

which can also be felicitously uttered in contexts which require us to interpret the relation in question as deviating substantially from any narrow notion of ownership, possession or control.

The second obvious problem faced by the traditional analysis of the genitive concerns the uniqueness requirement which comes along with Russellian semantics for the definite description operator as it appears in (3). There are, of course, some instances in which a requirement appears to be in force. For instance, it appears infelicitous to say

(6) #My cat is orange; my other cat is black

But at the same time, the following parallel sentence seems perfectly fine

(7) My brother got married last month; my other brother was the best man

when uttered in a situation where the speaker has more than one brother.

Problems for current analyses

I will refer to the fact that felicitous uses of genitive constructions in English deviate from the Russellian analysis embodied by (3) respectively as the *relational problem* and the *uniqueness problem*. It is my contention that an adequate analysis of the semantics and pragmatics of genitive constructions ought to explain both.

The relational problem is dealt with in a number of recent treatments of the genitive: e.g. Jensen & Vikner (2004), Storto (2004). These proposals attempt to handle the potential variability in the relation which may obtain between a speaker and the object denoted by a successfully-denoting utterance of a genitive expression *my P* in two different but related ways: a double semantic analysis, and a recourse to the lexicon. They appear to approach the problem by shoehorning the source of this relation into the semantics (and sometimes the syntax) of either the genitive, the head noun of the object *P*, or both.

The first way includes two separate semantic representations for the pre-nominal genitive.¹ These two representations, their *Constructional interpretation* and *Control interpretation*, are as follows:

Constructional: $\lambda P[\lambda R[\lambda P[\lambda u[\exists x[\forall y[R(u)(y) \leftrightarrow y = x] \& P(x)]]]]]$

Control: $\lambda P[\lambda Q[\lambda P[\lambda u[\exists x[\forall y[[control(u)(y) \& Q(u)] \leftrightarrow x = y] \& P(x)]]]]]$

The Constructional interpretation is meant to represent the type of relation that is available when the genitive combines with a relational N-bar, the relation being derived “either from the Argument structure, or from the Constitutive role, or from the Agentive role of the head noun” [Jensen & Vikner 2004: 9]. The Control interpretation takes care of the remaining cases, presumably those where a more clear-cut “control” type relation can be posited to obtain between the two nouns. It appears

¹ Their analysis focuses on the ‘s construction, however it is intended to cover all relationships potentially categorized as genitive, including the possessive pronoun cases.

that they did attempt to work in a Montague-style quantificational interpretation of the definite article, as seen in the lambda expressions above.

The use of the universal quantifier in this way seems to be intended to ensure that there is only one x satisfying the condition, thus ensuring definiteness. However, as their analysis progresses, they drop this feature from their interpretation and are left with an indefinite expression. This is a problem because although the issue of uniqueness does not appear to be constantly present in all genitive constructions, it is clear that many do implicate, if not entail, that there be no more than one object standing in the relation. Indeed, the very sporadic nature of this uniqueness requirement should be explained by any analysis of the genitive.

But lack of definiteness is not the only flaw in their analysis. Jensen & Vikner also rely heavily on the lexicon to provide their relation in each case. This is the second way in which they attempt to account for the variability of the nature of the relation that obtains. According to their analysis, “the control interpretation is the interpretation that is most salient in examples such as *Ann’s car*, *Bill’s pencil*, *her pearl*, *his stone*, *my monkey*, *your apple*, *our room*, when the context does not indicate a particular pragmatic interpretation” (Jensen & Vikner 2004: 11). But note that it is difficult to imagine how to go about figuring out what it might mean for one interpretation to be “most salient” if the context does not supply such information. In fact, it doesn’t seem possible to define what “salient” might mean without recourse to the idea of a context. Take an example sentence such as “The sheep strolled across the meadow.” Outside of any context, it is impossible to know whether the sheep, or the meadow, or the act of strolling itself is the most salient constituent of that sentence. For note that the sentence could be uttered in response to a number of different questions, such as “where did the sheep go?” or “which animals have been by here?” It is certainly true that *salient* is a term that has a number of varying definitions in the current literature; however they all do make reference to a context or a discourse in which the salient element is embedded.

