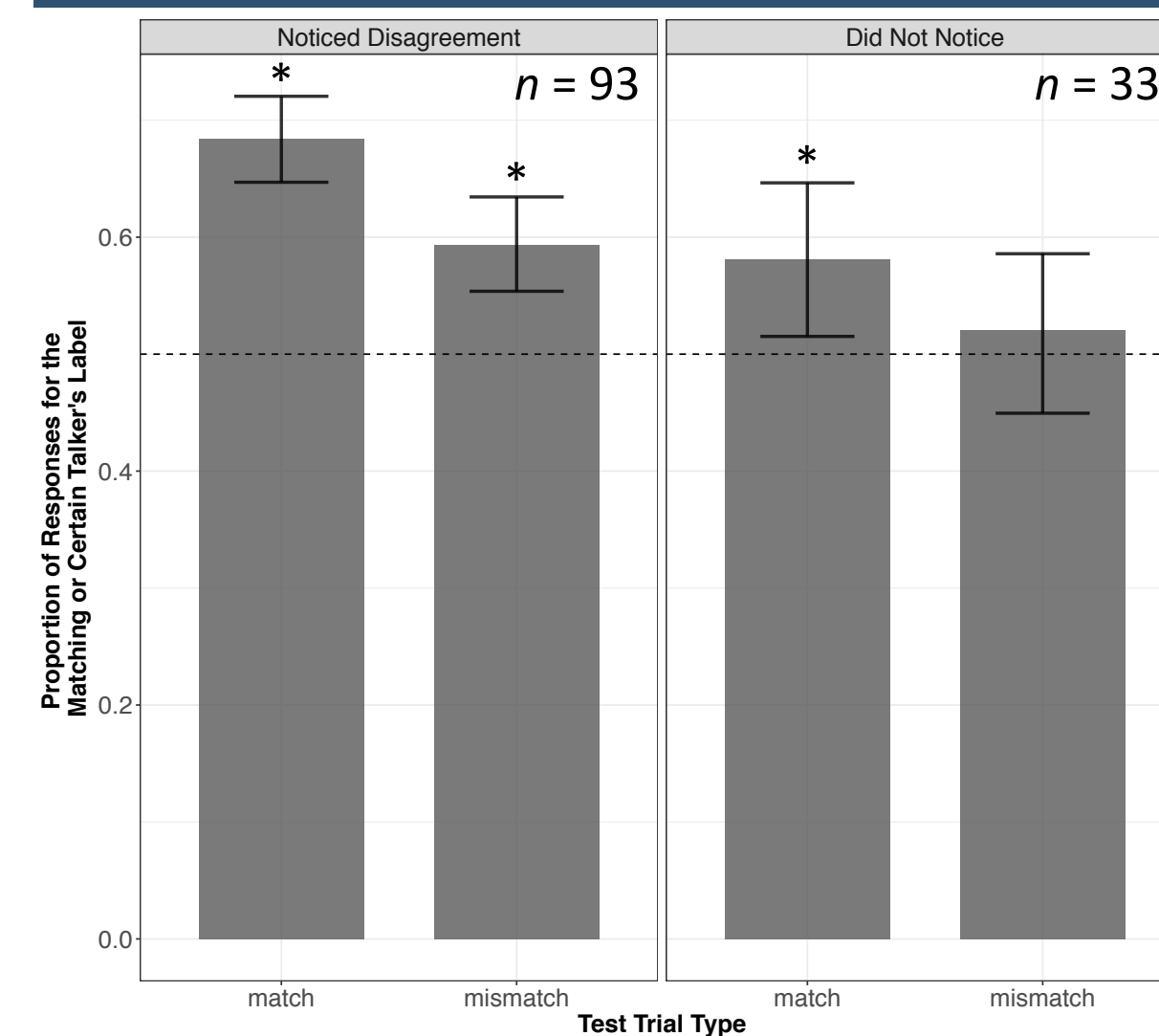
## Experiment 3: Results



### General Findings:

- Listener's certainty reflects talker's certainty
- Betting reflects accuracy (proxy for certainty)

## Experiment 4: Results



### General Findings:

- Matching labels:** Learners choose matching (agreed-upon) labels
- Mismatching labels:** Learners choose the more certain/reliable speaker, if they notice that speakers sometimes disagree

## Discussion

- Talkers can convey reliability by marking their certainty and listeners track this information
- Approach provides foundation for mapping information uncertainty onto linguistic uncertainty
- Provides foundation for future work examining how interlocutors calibrate and adapt to one another.