(Un)certainty in language and cognition: Eyewitness reports vs. statistical probability

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1. Eyewitness vs. statistics

- Eyewitness evidence is privileged over statistical information in legal verdicts => ***Wells Effect***
- *People are more likely to deem a suspect guilty based on eyewitness testimony than statistical evidence* (e.g. DNA tests) even when their estimates of numerical likelihoods are comparable (Wells'92, Niedermeier et al'99)
- When the state-of-affairs is not certain, ***eyewitness reports have a privileged cognitive status relative to statistical information.***
- **Is this distinction is reflected linguistically?**

2. Linguistic encoding

- How are cognitive representations of (un)certainty reflected in language?
- Many tools for different levels of signaling (un)certainty, including
  - adverbials (e.g. *possibly, definitely*)
  - verbal statements (e.g. *I am convinced, I doubt*, Theil'02, Brun/Teigen'98, Juanchich etal'19).
- **Do eyewitness reports play a privileged role in guiding use of linguistic certainty markers, compared to stats info?** (cf. Willet'88 on evidentials)
- If yes, this suggests
  - certainty markers can't be defined on a unidimensional numerical probability scale (challenging many current approaches);
  - the cognitive asymmetry in the Wells Effect should be incorporated into theories of language.

3. Experiment

- Participants (n=216, L1 US-English) read 8 **paragraphs**; each followed by a **critical sentence** on the same screen.
- **PARAGRAPHS**: **We manipulated whether the paragraphs provided**
  a) eyewitness information only (blue sentence included, OnlyEyeEvid)
  b) statistical information only (red sentence included, OnlyStatsEvid)
  c) both included (ConflictingStatsEye, both red+blue included)
  d) neither (NoEvid; **neither** red nor blue sentence included).
- The eyewitness report & statistical information conflict

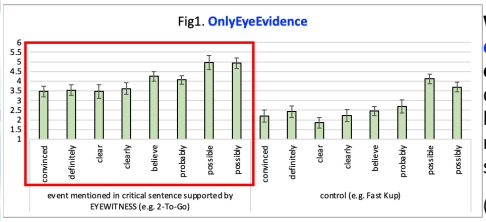
(1) Mrs. Wells suffered serious burns when the disposable cup containing her coffee from the Yum Roastery Cafe suddenly collapsed as she was holding it. The Yum Roastery Cafe only uses disposable cups by two companies; the Fast Kup company and the 2-To-Go company. Both companies use the same raw materials and the same kinds of machines. Neither company puts any branding on its cups. *Eighty percent of the disposable cups used by Yum Roastery are manufactured by Fast Kup, whereas 20 percent of the cups are manufactured by 2-To-Go.* The barista who served Mrs. Wells said he is 80 percent certain that he grabbed a cup from the box containing 2-To-Go disposable cups when he made Mrs. Wells' coffee. Because the two companies' cups look alike and because Mrs. Well's cup got soaked, it's impossible to tell from the remnants of the cup itself who made it.

- **CRITICAL SENTENCE**: **We manipulated the certainty marker (see table)**
- **Task**: Rated your level of agreement with the critical sentence (1= strongly disagree, 6=strongly agree), on the basis of the paragraph.

Certainty level	*Ling certainty marker*	*Example critical sentence*
higher certainty	*I am convinced*	I am convinced beyond a doubt that Mrs. Wells was burned because a cup made by **{Fast Kup/2-To-Go}** malfunctioned.
	definitely	Mrs. Wells was burned because a cup definitely made by **{Fast Kup/2-To-Go}** malfunctioned.
	clear	There is clear and convincing evidence that Mrs. Wells was burned because a cup made by **{Fast Kup/2-To-Go}** malfunctioned.
	clearly	Mrs. Wells was burned because a cup clearly made by **{Fast Kup/2-To-Go}** malfunctioned.
mid certainty	*I believe*	I believe that Mrs. Wells was burned because a cup made by **{Fast Kup/2-To-Go}** malfunctioned.
	probably	Mrs. Wells was burned because a cup probably made by **{Fast Kup/2-To-Go}** malfunctioned.
lower certainty	*it's possible*	It is possible that Mrs. Wells was burned because a cup made by **{Fast Kup/2-To-Go}** malfunctioned.
	possibly	Mrs. Wells was burned because a cup possibly made by **{Fast Kup/2-To-Go}** malfunctioned.

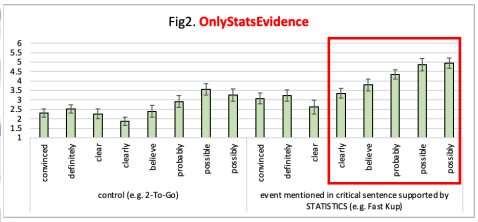
- The critical sentence mentions **either** (i) the event supported by the eyewitness (e.g. *used cup by 2-To-Go*) **or** (ii) event supported by statistical information (*used cup by Fast Kup*)
- If only one evidence type is provided (**OnlyStats**/**OnlyEye**), other version is about a **control event** (**event unsupported by clear evidence**).
- In **Conflicting StatsEye**, two versions allow us to compare responses to eyewitness vs. statistically-supported statements.
- In **NoEvidence**, neither version is supported by evidence.

4. Results (a) Eyewitness info is privileged in use of linguistic certainty markers, but (b) is weakened by conflicting statistical information.



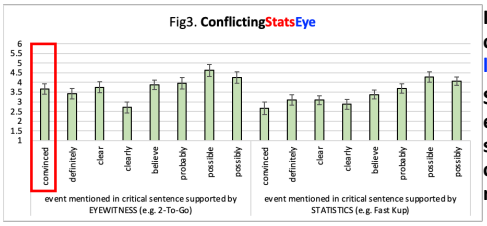
When only eyewitness evidence points to an event: *all* sentences describing the event have higher agreement ratings than control sentences

(lmer, emmeans, p's<.01, except *possible* p=0.04)



When only stats information points to an event: Lower-certainty markers get higher ratings than controls (p's<.002). Higher-certainty markers don't differ from controls (except for *clearly*, p<.001)

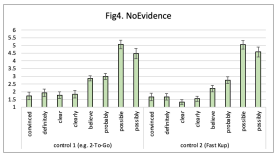
When **only statistical information** is provided, people are reluctant to accept *high-certainty* markers: they generally rate high-certainty-marker sentences as low as high-certainty markers modifying sentences about the control event.



If eyewitness & stats conflict: eyewitness loses special status

Sentences about the 2 events (eyewitness- vs. stats-supported) receive comparable agreement ratings.

I'm convinced still shows privilege of eyewitness: higher ratings when matches witness (p<.008)



If **no evidence** given for either event, ratings for sentences about 2 events don't differ => expected

5. Conclusions

- First experiment on how distinction b/w statistical & eyewitness evidence is reflected in acceptance of statements w/ different certainty markers.
- Eyewitness evidence has a special status in language, but if information sources conflict, high-certainty markers become less acceptable for eyewitness-based statements => Language shows that our reactions to eyewitness reports are *not impervious* to effects of statistical information.

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