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Stanley Peters, Dag Westerståhl

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Addendum to 'The semantics of possessives': Barker on quantified possessives

Stanley Peters
Stanford University

Dag Westerståhl
Stockholm University and University of Gothenburg

As far as we know, the phenomenon of narrowing for possessives was discussed for the first time in Barker (1995), with examples such as 1.

(1) a. Most planets' rings are made of ice.
b. Not every school's linguistics program is as good as that one.

Barker also proposed a general scheme for semantic interpretation of quantified (non-expanded) prenominal possessor DPs. His idea was to use a generalized quantifier that simultaneously binds TWO variables; one variable for possessors and one for possessions. Variable-binding was effected with the mechanism of unselective binding from Lewis (1975). The semantics enforces narrowing. How does it relate to our semantics with *Poss* and two separate quantifiers over possessors and possessions, respectively? In this note we make a brief comparison between his treatment and the one in Peters and Westerståhl (2013).

Lewis took adverbial quantifiers to be RESUMPTIVE, i.e. ordinary quantification over *pairs* (or triples, etc.) of individuals, but it has been noted that in other linguistic contexts (and perhaps sometimes for the adverbs too) where quantification over pairs seems natural, counting pairs rather than individuals may not give correct truth conditions. This is known as the PROPORTION PROBLEM. A well-known case, which Barker takes as his point of departure, is donkey sentences. At one time resumption was thought to provide a smooth account of the semantics of these sentences, but it soon became clear that this only gives the right result for donkey sentences with *every*, *some*, and *no*, and fails for practically all other quantifiers.[1] For example, sentence 2 gets completely wrong truth conditions if one tries to use the resumption of *at least two*.

(2) At least two farmers who own a donkey beat it.

So perhaps the relevant quantification over pairs is sometimes not resumptive, but of a different kind. Here is an illustrative (if artificial) example.

[1] For details, see Peters and Westerståhl (2006), ch. 10.2.1–2.

(3) a. Usually, when a farmer owns a donkey, he beats it.
b. Usually, when a farmer owns a donkey, he is happy.
c. Usually, when a farmer owns a donkey, it is unhappy.

In 3b and 3c, it is natural to think that the quantification over pairs is reducible to ordinary quantification over individuals, so that 3b means 4.

(4) a. 'most farmers that own a donkey are happy'
b. $\underline{most}\, x(Fx \wedge \exists y(Dy \wedge Oxy)\, , Hx)$

Likewise, 3c means 5.

(5) a. 'most donkeys that a farmer owns are unhappy'
b. $\underline{most}\, y(Dx \wedge \exists x(Fx \wedge Oxy)\, , \neg Hy)$

However, neither reduction captures the meaning of 3a. Could 3a perhaps be taken to be the resumption of *most* to pairs, as in 6?[2]

(6) a. 'most farmer-donkey pairs in the ownership relation are such that the farmer beats the donkey'
b. $\underline{most^2}\, xy(Fx \wedge Dy \wedge Oxy\, , BTxy)$

Barker reasoned similarly about possessives, as follows.[3] Consider a sentence like 1a, that is, one of the form 7.

(7) *Q C's As are B*

With R as the possessor relation, 7 is interpreted as in 8, where the narrowing requirement is made explicit.

(8) $Q^*xy(Cx \wedge Ay \wedge Rxy\, , By)$

Here Q^* is a quantifier over pairs somehow derived from the ordinary Q (over individuals). Which such quantifier is it? In what Barker calls the possessor-dominant reading, which is analogous to 5b, we have 9 (where $\varphi(x, y)$ and $\psi(y)$ contain at most the variables shown free).

(9) $Q^*xy(\varphi(x, y), \psi(y)) \leftrightarrow Qy(\exists x\varphi(x, y), \psi(y))$

This is a MODIFYING reading of 7; in the case of 1a it says (somewhat implausibly) that most rings-of-the-kind-planets-have are made of ice. The crux is to obtain the most likely reading, on which *most* seems to quantify over planets. reading. In analogy with 4b one might try 10.

