Weak NP's in HAVE Sentences[1]

Barbara H. Partee

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Landman and Partee (abstract 1987) is an occasionally-cited abstract of a never-written paper which offers a solution to the problem of how to compositionally interpret sentences like (1) and explain the ill-formedness of sentences like (2).

(1) John has two sisters.
(2) *John has every sister.

In this short note we repeat that proposal in slightly more detail and discuss its motivation and possible modifications in the light of recent work by Szabolcsi and others.

The restrictions on NP's that can occur in *there*-sentences are closely paralleled by restrictions on NP's that can occur in relational *have*-sentences, as observed by Partee in the early 80's[2] and as illustrated below.

(3) There is/are ____ candidates for the job.
(4) John has ____ sisters.
(5) OK in (3), (4): *a, some, three, at least three, several, many, a few, no, few, at most three, exactly three.*
(6) * in (3), (4): *the, every, both, most, neither, all, all three, the three.*

Earlier characterizations of the class of NP's permitted in (1) as "indefinite" have yielded to a description in terms of the weak/strong distinction suggested by Milsark

[1] This paper is dedicated with affection to Johan van Benthem on the occasion of his 50th birthday. The early part of the work reported here was joint with Fred Landman, and its capsule history is as follows. The descriptive data and theoretical problems were due to Partee, who reported them in a colloquium presentation in Amsterdam in June 1983 entitled "Genitives, *have*, and Relational Nouns". The solution reported here to the problem of *have* in "existential" sentences posed in that talk was proposed by Landman after the talk, and Partee found many reasons to like Landman's solution better than the approach she had been exploring. But nothing was written up then. In 1986 (I think) and again in 1987 (for sure) Landman and Partee submitted an abstract on the subject to NELS conferences, but the abstract was rejected and again nothing was written up. Subsequent geographic relocations discouraged Landman and Partee from trying to prepare a joint paper on the subject. This should ideally be that joint paper, but Partee thought of doing it now too close to the submission deadline to enlist Landman's participation. So Fred Landman should get credit for the most important idea in the paper, but Partee takes all of the blame for the way it is presented and developed here. I am also grateful to Anna Szabolcsi for stimulating discussions about genitives and *have*-sentences in Nijmegen in 1983, and to Per Anker Jensen, Carl Vikner, and Vladimir Borschev for new discussions, mostly about genitives but occasionally about *have*, over the last three years. Thanks to Robin Schafer for additional discussion of *have*-sentences. Thanks are also due to the National Endowment for the Humanities for a fellowship in 1982-83 and to the Max Planck Institute for Psycholinguistics for hosting me during 1982-83, when the early phase of my work on this topic took place. And thanks to Johan van Benthem for many stimulating conversations on indirectly related topics during that year.

[2] The observation was made in comments to colleagues and in the 1983 colloquium presentation in Amsterdam mentioned in the footnote 1. It is reported with attribution in published works of de Jong (1987), Szabolcsi (1986, 1994), and others.

(1977) and given varying formal explications in the work of Barwise and Cooper (1981), Keenan (1987), de Jong (1987), Diesing (1990, 1992). Heim (1987) suggests a synthesis of the novelty/familiarity theory of definiteness with the weak/strong distinction of Barwise and Cooper. De Jong (1987) and Diesing (1990, 1992) propose that the relevant notion of strength rests on the presence of an existential presupposition in the noun phrase. Szabolcsi (1994) agrees with the presuppositionality characterization and views strength as amounting to a kind of specificity, with definiteness a special case of specificity.

There sentences have long played an important role in explorations of the syntactic and semantic properties of determiners and NP's, and have themselves been the focus of much investigation in syntax and semantics, while *have-* sentences and the corresponding restrictions in them had received relatively little attention before the last decade or so; Keenan (1987) was one of the earliest explicit discussions in print. The analysis of *have*-sentences does not follow automatically from any familiar analysis of *there*-sentences, and the relational interpretation of the nouns heading the post-*have* NP in sentences like (4) raises interesting challenges for a compositional interpretation. Outside of the tradition of formal semantics, the relation between existential *be* and *have*-sentences has been discussed from theoretical and typological perspectives; see Bach (1967) and Freeze (1992). And the relation between *have*-sentences and possessive or genitive constructions has been a topic of recent investigation by Jensen and Vikner (1994, 1996) and by Szabolcsi (1986, 1994), who offers a detailed syntactic and semantic analysis of the relation among possessive constructions, *have*-sentences, and existential sentences in Hungarian.

