Communicating, interpreting, and learning from uncertainty: Could be a promising approach?

Amanda Pogue & Michael K. Tanenhaus, University of Rochester

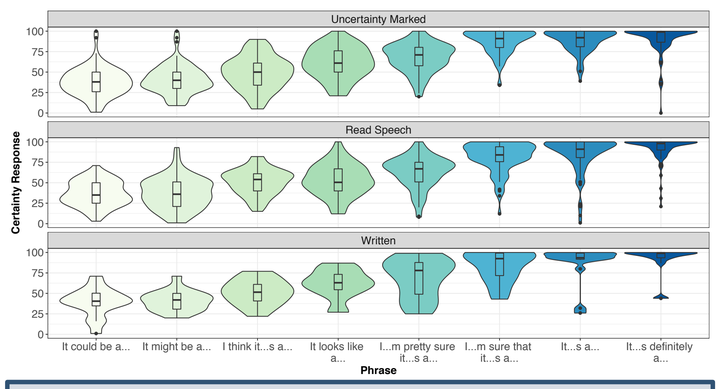
Background & Main Questions

- Researchers have shown that source reliability and commitment is important to pragmatics (Gunlogson, 2008; Bibyk, 2016; Brown-Schmidt, Yoon & Ryskin, 2015)
- Communicating reliability requires a speaker to appropriate mark her confidence, and for a listener to accurately interpret that reliability
- Complicated by individual and group differences in the use of confidence and its implications (e.g., politeness markings, mansplaining, etc)

1. Do speaker systematically mark their uncertainty, and do listeners systematically recover this information?
2. Can we test whether a speaker's certainty maps onto their linguistic certainty?
3. How do listeners use this information when acquiring new information, or throughout continued experience with a speaker?

Pre-test: Marking / Interpreting Uncertainty

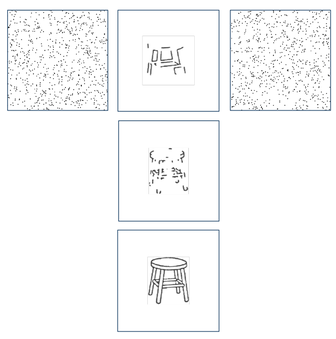
1. It could be a goose
2. It might be a robin
3. I think it's a falcon
4. It looks like a hummingbird
5. I'm pretty sure it's a woodpecker
6. I'm sure that it's a sparrow
7. It's a blackbird
8. It's definitely a canary



In sum: listeners systematically interpret these phrases as differing in certainty

Phrase	Pre-test Read-text Confidence	Pre-test Listen (Read)	Pre-test Listen (Uncertainty)	Read-text Rank	Listen Rank	Experiment 1 (mean confidence)	Experiment 2 (mean confidence)
1	36.994	37.706	36.283	7.125	7.063	25.163	24.68
2	39.294	41.094	37.494	6.375	6.375	28.798	
3	49.918	48.918	50.919	5.688	5.644	46.458	25.46
4	57.080	61.362	52.797	5.25	5.381	45.828	
5	65.476	68.110	62.842	4.063	4.319	68.577	
6	84.220	87.510	80.930	2.688	2.919	80.300	
7	86.777	88.864	84.689	2.625	2.525	91.765	80.40
8	90.935	90.246	91.624	2.188	1.775	93.192	
Control							64.55

E1: Mapping Visual Uncertainty onto Visual Uncertainty



Time: 120/220/750 ms
Recoverability: Non-recoverable, Recoverable, Complete

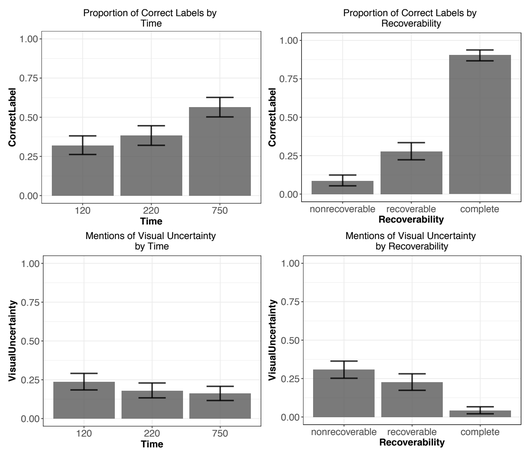
3 measures:

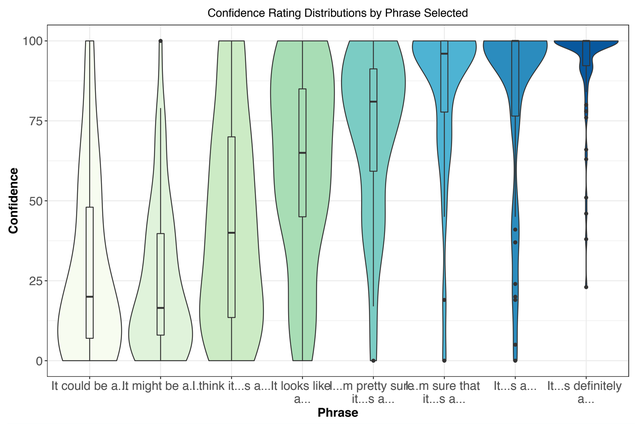
What did you see?

