

At least as a scalar modifier: Scalar diversity and ignorance inferences

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It is an established fact that utterances with *at least* convey a signal of speaker ignorance (SI). The majority of the relevant literature has focused on *at least* as a numeral modifier and the SI inference it triggers, e.g., *the speaker doesn't know the exact number n of people that were at the party* in (1). The most popular approach to these inferences derives them as (primary) Quantity implicatures. Importantly, the literature has generally overlooked uses of *at least* as an adjective modifier and their potential SI inferences, e.g., *the speaker doesn't know whether Sue is gorgeous* in (2). A few exceptions are Geurts & Nouwen (2007) and Cohen & Krifka (2014), who treat the two *at least* scalar constructions on a par.

These analyses

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| (1) There were at least 50 people at the party. (1') ??In fact, there were 54 people. |
| (2) Sue is at least pretty. (2') In fact, she's gorgeous. |

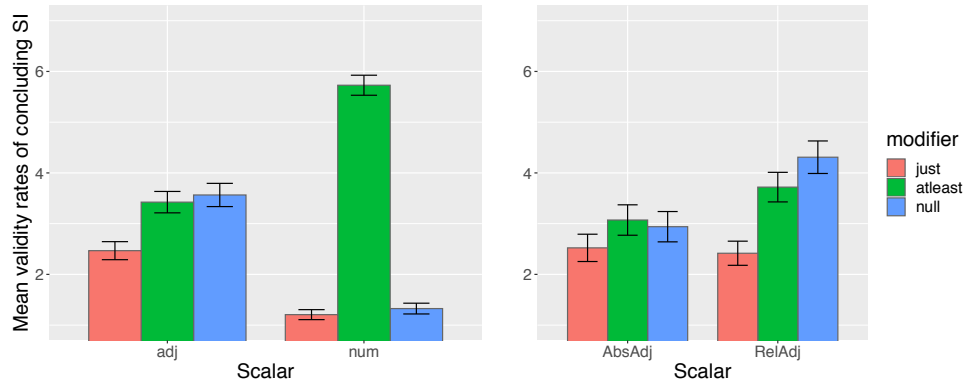
take for granted that the two *at least* constructions trigger SI uniformly, however cancellation data suggest otherwise. While (1-1') illustrate that SI inferences of *at least*+numeral are hard to cancel, (2') easily suspends the corresponding SI inference of (2). In this context, we set out to probe experimentally whether this contrast in SI robustness holds, although not captured by any theory.

Experiment—We used a web-based inference task (in Greek, $n=46$), consisting of pairs of an utterance by Maria and a conclusion. Participants had to rate how valid the conclusion was given Maria's utterance on a Likert scale from 1 (*not valid at all*) to 7 (*absolutely valid*). In the target items, Maria's utterance contained *at least*+(weak) scalar term. In **a.**, the ignorance inference of the conclusion follows from a (Quantity-based) reasoning given, e.g., a two-scale analysis of *at least*+*scalar*: i.e., with substitutions of *at least* from <at least, just> and of n from the number scale. Likewise for **b.**, with the difference of substituting for the adjective from the Horn scale <tipsy, drunk>. We had

two manipulations in Maria's utterance: the scalar modifier: *at least*

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| a. Maria says: "There were at least thirteen actors on stage yesterday."
Conclusion: Maria doesn't know the exact number of actors that were on stage yesterday. |
| b. Maria says: "When she came back to the hotel room, Fani was at least tipsy ."
Conclusion: Maria doesn't know whether Fani was drunk when she returned to the hotel. |

just / \emptyset (*null*), and the **scalar** type: num vs. adj (3×2 Latin square). The *just* control conditions being inconsistent with the conclusion's ignorance inference are expected to obtain low rates. The same holds for the *null* conditions, if the respective scalar implicatures are computed, replicating Doran et al.'s (2009) diverse findings for bare adj and num. We had 12 items mixed with 24 fillers. The adj items were split into 6 absolute and 6 relative adj. **Results**—Mixed-effects ordinal regression analyses (baselines: *just*+adj) revealed: *At least*+num received high rates overall (see plot), confirming the robustness of SI inferences of *at least*+num. *At least*+adj was rated significantly higher than *just*+adj ($p < .01$), indicating that *at least*+adj triggers SI, though to a lesser extent than *at least*+num does (interaction: $p < .0001$). This is at odds with a uniform analysis of *at least*+num/adj. Also, the higher rates of *null*+adj vs. *just*+adj ($p < .001$) and the lack of such an effect for num are consistent with the claim that numerals are better at triggering scalar inferences than adjectives (Doran et al.'s scalar diversity). Zooming in on the two gradable adj classes, we find that the significant simple effect of *at least* in the previous analysis seems to be mainly driven by such an effect for relative adj ($p < .01$), while this was not significant for absolute adj ($p = .53$). Hence, SI inferences target a specific class of gradable adj. A potential source of this preference is the underlying scale structure of relative adj, and specifically, vagueness. **Implications**—This study provides evidence that (i) scalar diversity is relevant not only for scalar inferences but also for SI inferences, hinting at a difference in the implicature mechanism of the different scalars, (ii) the underlying scale structure of adjectives affects the availability of SI inferences, as in the case of scalar inferences of bare adjectives (Gotzner et al., 2018). The interplay of scale structure and implicature needs to be looked into.



References: Cohen, A. & Krifka, M. (2014). Superlative quantifiers and meta-speech acts. *Linguistics and Philosophy*, 37:41–90. Doran, R., Baker, R. E., McNabb, Y., Larson, M., & Ward, G. (2009). On the non-unified nature of scalar implicature: An empirical investigation. *International Review of Pragmatics*, 1:211–248. Geurts, B. & Nouwen, R. (2007). At least et al.: The semantics of scalar modifiers. *Language*, 83:533–559. Gotzner N, Solt S., & Benz A. (2018). Scalar Diversity, Negative Strengthening, and Adjectival Semantics. *Frontiers in Psychology*, 9:1659.

Original example items with glosses in all conditions

I Maria lei:
 Det Maria says
 'Maria says:'

a.' Numeral

"Ipirhan to lighotero / akrivos / ∅ dhekatris ithopii epi skinis stin parastasi pu idhame
 there were at least / exactly / ∅ 13 actors on stage at the show that watched
 hthes."

yesterday

'There were at least / exactly / ∅ 13 actors on stage at the show we watched yesterday.'

Simberasma: I Maria dhen kseri ton akrivi arithmo ithopion pu itan epi skinis stin
 conclusion Det Maria not knows the exact number actors.gen that were on stage at the
 parastasi pu idhe hthes.
 show that saw yesterday

Conclusion: 'Maria doesn't know the exact number of actors that were on stage at the show she saw yesterday.'

b.' Adjective

"Otan epestrepse sto dhomatío tu ksenodhohiu apo to
 when returned at the room the.gen hotel from the
 nihterino maghazi dhyaskedhasis, i Fani itan to lighotero / aplos / ∅ zalizmeni."
 night club Det Fani was at least / simply / ∅ tipsy

'When she came back to the hotel room from the night club, Fani was at least / just / ∅ tipsy.'

Simberasma: I Maria den kseri an i Fani itan methismeni otan epestrepse sto
 conclusion Det Maria not knows whether Det Fani was drunk when returned at the
 dhomatío tu ksenodhohiu apo to nihterino maghazi dhyaskedhasis.
 room the.gen hotel from the night club

Conclusion: Maria doesn't know whether Fani was drunk when she came back to the hotel room from the night club.'