A New Semantics for Number

The feature plural [Pl] is often morphologically realized in more than one position. A semantics of the plural must first determine which occurrences of [Pl] are actually interpreted, and which are the result of syntactic agreement. Link (1983), Hoecksema (1983), Landman (1989), Lasersohn (1995), Schwarzschild (1996) and others assume that [Pl] on nouns is interpreted. For concreteness, consider the mereological version of Schwarzschild's (1996) proposal in (1), which we call the "[Pl] on N"-analysis.

(1) $[\![\text{[Pl]}]\!](P^{\langle e,t\rangle})(X^e) = 1$ if and only if
$\forall x : (atom(x) \wedge x \sqsubseteq X) \rightarrow P(x)$

Proposal: We argue against (1) and that instead the only semantically contentful plural feature is in a position we call Agr above the determiner: the "[Pl] in Agr"-analysis. The lexical entries in (2) assign to the singular [Sg] a presupposition that its sister denote an atom, while [Pl] merely presuppose that its sister denote an individual.

(2) $[\![\text{[Sg]}]\!] = id^{\langle e,e\rangle}_{\{X|atom(X)\}}$
$[\![\text{[Pl]}]\!] = id^{\langle e,e\rangle\}}$

We assume furthermore that [Pl] can only be used if the presupposition of [Sg] isn't satisfied (cf. Heim's (1991) maximize presupposition maxim). [Pl] on N is a reflex of agreement with [Pl] in Agr, just like [Pl] on verbs.

Number in Agr is needed: Cooper (1983) argues that number marking on pronouns is interpreted as a presupposition. Our proposal predicts this as shown in (3):

(3) $[\![\text{[Sg] pro}_i]\!]^g$ presupposes $atom(g(i))$

Coordinations also require [Pl] in Agr. (4) shows that coordinations allow singular agreement, when the denoted entity is perceived as an atom.

(4) Strawberries and cream is on the menu.

On our analysis in (5), (4) presupposes that *Strawberries and cream* be atomic.

(5) [Sg](Strawberries and cream) is ...

[Pl] on N is (at least) redundant: Consider now definites. We assume that nouns are semantically numberless as illustrated in (6).

(6) $[\![\text{girl/girls}]\!](X) = 1$ if and only if
$\forall x \subseteq X : atom(x) \rightarrow x$ is a girl

We analyze *the* uniformly as a maximalizer with an existence presupposition:

(7) $[\![\text{the}]\!](P)$ is defined iff. $\exists x \neq \emptyset : P(x) = 1$
when defined $[\![\text{the}]\!](P) = \max_{P(x)=1} x$

If [Sg] is in Agr, our analysis predicts the uniqueness presupposition as shown in (8).

(8) $[\![$[Sg](the girl(s))$]\!]$ is defined if there's a unique salient girl.

With [Pl], we predict a complementary non-singularity presupposition. Hence, it's possible to interpret [Pl] only in Agr and treat [Pl] on N merely as agreement.

Avoid [Pl]: Consider (9). (9a) presupposes that every salient boy has a single sister. (9b), however, doesn't presuppose that every salient boy have more than one sister. Rather, (8b) presupposes that every boy has at least one sister, and at least one boy has more than one sister.

(9) a. Each boy here is writing to his sister.
b. Each boy here is writing to his sisters.

Our proposal predicts this presupposition: [Pl] in Agr has no number presupposition, but can be used when the presupposition of [Sg] isn't satisfied. Proponents of the [Pl] on N analysis have to adopt a similar Avoid [Pl] principle.

[Pl] on N is not interpreted: Now consider the definite in (10). (10) is felicitous if John and Bill each have a single daughter.

(10) the daughters of John and Bill

Beck (2000) argues that (10) involves cumulation of *daughter* and defines ** such that **daughter(X)(Y) is true if and only if every atom in X is the daughter of some atom in Y and vice versa. (10) is then analyzed as (11):

(11) the **daughter (J $\oplus$ B)

Though no part of (11) corresponds to the interpretation attributed to [Pl] on N by (1),

(11) denotes the group of John's daughter and Bill's daughter. "Avoid [Pl]" should predict that *daughter* must be singular. Why then is plural morphology forced in (11)? Beck proposes that ** is the interpretation of plural morphology. But, this would incorrectly predict that (12) also requires plural morphology because the salient interpretation of (12) requires cumulation of *employee*.

(12) every employee of these companies

Therefore, the [Pl] on N analysis has no account for the obligatory plural marking in (10). On our analysis, on the other hand, [Pl] in Agr is forced because (11) doesn't denote an atom. Plural marking on *daughter* in (10) is the result of syntactic agreement with Agr.

Number on Quantifiers: [Sg] and [Pl] in Agr cannot combine with a quantificational NP as its sister, but only with an expression of type e. Still, we find number marking:

(13) a. every boy is singing.
b. Some boys are singing.

We propose that quantificational NPs must move to a higher position as shown in (14).

(14) a. every boy λx [[[Sg] x] is singing]
b. some boy(s) λx [[[Pl] x] are singing.

Since *every* quantifies over atomic individuals, it requires [Sg] in (14a). With indefinites, as in (14b), the presupposition of Agr is accomodated into the existential quantifier. Hence, (14b) requires the existence of a non-singular group of singing boys to be true.

Our approach corroborates the treatment of cardinals as group indefinites (Diesing 1992) and decompositional treatments of more complex plural quantifiers (cf. Hackl 2000). Consider sketches of *three* in (15), and *most* in (16) (assume K is the singleton set containing the number of non-singing boys).

(15) a. Three boys are running.
b. $\exists X$: 3(X) $\wedge$ boy(X) $\wedge$ run([Pl]X)

(16) a. Most boys are singing.
b. $\exists X$: $\exists n$: ($\forall m \in K$: $n > m$)
$\wedge$ ([Pl] n-many boys) are singing

NPs with *all*, we analyze with Brisson (1996) as definites. Agreement of predicative nouns must be syntactic. We show furthermore that quantifier raising cannot license singular agreement with plural DPs of type e because of the interplay of maximize presupposition and obligatory syntactic agreement of bound variables.

We predict correctly that languages like English and German that have both quantificational noun phrases and agreement must allow quantifier raising, while languages without agreement (Japanese, Chinese) need not [evidence not shown in abstract].

Further Evidence: Our proposal can easily be extended to account for Person. (17) lists the presuppositions of 1st, 2nd, and 3rd person.

(17) [1]: overlap with speaker
[2]: overlap with discourse participants
[3]: be any individual

Consider the account of Person agreement with coordinations in German:

(18) a. Ich und Du sollten gehen.
I and you should-1st-Pl go.
b. Du und er solltet gehen.
You and he should-2nd-Pl go

The combination of maximize presupposition and (17) predicts that Agr in (18a) must contain [1], while it contains [2] in (18b). It seems possible, hence, that all agreement features can be semantically characterized as presuppositional.

Our results on the semantic licensing of agreement are also of interest for morphological and syntactic work in this area, which currently is semantically naive (cf. Corbett 2000, Harley and Ritter 2002).

Selected References:

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