If proponents of this view are not able to rely on the context to provide the nature of the relationship in question, then given that it is not unambiguously determined by their semantic interpretation of the genitive (nor could it possibly come from the syntax), the only remaining place to look in order to determine the nature of the relation which is required for the interpretation of the sentence in question is in the semantics of the head noun itself.

The primary component of Jensen & Vikner’s analysis is in fact taken up by an elaborate explanation of how the various possible relations which a speaker can bear to an item falling under a head noun P may be taken to be stored along with the lexical entry for P . One of the cases they consider is nouns denoting regions of the earth: e.g. *forest*, *lake*, *sea*, *city*, *country*, *island*, etc. As these terms denote physical objects, their denotations have physical parts, which are in turn denoted by another class of nouns such as *rock*, *soil*, and *water*. According to Jensen & Vikner, what licenses the acceptability of constructions such as

(9) the lake’s surface water

(10) the island’s fertile soil

is that terms such as *water* and *soil* are marked *in the lexicon* in some manner that encodes the fact that the items in the classes of objects they denote may be material constituents of the objects denoted by other concrete nouns like *lake* and *island*.

Regions can also designate habitats, and so any nouns referring to types of plants or animals must also be listed in the lexicon as possible parts of a region (Jensen & Vikner 2004: 15), thereby licensing *the lake's fish* and *the island's birds*. They go on to note that a "social region noun" can also refer to the human society which is located in the region. And parts of human societies are their physical and cultural artifacts. So *Iceland's chieftains* can be explained due to the fact that *chieftain* is listed in the lexicon as a part of human society, and therefore part of a region, and this lexical item passes the nature of its status as a potential part of human society to the genitive particle, thereby selecting which of the relations is to be interpreted. The mechanics of how this selection occurs is via a meaning-shifting operator which takes the noun in question as an argument and returns a particular argument which is then itself passed to the genitive construction.

Despite the apparent ability of Jensen & Vikner's analysis to explain the broad variance in the relations which may link the speaker to the denoted object in genitive constructions, their proposal suffers from a significant drawback. In particular, they rely so heavily on the lexicon in order to account for the acceptability of various genitive constructions that if their aim is to achieve full generality, their analysis must become extraordinarily complex and domain specific. Note, for instance, that one of the possible relations which may obtain between the speaker and the object denoted by the expression *my horse* as it occurs in (5a) is that of the former having bet on the latter. According to J & V's account, this would be explained in terms of storing this potential relation in the lexical entry for *horse*.

But on this sort of account, the noun *dung beetle*, for example, is presumably not listed in the lexicon as an animal that is customarily raced, and upon which bets can be placed. However, nothing prevents us from starting to race dung beetles as a sport, at which point one might felicitously exclaim, "My dung beetle is going to win." At this point Jensen & Vikner would presumably have to predict that the lexical entry for *dung beetle* would be updated so as to include *bet on* as a potential relation in which a speaker may hold to a dung beetle in order to license the use of "my dung beetle."

An even worse problem arises when we note that the sentence "My dung beetle is going to win" seems to be felicitous if we are to imagine the sport of dung beetle racing. So is the notion of "potential to be raced" currently stored in the lexical entry for *dung beetle* as it stands now? The complexity of the lexicon on the Jensen & Vikner account is bounded only by our imaginations, in that case.

Pertainedness and the Per relation

I will now advance an analysis of genitive constructions which I believe remedies these problems while also solving the uniqueness problem which Jensen & Vikner do not attempt to address directly.² On this proposal, the semantic contribution of

² At one point in their paper they present a derivation which includes definiteness, but they go on to discard this portion of the analysis (somewhat inexplicably). See "leaving out this subpart..." on p. 9 of Jensen & Vikner (2004).

the genitive construction is to determine a relation R —which I will refer to as a *pertainedness relation*— which serves to link a speaker and an object. While in statements of the form *My P is Q* the head noun will contribute to the manner in which R is determined, R is not itself determined exclusively by the lexical information conveyed in an utterance of such a statement. Rather, I maintain that the context in which such a statement is uttered plays an essential role in the determination of R .