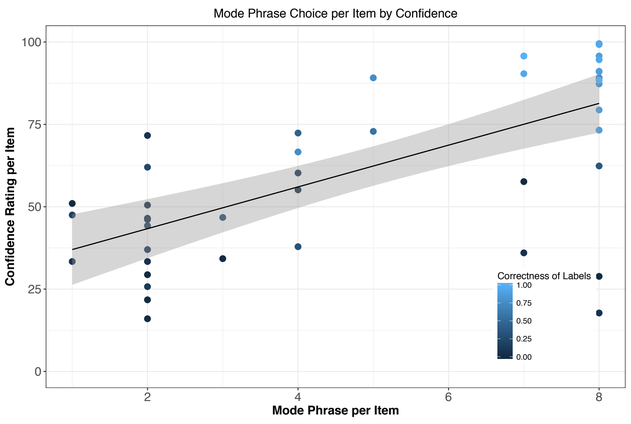
How confident are you that you correctly labeled the image?

Which is the most likely phrase that you would use to describe what you saw to another person?

Manipulation Check:





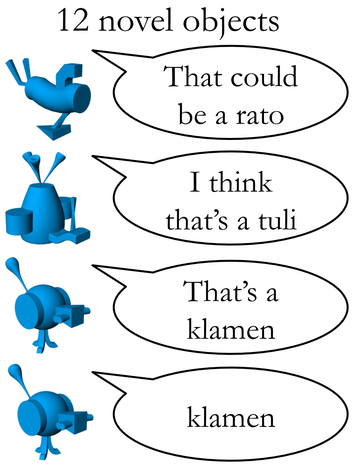


General Findings:

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

E2: Behavioral Effects of Certainty on Learning

Learning:
12 novel objects

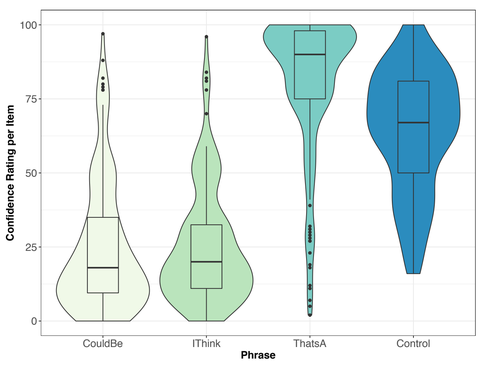


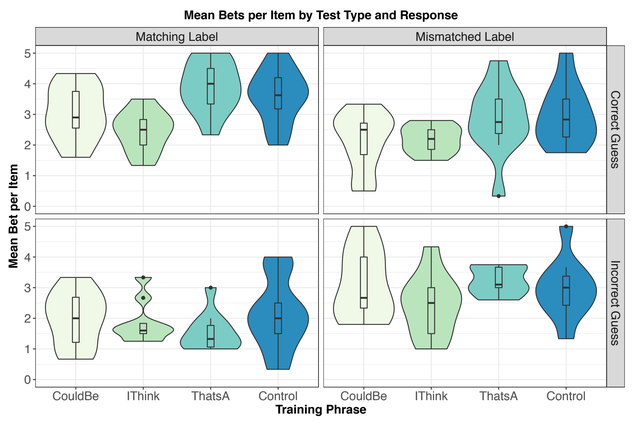
Test:
6 matching labels
6 mismatched labels

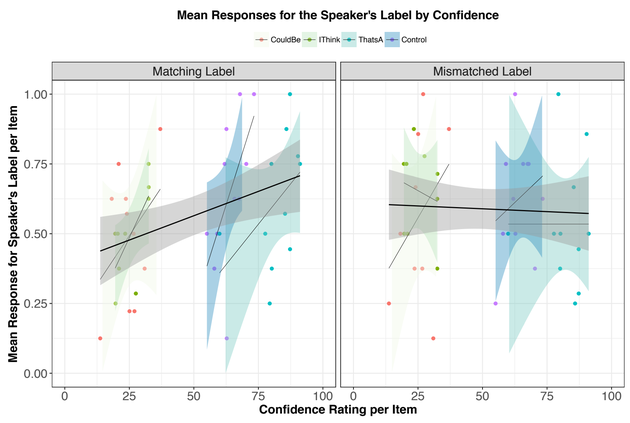
tuli (match)
klamen (mismatch)

Bet:
Up to $0.05 that you're correct

Norming:
How certain does the speaker sound about their label?







General Findings:

- Can investigate how speaker certainty maps onto a listener's judgment about the speaker's knowledge about a label, and consequently their beliefs about the veracity of information / their commitment to that information

Summary: a **promising** approach

1. Speakers and listener's systematically produce and interpret utterances marked with uncertainty.
2. Have shown that we can design tasks where we can manipulate speaker certainty, and then evaluate how certainty maps onto linguistic choices.
3. A speaker's certainty influences a listener's learning behaviors, suggesting listeners make inferences about the information being conveyed in a nuanced way

Current and Future Directions

Learning from 2 speakers:
12 novel objects

That's definitely a tuli

That could be a mafer

Learning from an un/certain speaker:
Domain expertise

A kale stripper

The leaf shaped tool with holes in it

Adapting to un/reliable speakers:
Over/under confidence

That's definitely a klamen

I know that is called a "tuli"

References: