

Does plural really mean ‘more than one’? An experimental investigation of plural interpretation as a species of scalar implicature

Research issue. Semanticists have long been puzzled by the fact that in certain cases, plural nominals can include atoms in their denotations [1,2,3,4,5,6]. If Professor Brown has exactly one book on her desk, then she cannot truthfully utter (1a), should lock her office according to (1b-c), and should answer ‘yes’ to (1d). Various researchers [1,2] have responded to the challenge presented by these data by assuming a ‘weak’ semantics for plural morphology. Hence if the set of cookies in a model M is $\{a, b, c\}$, then we have the denotations in (2a,b). Theories of this type face the challenge of explaining why a noun bearing plural morphology is typically false of singularities; that is, why (3) is false in the context we described.

Sauerland [4,5] argues that the ‘more than one’ component of the meaning of the plural arises as a scalar implicature (SI). Adopting a presuppositional treatment of number features, he proposes that whereas a number feature with the value ‘singular’ (SG) is defined only for atoms, the plural value (PL) is always defined (4). SG and PL therefore form a scale $\langle PL, SG \rangle$, where whatever is at the rightmost edge of the scale carries the most presuppositions. Given Maximize Presupposition [7], it is predicted that use of PL should implicate that the atomicity presupposition of SG is not satisfied.

Some weight is lent to this proposal by the observation that the environments in which plural nominals can be true of atoms are those in which scalar implicatures are typically suspended (Chierchia 2004): downward entailing (DE) environments, as exemplified in (1). However, this empirical landscape could also be accounted for within a weak theory of the plural without appeal to scalar implicature, since DE contexts license inferences from sets to subsets and, on any weak theory, the denotation of a singular nominal is a subset of that of its plural counterpart (2a,b). This is a case where linguistic data alone seem inadequate to adjudicate between competing accounts, and it is worthwhile to conduct an experimental investigation.

Method. We employed a variant of the covered box task [9] using cards instead of boxes, each depicting Big Bird with various items; one card was placed face down and two face up on each trial. This task capitalizes on the cancelability of SIs by observing whether participants will accept the semantically compatible visible option, or assume that the pragmatic match must be present in the non-visible option. 13 adult participants were tested one of two conditions. A familiarization phase trained participants on the idea that when there was no visible match for the description, the intended card must be the one that was face down. In the singular condition, participants heard descriptions with singular morphology (5a) but saw a card with more than one of that object; in the plural condition (5b), the visible card match displayed exactly one of that object. Sauerland's theory predicts that in the condition where a plural noun is used but does not match the visible options, the ‘more than one’ meaning of the plural should be canceled, and participants should choose the singular match.

Results. We analyzed participants’ responses on the first trial in this task. All participants consistently chose the face down card in trials where the description was singular but only a plural match was visible. In contrast, participants in the plural noun condition were equally likely to choose or reject the visible card depicting a single kite, this is significantly different from behaviour in the singular condition, Wilcoxon Signed Rank Test, $Z = -2.05$, $p < .05$. These results constitute evidence in favor of Sauerland's theory.

Discussion. Given a context that facilitates SI cancellation, participants were willing to accept a single object as the target of a plural description. Note, moreover, that this cannot be accounted for by simple flexibility in responses in this task, as participants did not accept multiple objects in the singular condition. These results also have implications for our understanding of the interaction of presuppositions and implicatures. Let's assume a presuppositional semantics for *only* [10], where ‘Big Bird only has kites’ presupposes that Big Bird has kites and asserts that Big Bird has nothing that is not a kite. Sauerland's theory predicts a choice between a strengthened presupposition, ‘more than one kite’, and a weaker one with no SI, ‘at least one kite’. In this experiment, we found that a card that satisfies the asserted component and the weaker presupposition is deemed an adequate match. It is clear that the SI of the plural is typically difficult to cancel [11], but it seems that occurrence within a presupposition facilitates cancellation, a behavior that arguably mirrors that found with other SIs occurring within presuppositional material, as exemplified in (6) [12].

Examples

- 1a. There are no books on my desk.
1b. If there are books on your desk, please lock the office door when you leave.
1c. Every professor who has books on her desk should lock her office door when she leaves.
1d. Are there books on your desk?
- 2a. $[[\text{cookie-SG}]]^M = \{a, b, c\}$
2b. $[[\text{cookie-PL}]]^M = \{a, b, c, a + b, a + c, b + c, a + b + c\}$
3. Professor Brown has books on her desk.
- 4a. $[[\text{SG}]] = \lambda x \in D_c: \text{ATOM}(x). x$
4b. $[[\text{PL}]] = \lambda x \in D_e. x$
- 5a. Give me the card where Big Bird only has a kite.¹
5b. Give me the card where Big Bird only has kites.
6. George knows that some of his advisors are crooks.
(Equally felicitous regardless whether it is presupposed that some of George's advisors are crooks, or all are (Russell 2006)).

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¹ We used ‘only’ in the instruction to prevent participants from taking the description to apply to a subset of the items on the card, as this would allow ‘a kite’ to be consistent with a card with multiple kites on it, thereby obscuring any possible effects of a scalar implicature on the plural.