To a first approximation, my proposed account of the logical form of a statement *my P is Q* will thus take the form

$$(3') \quad Q(\iota x \exists R [Per(R, P) \wedge R(I, x) \wedge P(x)])$$

Note that this formula does not assert that the speaker bears any particular relation to any particular object, but rather that *there exists* a pertainedness relation which bears the relation I have denoted by *Per* to the head noun P . This relation is intended to correspond to a higher-order notion of relatedness which holds between a relation R and a property P just in case in a given context (which, as will emerge below, I am assuming has an effect by delimiting the range of the initial existential quantifier) the speaker would be entitled to refer to an object satisfying P as “*my P*” if he bore R to it.

In order to illustrate how the analysis operates in practice, consider again the sentence

(5 a) My horse is going to win!

as it might be uttered respectively by a horse breeder (context c1), a jockey (context c2) and a bettor (context c3). Examining these contexts in more detail will shed light on precisely how *Per* works. In c1, sentence 5a is uttered by a horse breeder. Presumably, his interlocutor is aware that he is the breeder of a horse in the race, the sentence is uttered at the racetrack (or some other venue where watching the race is possible), and he is not in contact with additional horses at the time of utterance. The context c1 thus is involved in the work of *Per* as it restricts the set of relations which might hold between the speaker and the horse. So looking at the expression in (3') (reprinted here), we see a context-sensitive relation *Per* which picks out all potential relationships which could conceivably hold between the speaker and the object in question, and as long as one of those relations does hold, and the x is unique, then the sentence is true.

$$(3') \quad Q(\iota x \exists R [Per(R, P) \wedge R(I, x) \wedge P(x)])$$

In other words, Q holds of the unique x such that there exists a relation R which bears an appropriate pertainedness relation to P according to the context, is such that R holds between the speaker and x , and is such that it additionally satisfies P .

This analysis, with its reliance on pragmatics and underspecification, has the added feature of tolerating ambiguities as to the appropriate notion of relatedness between the speaker and the referent of *my P*, as occasionally occur in ordinary discourse. For instance, if (5) were overheard at the racetrack, a hearer might fail to realize what relationship the speaker was asserting to hold between himself and the horse he takes to be the likely winner. But uttered in the context of a discussion on betting, a hearer could employ the Gricean Maxim of Relevance (Grice 1975) to

conclude that the relevant *Per*-licensed relation between the speaker and the horse was that of the former having bet on the latter.

Explaining uniqueness

The remaining phenomenon to be explained is that of uniqueness. In some instances, it appears to be completely felicitous to utter *my P is Q* when there is more than one object satisfying *P* to which the speaker bears the appropriate contextually determined relation. An example such as

(11) My sister is a doctor and she recommends vitamins

can, for instance, be felicitous in a discourse concerning dietary supplements, even if the speaker has more than one sister. However, if the speaker is involved in a discourse concerning siblings, where speaker B has more than one sister, the following example appears infelicitous:

(12) A: Do you have any siblings?

B: Yes, my sister is a doctor and my brother is a teacher.

In uttering the first conjunct of his reply in (9), B has strongly implicated that he only has only one sister. However the speaker in example (8) has done nothing of the sort.

To explain this apparent conflict, I propose a solution which involves function composition, triggered by the salience of the predicate *Q* (in a construction such as *my P is Q*) to the context of the discourse. Function composition has been put forth as an explanation for a variety of phenomena (e.g. Dowty 1988, Jacobson 1992, Barker 2004). To function compose two functions, *f* and *g*, is to create a new function $f \cdot g$ that is the result of applying *f* to the result of applying *g*. So $f \cdot g(x)$ is equivalent to $f(g(x))$. It is vital to note that the final outcome of composing two functions and then applying the resulting function to an argument is equivalent to applying the two functions in order, the second taking the output of the first.

I extend the work of Barker (Barker 2004) on possessive weak definites, which observes that constructions of the form

(13) I hope the cafe is located on the corner of a busy intersection

do not require that there be a unique corner of the intersection; in fact they are completely felicitous in occurrences such as (13) where it would be impossible for the corner to be unique. In order to formalize this intended reading, he employs an analysis based on composing the semantics constituents in a non-standard order. As Barker puts it,

...the composition of two functions *f* and *g*, written as $f \cdot g$, is defined as in (70):

(70) Function composition: $f \cdot g \equiv \lambda x.f(gx)$

This definition gives rise to the simple theorem (given in (71))

(71) Theorem: $(f \cdot g)h = (\lambda x.f(gx))h = f(gh)$ (Barker 2004).

By way of illustration, if $f = [[the]]$, $g = [[corner]]$, and $h = [[of\ the\ intersection]]$, the two available readings are the standard

$$(14) f(g(h)) = the(corner(of\ the\ intersection))$$

and the function-composed reading

$$(14') (f \cdot g)(h) = (the \cdot corner)(of\ the\ intersection)$$

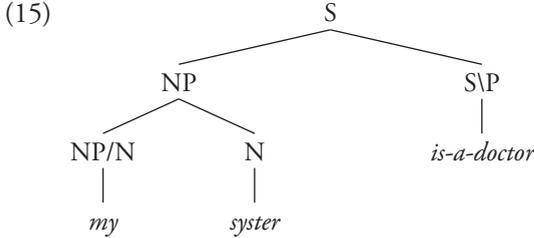
In the second of these analyses, the determiner combines first with the relational noun $[[corner]]$, and then with the prepositional phrase. This yields the interpretation that it is the corner (and not the middle, or the side) of the intersection that is denoted, thereby preserving uniqueness in picking out one possible location related to the intersection, not one possible corner.

I propose to use a similar analysis of possessives of the form *my P is Q*, illustrating the function compositional approach with categorial grammar. Much like simple-typed lambda calculus, categorial grammar can capture the combinatorial possibilities of various elements in a sentence, but unlike lambda calculus, which only has one function type, categorial grammar has directional function types which specify whether their argument comes from the right or left. The notation as standardly used employs left-leaning and right-leaning slashes to indicate this difference. Expressions are written as the category of expression they yield, followed by a slash indicating the location of their argument (either \backslash to indicate the argument is to the left of the expression or $/$ to indicate that the argument is to the right), followed by the type of expression they take as an argument. To illustrate, a determiner can be considered to be of type $NP \backslash N$, indicating that it takes an argument of type N to its left, yielding an expression of type NP .

Note that expressions can use parentheses as a means of expressing more complicated types. A transitive verb could be written as $(S \backslash NP) / NP$ indicating that it is an expression which takes an expression of type NP to its right, yielding an expression of type $(S \backslash NP)$, which reflects its status at this point in the derivation as a partially saturated verb, equivalent to an intransitive verb in that both are looking for an argument of type NP to the left in order to form a complete sentence of type S .

As detailed by Jacobson (Jacobson 1999), the function composition operator can be viewed combinatorily as taking an expression of category A/B and one of type C into one of category $A/(B \backslash C) / C$. To break this down further, it will be useful to look into how these expression types take the same arguments and ultimately yield the same result. The difference is in the order in which the arguments are applied. An expression of type A/B is an expression that takes an expression of type B to the right and yields an expression of type A . If the function composition operator is applied to this expression, it results in an expression of type $A/(B \backslash C) / C$. This is an expression which takes an argument of type C to its right and yields an expression of type $A/(B \backslash C)$. This last expression is one which takes an expression of type $(B \backslash C)$ to its right, and yields an expression of type A . And an expression of type $B \backslash C$ is one that takes a C to its left and yields an expression of type B . So ultimately in both cases we have applied arguments and ended up with an expression of type A . Semantically, this operator can be seen as shifting a function f to $\lambda gh.f(gh)$.

Taking the examples (11) and (12), a standard categorial grammar account of the constituent *my sister is a doctor* is illustrated in the following:



As we see above, the verb phrase *is-a-doctor* is an expression of type $S\backslash NP$, which is to say it is an expression which takes an expression of type NP to its left and yields a sentence (type S). The expression *my* is very much like a determiner in that it takes an expression of type N to its right and yields an expression of type NP . The expression *sister* is this N , and the expression *my sister* is the NP which forms the argument to the verb phrase *is-a-doctor*.

