The plural involves comparison

Uli Sauerland, Jan Anderssen, Kazuko Yatsushiro

Tübingen/UConn, UMass, UConn

uli@alum.mit.edu, jan@linguist.umass.edu, kazuko@mac.com

This talk makes two contributions concerning the use of plural forms. Specifically, the talk concerns the fact that plural forms cannot be used to refer to singular objects. We call this the *Anti-Singularity* of the plural. The main contribution of our talk is to show that anti-singularity is derived by a comparison: We argue that anti-singularity is not an inherent part of the meaning of the plural, but that the inherent meaning of the plural includes the singular. Instead, we argue anti-singularity is derived via a comparison with a sentence where singular has replaced plural. We present three types of evidence for this conclusion. First, we show that in specific environments in adult English, plural forms can be used to refer to singular individuals. Secondly, experimental data from language processing show that the computation of anti-singularity requires extra time. Thirdly, we show that five-year old children are unable to compute anti-singularity.

Adult Competence

Semantic accounts of the plural divide into two camps: One camp claims that the singular and plural have mutually exclusive interpretations (Bennett, 1974; Chierchia, 1998). The other camp claims that the inherent semantics of the plural does not exclude the singular, but that a comparison mechanism brings about the complementarity of singular and plural (Schwarzschild, 1996; Beck and Sauerland, 2000). Concretely, if agreement morphology is generally interpreted as a presupposition (Sauerland, 2003), both accounts would assume (1) for the singular.

(1) $\mathrm{domain}(\llbracket \mathrm{Sg} \rrbracket) = \{X \mid \#X = 1\}$

A non-comparison account of the plural would assume (2) where anti-singularity is an inherent part of the semantics of the plural.

(2) $\mathrm{domain}(\llbracket \mathrm{Pl} \rrbracket) = \{X \mid \#X2\}$

On a comparison based account, on the other hand, the presupposition of the plural could be (3) which includes the singular.

(3) $\text{domain}(\llbracket\text{Pl}\rrbracket) = \{X \mid \#X1\}$

On this account, anti-singularity is excluded by a comparison with the singular. Consider (4). The general principle Maximize Presupposition (Heim, 1991) says that (4a) can only be used when the presupposition of (4b) is not known to be satisfied. Hence, (4a) must not be used if the speaker knows that Henry has only one wife.

(4)   a.   Henry's wives are dancing.
       b.   Henry's wife is dancing.

Evidence for the comparison based account comes from four cases where the use of plural morphology is compatible with singular reference:

A) In the scope of negation in (5), the plural *books* also excludes John having read a single book.

(5)   a.   John didn't read any books.
       b.   John read no books.

B) When the singular form of a pronoun is blocked for being considered impolite, plural pronouns can be used to refer to single individuals: e.g. French *vous*, and German *sie*. The opposite shift—use of Singular instead of Plural—is crosslinguistically never found (Svennung, 1958; Head, 1978).

C) In the scope of a universal, the singular presupposition in (6a) projects universally to yield the presupposition that every boy has exactly one sister. The plural (6b) however has the complementary weak presupposition that every boy has at least one sister, and at least one boy has more than one sister. This allows *his sisters* to refer to single individuals for many of the boys.

(6)   a.   Every boy should invite his sister.
       b.   Every boy should invite his sisters.

D) The plural is used when the speaker is uncertain about the numerosity. Consider (7) in a context where we are wondering why Sam did not come for the class reunion party. If the speaker knew that Sam has at least one, but possibly more children, the plural (7a) would be used. The singular (7b) expresses that the speaker is certain that Sam has exactly one child.

(7)   a.   Sam has children.
       b.   Sam has a child.

Adult Performance

In this experiment, we tested whether the computation of anti-singularity requires additional processing time for adults. We compared the response times for questions requiring the computation of anti-singularity for the correct response with questions that do not. 43 undergraduate students participated in the experiment. 5 participants, who gave 15% or more erroneous responses, are excluded from the ANOVA.

Subexperiment 1 compared 20 items like (8). (8a) requires the computation of anti-singularity, while (8b) with *two* does not. Each subject was shown only one item of a pair of items like (8), and a total of 10 items of each type.

(8)   a.   Does a cat have noses?
        b.   Does a cat have two noses?

The response time for the questions like (8b) was on average 95 ms faster than for the questions like (8a) despite the fact that (8b) contains the extra word *two*. A t-test shows the difference to be significant ($p0.05$).

Subexperiment 2 compared items like (8) with further items like (9), where (9a) also requires the perception of plural morphology for the correct response, but not the computation of anti-singularity. This test provides an independent measure for the reading time required for *two*.

(9)   a.   Does a mouse have eyes?
        b.   Does a mouse have two eyes?

The average response time for (9a)-type questions without the word *two* was 444 ms faster than for (9b)-type questions. A two-factor ANOVA shows that the interaction between the presence of *two* and whether anti-singularity must be computed is highly significant: $p0.001$ taking both subjects and items as random factors ($p0.004$ by subjects, $p0.007$ by items).

Child Performance

Grodzinsky and Reinhart (1993); Reinhart (1995) propose that children's lack of comparison resources to explain non-adult performance on binding theory and focus tests. The results of Noveck (2001); Papafragou and Musolino (2003) can be seen as an extension of this idea to the domain of implicatures. In this experiment, we set out to test children's performance on anti-singularity. We report the result of a pilot study involving six children (age 4:0 to 5:5).

Our experiment tested 5 questions like (10) that require the computation of anti-singularity for the adult response.

(10)   Does a girl have heads?

As a control, we also tested 9 similar items like those (11) that do not require the computation of anti-singularity for the adult response.

(11)   a.   Does a fish have legs?
        b.   Does a cat have feet?
        c.   Does a boy have beek?

Finally, the experiment included a picture selection task testing whether children perceive word-final *s* with 3 sentences like (12a) that don't involve anti-singularity. When (12a) was presented, the task tested whether children correctly excluded the interpretation of (12b), which is phonetically distinguished from (12a) by the missing final *s*.

(12)   a.   Where can you see Johnnie's boards?
        b.   Where can you see Johnnie's bored?

Our preliminary result is unequivocal: Children exhibited 100% non-adult responses on items like (10) requiring anti-singularity, while giving only 6% non-adult responses to the control items like (11). A t-test indicates significance with $p < 0.0005$. On the test of perception of word-final *s* children exhibited 44% adult performance. Our result confirms and extends a pilot study of Anne Vainikka reported by de Villiers and Roeper (1991) the original data of which are lost.

Conclusion

We have shown that three lines of inquiry based on three different types of evidence argue for a comparison based explanation of anti-singularity. The processing and acquisition data furthermore corroborate the Reinhart's (1995) idea that comparison resources are a bottleneck of linguistic performance. Finally, our result points to an interesting semantics-morphology mismatch as the singular is regarded as the unmarked number in morphology (Noyer, 1992; Corbett, 2000; Harley and Ritter, 2002).

References

Beck, S. and U. Sauerland (2000). Cumulativity is needed: A reply to Winter (2000). *Natural Language Semantics*, **8**:349–371.

Bennett, M. (1974). *Some extensions of a Montague fragment of English*. Ph.D. thesis, UCLA.

Chierchia, G. (1998). Plurality of mass nouns and the notion of "semantic parameter". In S. Rothstein, ed., *Events and Grammar*, pp. 53–103. Kluwer, Dordrecht, Netherlands.

Corbett, G. (2000). *Number*. Cambridge University Press, Cambridge, UK.

de Villiers, J. and T. Roeper (1991). The emergence of bound variable structures. In *UMOP*. GLSA, University of Massachusetts, Amherst.

Grodzinsky, Y. and T. Reinhart (1993). The innateness of binding and coreference. *Linguistic Inquiry*, **24**:69–101.

Harley, H. and E. Ritter (2002). A feature-geometric analysis of person and number. *Language*, **78**:482–526.

Head, B. (1978). Respect degrees in pronominal reference. In J. Greenberg, C. Ferguson, and E. Moravcsik, eds., *Universals of Human Language, Volume 3*, pp. 151–211. Stanford University Press, Stanford.

Heim, I. (1991). Artikel und Definitheit. In A. von Stechow and D. Wunderlich, eds., *Semantik: Ein internationales Handbuch der zeitgenössischen Forschung*, pp. 487–535. de Gruyter, Berlin.

Noveck, I. (2001). When children are more logical than adults: Experimental investigations of scalar implicature. *Cognition*, **78**:165–188.

Noyer, R. (1992). *Features, positions and affixes in autonomous morphological structure*. Ph.D. thesis, MIT, Cambridge, Mass.

Papafragou, A. and J. Musolino (2003). Scalar implicatures: Experiments at the semantics-pragmatics interface. *Cognition*, **86**:253–282.

Reinhart, T. (1995). Interface strategies. OTS Working Paper 95/02, Utrecht University, Utrecht, Netherlands.

Sauerland, U. (2003). A new semantics for number. In *The Proceedings of SALT 13*. Cornell University, CLC-Publications, Ithaca, N.Y. (in print).

Schwarzschild, R. (1996). *Pluralities*. Kluwer, Dordrecht, Netherlands.

Svennung, J. (1958). *Anredeformen*. Lund.