Invisible, unmentioned entities affect referential forms

Si On Yoon (U. of Iowa) Breanna Pratley (U. of Toronto) and Daphna Heller (U. of Toronto)

Referential Expressions (REs) are subject to multiple influences. One such influence is discourse history, whereby speakers tend to reuse structures and concepts that were said earlier [e.g. 1,2], and even more so if the noun overlaps [3]. But speakers are also rational: they normally include *just enough* information to allow the addressee to pick out the intended referent [e.g., 1,4]. It is therefore surprising that speakers sometimes include information that distinguishes the intended referent from an entity that is no longer present: in contexts like Fig. (1a), speakers sometimes say *"the open umbrella"* to refer to a single umbrella after referring to a different umbrella on an earlier trial [e.g., 5]. This behavior is not rational because the umbrella from the earlier trial is no longer a potential referent. Here we demonstrate an even more surprising effect: REs are influenced by an entity that is not just no longer visible, but was not even described earlier.

General Method. Participants (n=24) viewed virtual grids of 15 "cards" each. On each trial, 4 of the 15 cards were "flipped" to show their images, and the participant described a target card for the experimenter to click. Participants completed 8 trials with each grid before moving to a new grid: 1 ENTRAINMENT, 1 TEST, and 6 interspersed fillers (trials order varied by grid, but the test trial always followed the entrainment trial).

Exp. 1. The test trial was constant, and always included one object (e.g., a striped open umbrella). The entrainment trial included (i) the same noun (e.g. umbrella) or a different noun (e.g. bottle), and (ii) one or two such objects. The same and different objects contrasted in the same property (e.g., open vs. closed) so as to elicit the same modifier. Indeed, speakers produced the modifiers at ceiling for two objects (same: 100%, diff: 97%), and much less for a single object (same: 33%; diff: 20%). Our main question is how referential forms at TEST are influenced by the ENTRAINMENT trials. We calculated how likely speakers were to say "open umbrella" after they said *"closed N"* in entrainment. Due to the difference in the production of modified expressions across conditions in the ENTRAINMENT trials (speakers had more of an opportunity to be primed by their own modified REs in the pair conditions), we examined this behavior relative to the "priming potential". Thus, we asked how much of the priming potential was fulfilled, by examining the likelihood of priming out of those trials where priming was possible. We find, first, that more of the priming potential is fulfilled when the noun is repeated [cf. 3], but, strikingly, this measure reveals that priming was much less likely in Same-Pair (31%), where the primed form (*"open umbrella"*) could also describe an unmentioned entity from the entrainment trial, compared to Same-Single (64%), where such an object was not seen earlier. This effect cannot be explained by priming alone, and instead shows the need to represent the visual context, even after it is no longer visually available and the relevant memories possibly fade with time.

Exp. 2 was designed to further explore this effect while minimizing priming. We exploited the fact that the intermediate object in a set of three is called *"medium"* (pilot: 94%), but the same object would be called "big(ger)" when paired with just one object (pilot: 97%). Here (i) the TEST contained either a PAIR of objects or a SINGLE object – participants always described the object of intermediate size, and (ii) the ENTRAINMENT trial either completed the set of 3 (Critical), or had one less object (Baseline). The effect of the historical context was observed: the likelihood of comparatives (e.g., bigger) was higher (72%) when a third object of the same category was seen earlier than when it was not (59%). However, speakers rarely produced *"medium"* in the Critical conditions, revealing that the local physical context takes precedence over the historical context.

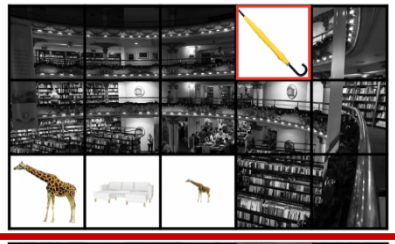
Conclusions. We observe a novel effect where an entity can influence the form of a referring expression, even though it is not a potential referent in the current context nor was it mentioned earlier in the discourse. This reveals that speakers do not just represent the language previously uttered, but also aspects of the non-linguistic context that has given rise to their utterance. However, speakers do exhibit rational behavior in that the past context has a weaker influence in shaping current referential forms.

Exp. 1

ENTRAINMENT TRIAL

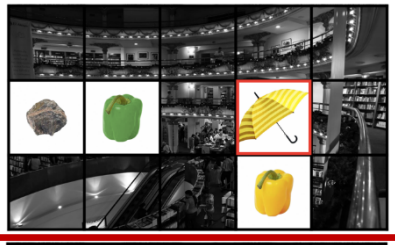
TEST TRIAL

(a)
Same-noun Single-history



umbrella: 67%

closed umbrella: 33%



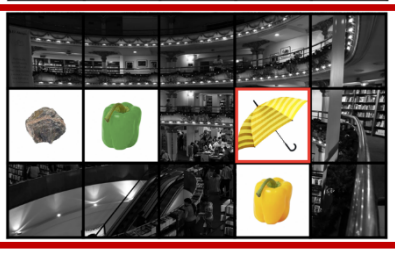
umbrella: 52%

PRIMED
open umbrella: 21%
PRIMING POTENTIAL
→ 21/33 = 63.6%

(b)
Same-noun Pair-history

umbrella: 0%

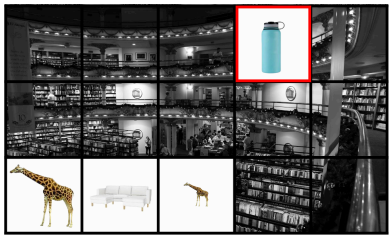
closed umbrella: 100%



umbrella: 44%

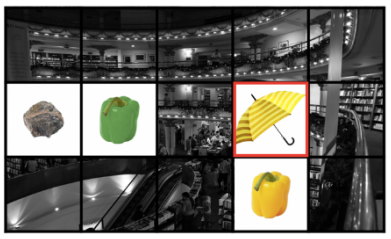
PRIMED
open umbrella: 31%
PRIMING POTENTIAL
→ 31/100 = 31%

(c)
Diff-noun Single-history



bottle: 80%

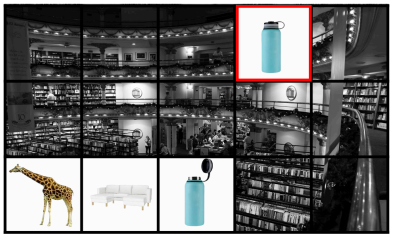
closed bottle: 20%



umbrella: 65%

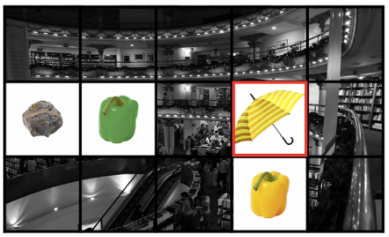
PRIMED
open umbrella: 1%
PRIMING POTENTIAL
→ 1/20 = 5%

(d)
Diff -noun Pair -history



bottle: 3%

closed bottle: 97%



umbrella: 55%

PRIMED
open umbrella: 14%
PRIMING POTENTIAL
→ 14/97 = 14.4%

Exp. 2

ENTRAINMENT TRIAL

TEST TRIAL

(a)
Pair critical

flower: 76%
big flower: 6%
bigger flower: 0%

medium flower: 0%

flower: 0%
big flower: 24%
bigger flower: 72%

medium flower: 3%

(b)
Pair baseline

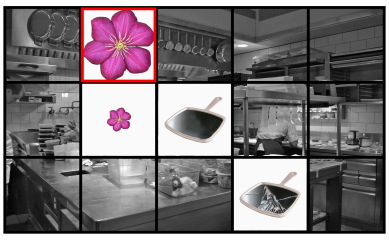
garlic: 77%
big garlic: 6%
bigger garlic: 1%

medium garlic: 0%

flower: 1%
big flower: 35%
bigger flower: 59%

medium flower: 4%

(c)
Single critical



flower: 0%
big flower: 54%
bigger flower: 40%

medium flower: 0%

flower: 85%
small flower: 2%
smaller flower: 3%

medium flower: 6%

(d)
Single baseline

Flower: 83%
big flower: 3%
bigger flower: 0%

medium flower: 0%

flower: 83%
small flower: 2%
smaller flower: 6%

medium flower: 4%

REFERENCES [1] Brennan & Clark, 1996 [2] Pickering & Garrod (2004), BBS [3] Cleland & Pickering, 2003 [4] Brown-Schmidt & Konopka (2011) [5] Van der Wege, 2009 [6] Carbary, Frohning, & Tanenhaus, (2010)