Example (15) illustrates the standard account with no function composition. This would be the reading which requires uniqueness, as in example (12). However, we also need to account for the additional reading as available in (11), where no uniqueness appears to be required for the sentence to be felicitously interpreted, as it would be in (12). In order to achieve the second reading, note that the function composition operator can take $[[is\ a\ doctor]]$ and lift it, as in

$$(16) S\backslash NP \rightarrow (S\backslash(NP/N))\backslash N$$

Recall example (11):

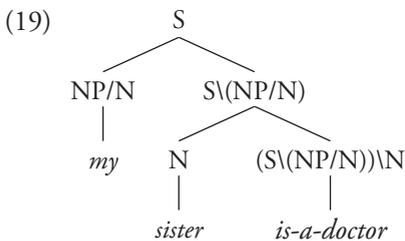
(11) My sister is a doctor and she recommends vitamins

In this example, because the discourse has made the medical profession particularly salient, the predicate Q ($[[is\ a\ doctor]]$) is able to compose with the predicate $[[sister]]$ and yield the correct result. Assuming that $f = [[my]]$, $g = [[sister]]$, and $h = [[is\ a\ doctor]]$, we see that both readings are possible:

$$(17) (f(g))(h) = (my)(sister)(is-a-doctor)$$

$$(18) (f)(g \cdot h) = (my)(sister \cdot is-a-doctor)$$

The tree in (15) corresponds to (17), the first reading. The illustration of the second reading, (18), is as follows:



The tree in (19) shows the effect of function composition. The predicate *is-a-doctor* has been lifted by the function composition operator from type $S \setminus NP$ to become one of type $(S \setminus (NP/N)) \setminus N$, that is to say, it has become an expression which takes an expression of type N to its left, and yields an expression of type $S \setminus (NP/N)$. This latter expression, which is a result of the application of the N *sister* to the lifted *is-a-doctor*, itself takes the expression *my* which is of type NP/N and results in the correct sentence type S .

The standard interpretation, as shown in (15), requires that the speaker have only one sister, given that $[[my]]$ combines directly with $[[sister]]$ and must pick out the unique object which bears the sister relation to the speaker. However, we see in (18) and (19) that the functional composition of $[[sister]]$ and $[[is-a-doctor]]$ allows $[[my]]$ to combine with the complex $[[sister \cdot is-a-doctor]]$, thus discharging its uniqueness requirements on the set of salient “doctor-sisters”, and allowing the utterance to be felicitous when the speaker has more than one sister.

Conclusion

The analysis presented in this paper has the advantages of failing to over-burden the lexicon with potential control relationships as well as accounting for the uniqueness requirement that appears to be part of genitive constructions. It also neatly explains how the same sentence can incur different felicity readings in contrasting contexts. Note that this analysis has the added benefit of explaining why although some speakers do find sentences such as

(20) ?My cat is orange, and my other cat is black

felicitous in some cases, a sentence such as

(21) #My orange cat is fat, but my black cat is not

is clearly infelicitous when the speaker has more than one orange cat.

This function composition based analysis, an extension of work by Barker (Barker 2004), solves the problem of explaining how definiteness requirements seem to be in effect in some instances and not in others. Future work in this area could explore whether the analysis given here is flexible enough to extend to other types of constructions which appear to require definiteness.

References

- Barker, Chris, 2004, «Possessive weak definites». In *Possessives and Beyond: Semantics and Syntax*. Ji-yung Kim, Yury Lander and Barbara H. Partee, eds., 89-113. Amherst, MA: GLSA Publications.
- Dowty, David, 1988, «Type raising, functional composition, and non-constituent coordination». In *Categorial Grammar and Natural Language Structures*, Emmon Bach, Richard Oehrle and Deirdre Wheeler, eds., 153-198. Dordrecht: Kluwer.
- Grice, H. Paul, 1975, «Logic and conversation». In *Syntax and semantics*, vol. 3. P. Cole and J. Morgan, eds. New York: Academic Press.

-
- Jacobson, Pauline, 1999, «Towards a Variable-Free Semantics», *Linguistics and Philosophy* 22.2, 117-184.
- Jensen, Per Anker and Carl Vikner, 2004, «The English pre-nominal genitive and lexical semantics». In *Possessives and Beyond: Semantics and Syntax*. Ji-yung Kim, Yury Lander and Barbara H. Partee, eds., 3-27. Amherst, MA: GLSA Publications.