The basic problem for compositionality presented by existential *have*-sentences like (4) can be described as follows.

On the one hand, the NP following *have*, like the NP in existential *there*-sentences, appears to be a complete NP (or "DP", following Abney (1987)). It must be an "indefinite" (weak) NP, but the range of determiners illustrated by the list in (5) shows that it is not limited to the possibly <e,t> type of predicative NP's (actually, <e,<e,t>> type in this case, since these are relational NP's), which exclude determiners like *few* and *exactly three* (and in English normally exclude *no*); these would be classified as NP's in a system making the NP/DP distinction, which we are not making here. The indefiniteness restriction also eliminates all prototypical e-type NPs from this position, such as proper names and NPs headed by *the, this, that.* So it is most natural to assume that it is a normal NP interpreted as a generalized quantifier, and to look for a semantic explanation of its required weakness along the lines of the explanations that have been proposed for the indefiniteness requirement in existential *there*-sentences.

On the other hand, if we start from the evident meaning of the sentence as a whole and try to see how to build it up compositionally, it is not clear how the NP following *have* can be interpreted as a generalized quantifier, of type <<e,t>,t>[3], when it contains a relational head noun *sister* one of whose argument places is filled by the subject *John.* The meaning of the whole sentence is given in (7); the meaning of the

[3] In this paper we ignore intensions; all types given are simplified extensional variants.

VP is given in (8). The problem is then how to find reasonable meanings of *have* and *a sister* which can combine to give the meaning in (8).

(7) *John has a sister*: $\exists x[\textit{sister-of'}(j)(x)]$
(8) *have a sister*: $\lambda y[\exists x[\textit{sister-of'}(y)(x)]$

The solution of Landman and Partee (1987) is to give *a sister* a meaning which is not of the simple generalized quantifier type, but rather of an "unsaturated" relational generalized quantifier type <<e,t,>,<e,t>>, as given in (9), and to give *have* the meaning in (10).

(9) *a sister*: $\lambda P\lambda y[\exists x[\textit{sister-of'}(y)(x) \,\&\, P(x)]]$
(10) *have*: $\lambda \boldsymbol{R}[\boldsymbol{R}(\textit{exist})]$
where $\boldsymbol{R}$ is of type <<e,t,>,<e,t>>, and *exist* is $\lambda z[z = z]$.

We have borrowed the name *exist* from Keenan (1987) (in earlier work he called the same property "Mercy"); it is the property that holds of every entity in the domain. Keenan's *exist* can be identified with the property $\lambda z[z = z]$ used by Barwise and Cooper (1981) in their analysis of existential *there*-sentences.

The meaning of the determiner *a* in its occurrence in (9) is as given in (11b), contrasted with its normal meaning in (11a)[4]. For other determiners, the corresponding "relational NP" versions can be obtained by the general rule in (12).

(11) a. Normal *a*: $\lambda Q\lambda P[\exists x[Q(x) \,\&\, P(x)]$
b. Relational *a*: $\lambda R\lambda P\lambda y[\exists x[R(y)(x) \,\&\, P(x)]$
where P,Q are of type <e,t>, R of type <e,<e,t>>

(12) If Det has a normal translation $\lambda Q\lambda P[\Phi(Q,P)]$, i.e. Φ, then its translation as a "relational" Det is $\lambda R\lambda P\lambda y[\Phi(R(y),P)]$.

To defend this analysis, we need to show (a) that it gives the right results in *have*-sentences, and (b) that the given translations can be motivated and are not simply *ad hoc*.

First of all, it can easily be checked that applying the given translation of *have* to the given translation of *a sister* and doing λ-reduction leads, as desired, to the formula in (8). It can similarly be checked that the same holds for the full range of determiners in (5). We give one illustration in (13).

(13) a. $\textit{few}_{Rel}$: $\lambda R\lambda P\lambda y[\boldsymbol{\textit{few'}}(R(y),P)]$
b. *have few friends*: $\lambda y[\boldsymbol{\textit{few'}}(\textit{friend'}(y), \textit{exist})]$
c. *John has few friends*: $\boldsymbol{\textit{few'}}(\textit{friend'}(j), \textit{exist})$

And it is encouraging to see that we also get the right result with conjoined NP's following *have*, assuming the generalized conjunction of Partee and Rooth (1983).

[4] Here, as in our original proposal in 1987, we are simply assuming the Montagovian generalized quantifier treatment of indefinites. Adaptations of the proposed solution to other treatments of indefinites are an open issue that we have not explored.

(14) a. *a brother and a sister*: $\lambda P\lambda y[\exists x[brother\text{-}of'(y)(x) \ \& \ P(x)]]$
$\lambda P\lambda y[\exists x[sister\text{-}of'(y)(x) \ \& \ P(x)]]$
$= \lambda P\lambda y[\exists x[brother\text{-}of'(y)(x) \ \& \ P(x)] \ \& \ \exists x[sister\text{-}of'(y)(x) \ \& \ P(x)]]$
b. *have a brother and a sister:* $\lambda y[\exists x[brother\text{-}of'(y)(x) \ \& \ \exists x[sister\text{-}of'(y)(x)]]$

This is important, because as we see in (15), conjoined post-*have* NPs can each have their own determiner, not necessarily of the same monotonicity. This is a strong argument against the possibility (explored in Partee (ms. 1983)) of treating the post-*have* NP as an <e,<e,t>>-type relational common noun phrase, with its "determiner" really a modifier. Such an approach would be analogous to the <e,t>-type meanings proposed in Partee (1987) for predicative NPs (true "predicate nominals"). That approach works well for predicate nominals, which have a more restricted set of possible "determiners", but does not work well for these post-*have* NPs. On the present analysis, on the other hand, the examples in (15) all work as straightforwardly as the one in (14).

(15) a. John has two sisters but no brothers.
b. John has many friends and exactly two enemies.
c. John has a brother, two sisters, and at most four cousins.

Furthermore, this analysis explains the restriction to weak NP's in a way exactly analogous to Barwise and Cooper's explanation of the corresponding restriction in *there*-sentences. The interaction of strong NP's with the predicate *exist*, which is true of every entity in the domain, makes existential sentences containing strong NP's come out either tautologous, contradictory, or else asserting or denying something they already presuppose. We leave the derivations as an exercise for the reader. On approaches which identify strength with presuppositionality, the anomaly would always be of the latter sort. That would be an advantage, since otherwise one has to try to tell a convincing story about why these tautologies and contradictions are perceived as semantically anomalous, not merely as tautological or contradictory. In any case, on this approach, it seems that any good explanation of the weakness restriction in *there*-sentences will extend directly to *have*-sentences.

So the analysis does well in terms of covering the data. But where do these meanings come from? Are they simply *ad hoc* stipulations?

As many authors have argued, *have*-sentences like these are a species of existential sentences, a claim we have implicitly accepted in starting from the translation in (7). So let us review the treatment of *there*-sentences to put the analysis of *have*-sentences in context. One of the earliest attempts to capture the interpretation and explain the definiteness restriction in *there*-sentences came in the classic work of Barwise and Cooper (1981). Barwise and Cooper analyze a *there*-sentence (without trying to take apart the *there* and the *is/are*) as in (16).

(16) *There is/are NP*: $NP'(\lambda x[x = x])$ or equivalently $NP'(exist)$.

We suggest that the "dummy" predicate *exist* introduced in the analysis of *have* in (10) and the analysis of existential *there*-sentences in Barwise and Cooper (1981) is the existential generalization of a missing XP argument in a construction whose full form is *have* NP XP (with relational NP) or *there be* NP XP, as in (17).

(16) a. John has a friend on the committee.
b. There is a unicorn in the garden.

Ignoring the problem of how to account for the intuition that the predicational structure, or perhaps the information structure (topic-comment structure), in existential sentences is in some sense "reversed" from that in normal subject-predicate sentences, we can give the semantics for these structures as follows:

(17) a. *have a friend on the committee*: $\lambda y[\exists x[friend'(y)(x) \,\&\, on\text{-}committee'(x)]$
b. *have on the committee*: $\lambda \boldsymbol{R}[\boldsymbol{R}(on\text{-}committee')]$
c. *have* (with coda): $\lambda Q[\lambda \boldsymbol{R}[\boldsymbol{R}(Q)]]$

(18) a. *There is a unicorn in the garden*: $\exists x[unicorn'(x) \,\&\, in\text{-}the\text{-}garden'(x)]$
b. *there is in the garden* $\lambda \boldsymbol{P}[\boldsymbol{P}(in\text{-}the\text{-}garden')]$
c. *there is/are* (with coda): $\lambda Q[\lambda \boldsymbol{P}[\boldsymbol{P}(Q)]]$

If we say in each case that the existential construction (*have* or *there is/are*) has an extra argument place for a "coda" constituent, perhaps typically a locative though this is a big subject for further discussion, then in the absence of the coda constituent, it is reasonable that the result should be existential quantification over a corresponding variable, just as in the case of "missing objects" with intransitive versions of *eat* and *read*. The results would be as follows:

(19) a. *there is/are* (without coda): $\lambda \boldsymbol{P}[\exists Q[\boldsymbol{P}(Q)]] = \lambda \boldsymbol{P}[\boldsymbol{P}(\lambda z[z = z])] = \lambda \boldsymbol{P}[\boldsymbol{P}(exist)]$
b.*have* (without coda): $\lambda \boldsymbol{R}[\exists Q\,[\boldsymbol{R}(Q)]] = \lambda \boldsymbol{R}[\boldsymbol{R}(\lambda z[z = z])] = \lambda \boldsymbol{R}[\boldsymbol{R}(exist)]$

That gives some independent motivation for the *exist* predicate in both kinds of existential sentences. (This may be seen as one possible formalization of the frequently felt intuition that "exist" *simpliciter* means "exist somewhere".)

But there still remains the question of motivating the interpretation of the relational NPs in the *have* sentences and the corresponding occurrence of the relational NP variable $\boldsymbol{R}$ in the interpretation of *have*. Partee (1983/1997) defends (with some hesitation) a relational type, <e,<e,t>>, for inherently relational common nouns (TCN: "transitive common noun") like *sister, friend* as part of the analysis of the genitive construction *John's sister, John's friend*, and Partee and Borschev (to appear) argue for a modified version of the analysis of Jensen and Vikner (1994) in which non-relational common nouns are coerced to relational meanings when occurring with a genitive NP. But on those analyses, the full NP *John's sister* is still of the ordinary generalized quantifier type, <e,<e,t>>. Thus that analysis of genitives does not lend any support to the kind of relational NP type that is posited in (9). And in fact Landman and Partee (ms. 1987) had no independent motivation for the use of that type; its motivation was simply its success in accounting for the data.

The more recent work of Szabolcsi (1994) on possessives and *have*-sentences in Hungarian suggests a different way of looking at the analysis proposed above, which would relate it both to existential sentences and to possessive constructions, both of which it should clearly be related to. Space does not permit a full review of

Szabolcsi's analysis and arguments; we present them in an extremely condensed and superficial form. Szabolcsi argues that Hungarian *have*-sentences are existential *be*-sentences involving possessor extraction; i.e. that the Hungarian surface analogue of *John has a sister* has an underlying structure roughly like *there-is a sister of John's.* There are many important differences between Hungarian and English syntax, making such a derivation much less "abstract"-looking for Hungarian than a similar derivation would be for English. But for present purposes, without making any actual claims about derivation, let us look at how such a relationship might make sense of the types posited above for *have*-sentences.

First we should review some basics of English genitive or possessor[5] constructions. Again abbreviating, following the presentation in Partee (1983/1997) and that in Partee and Borschev (to appear), we can say that the basic genitive construction is the postnominal one, and it takes an e-type NP in the genitive:

(20) Postnominal genitive, the "inherent *R*" type:

teacher of John's:	$\lambda x[\textit{teacher}(\text{John})(x)]$	type: <e,t>
of John's:	$\lambda R[\lambda x[R(\text{John})(x)]]$ or equivalently, $\lambda R[R(\text{John})]$	type: <<e,<e,t>>,<e,t>>
[$_G$ *'s*]:	$\lambda y \lambda R[R(y)]$	type: <e, <<e,<e,t>>,<e,t>>>

Then, departing slightly from the presentation in those papers, we introduce two more constructions for the genitive (here I am inspired by Szabolcsi 1994, although not exactly following her). First, for English prenominal genitives, there is the fusing of the genitive NP, still type e, with an implicit definite article by function-composition.

(21) Prenominal genitive:

$[\textit{John's}]_{\text{DET}}$ $\lambda R[_z[R(\text{John})(z)]]$ type: <<e,<e,t>>,e>

= $\text{TR}([\textit{the}]_{\text{DET}}) \bullet \text{TR}([\textit{of John's}])$

where $\text{type}(\text{TR}([\textit{of John's}])) =$ <<e,<e,t>>,<e,t>>

and $\text{type}(\text{TR}([\textit{the}]_{\text{DET}}))$ = <<e,t>, e>

Then there is the possibility of quantifying in a full generalized quantifier-type NP, type <<e,t>,t>, into a e-type genitive NP like (in MG terms) *he$_3$'s* in *he$_3$'s sister* or *one sister of he$_3$'s* to derive NP's like *each boy's sister* or *one sister of each boy's.* I give no actual syntactic analysis, but simply assert that since English NP's do not have the kind of "escape hatch" that Hungarian NP's do, the scope of a quantified NP in an English genitive NP construction is strictly limited to the "periphery" of the containing NP, a scope limitation that was built in a stipulative way into the analysis of genitives in Bach and Partee (1980) and Partee and Bach (1981).

(22) Quantifying into the genitive NP in an "NP's TCN" and "Det TCN of NP's" constructions[6].

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[5] I am not distinguishing between the terms *genitive* and *possessive*; both are frequently used in the literature, sometimes distinguishing between them and sometimes not.

[6] In Hungarian, there is a possessive suffix on the head noun; Szabolcsi takes that suffix as introducing the e-type argument position that gets quantified into. For English, the syntax at this point needs further investigation. It is harder to get a full range of quantified genitive NP's in the postnominal position, and there are restrictions between postnominal quantified genitive NP's and the choice of head NP determiner that need to be explained.

a. [*each boy*]$_3$ [*his$_3$ sister*] : λ*P*[*each boy'* (λ*x$_3$*[*x$_3$'s sister'* (*P*)])]
(the set of properties *P* such that each boy's sister has *P*, i.e. such that for each boy, the sister of that boy has *P*)

b. [*each boy*]$_3$ [*a sister of his$_3$*] : λ*P*[*each boy'* (λ*x$_3$*[*a sister of x$_3$'s'* (*P*)])]
(the set of properties *P* such that a sister of each boy's has *P*, i.e. such that for each boy, a sister of that boy has *P*)

Now how does this relate to existential *have*-sentences? If we think of the postnominal genitive as the basic genitive construction, and think of relational nouns as "wanting" a genitive argument, then whether we adopt such a move syntactically for English or not, we can motivate the semantic structure above by saying it is "as if" the subject of the *have*-sentence is a moved instance of a quantified-in possessor:

(23) *John$_3$ has a sister-of-x$_3$'s.* Or: John is an *x$_3$* such that there is a sister of *x$_3$*'s.

In *have* sentences, there is much more independence of determiners in the two NPs than there is in possessive constructions; so English *have*-sentences look more like their Hungarian counterparts than English NPs with possessives do. (Hungarian NPs with possessives allow two determiners with great freedom, allowing things analogous to **few students' every book*.)

(24) a. Most boys have at least one and at most four sisters.
b. Every student has a brother and a sister.

If we imagine (24b) to be a way of saying "there is, for every student, a brother of his and a sister of his" as the Hungarian analogue would be analyzed on Szabolcsi's account, then the "λ*y*" we see on the translation *have a sister* in (8) and of *have few friends* in (13b) is not the usual subject-seeking argument, but is rather the abstractor that always accompanies a quantifying-in rule. And the placement of the λ*y* in the translations of *a sister* in (9) and *a brother and a sister* in (14a) reflects the place where the generalized quantifier must end up having its scope in the possessive construction, as seen in (22).

Of course, it would take much more work to really motivate all the properties of this analysis – or, probably better, to improve it into one that could be more fully motivated --, including much more attention to the syntax of the NP and the syntax of existential constructions of both types.

There are a number of loose ends left by this brief sketch. I have not said anything about the relation of "existential *have*" to the true "verb" *have* (roughly, 'to have at one's disposal'), topics that are discussed by Jensen and Vikner (1996), Szabolcsi (1994), and Heine (1997). Another important loose end, which was left as a promissory note in Landman and Partee (ms. 1987) and which remains to be fulfilled, is the need for a discussion of the status of the above-mentioned "codas" in existential sentences, their relation to locatives, and careful examination of the arguments in the literature concerning whether and when a potentially single NP like *two sisters in the Navy* occurring in an existential sentence of either type is to be regarded as one

constituent and when as two. These should all be important parts of the story, but they must all be left for more thinking on another day.

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