(10) $Q^*xy(\varphi(x, y), \psi(y)) \leftrightarrow Qx(\exists y\varphi(x, y), \psi(y))$

[2]So $most^2(R, S)$ holds iff more than half of the ordered pairs in R belong to S. This quantifier is not logically definable in terms of any finite number of quantifiers binding just one variable; see e.g. Peters and Westerståhl (2006), ch. 15.5.

[3]The account below is essentially equivalent of Barker's (pp. 187–81), but avoids his use of (sets of) assignments in the truth conditions.

But this doesn't work since the free variable in $\psi(y)$ is not bound by any quantifier. Note that our Q_2 serves precisely to bind this variable. But for a resumptive analysis, one has to somehow express the truth conditions only in terms of Q^*. One possibility, then, seems to be using resumption.

(11) $\quad Q^*xy(\varphi(x,y),\psi(y)) \leftrightarrow Q^2xy(\varphi(x,y),\psi(y))$

Note, however, that without further assumptions these truth conditions are completely implausible, because of the proportion problem. For example, suppose there are ten planets in all, where one has ten rings each of which is made of ice, and the other nine have exactly one ring each, not made of ice. Then the number of planet-(ring-made-of-ice) pairs (10 pairs) is greater than half of the number of planet-ring pairs (19), so 1a would be true if interpreted along the lines of 11, which seems clearly wrong.

To avoid the proportion problem, Barker proceeds as follows (p. 179). Let (with reference to 7) $S = (C \times A) \cap R$, and consider

$$K = \{S_a\colon a \in dom(S)\}$$

where $S_a = \{b\colon S(a,b)\}$. Also, let

$$K_s = \{S_a\colon S_a \cap B \neq \emptyset\}$$

Now Barker's proposal is (in effect) to take 7 to have the truth condition 12.

(12) $\quad Q(K, K_s)$

This looks like applying Q not to sets of individuals but to sets of sets of individuals. That would be not the resumption of Q but a SECOND-ORDER version of Q. But one further assumption allows us to return to sets of individuals, namely, that no two possessors have exactly the same possessions. In other words, for $a, a' \in dom(S)$,

(13) $\quad$ if $a \neq a'$, then $S_a \neq S_{a'}$.

This clearly holds in the case of 7 (the set of rings of a planet is disjoint from the set of rings of any other planet), and it seems to be assumed in all example sentences mentioned by Barker, although 13 is not explicitly stated.

Now, (as Barker points out), since K is finite and $K_s \subseteq K$, only the cardinality of K and K_s matter for the truth value of 12. And it is clear that given 13, the following holds.

$$|K| = |dom(S)|$$
$$[K_s| = |\{a\colon S_a \cap B \neq \emptyset\}|$$

This means that the truth conditions for 7 end up as in 14.

(14) $\quad Qx(Cx \wedge \exists y(Ay \wedge Rxy), \exists y(Ay \wedge Rxy \wedge By))$

This is precisely what we obtain using *Poss*, with $Q_2 = some$; 14 expresses

(15) $\mathit{Poss}(Q, C, \mathit{some}, R)(A, B)$

In other words, it is the EXISTENTIAL interpretation of 7.

Summing up, although the source of inspiration for Barker's account is Lewis's unselective binding and thereby resumption, the means used to avoid the proportion problem eventually result in truth conditions that—at least under the assumption 13—only quantify over one variable at a time. Moreover, it results in the existential reading of possessives.[4] This reading came from the definition of K_s, and it is clear that if we instead define

$$K_s = \{S_a : Q_2(S_a, B)\}$$

we would obtain exactly $\mathit{Poss}(Q, C, Q_2, R)(A, B)$; the truth conditions for possessives (with narrowing) proposed in Peters and Westerståhl (2013).

Thus, Barker's approach is in a sense compatible with ours but less general. The complicated detour over unselective variable-binding is not really motivated. Our approach with Q_1 and Q_2 seems both simpler and more accurate. Moreover, isolating the role of Q_2, the quantifier over possessions, is in fact a crucial feature of our analysis; without it we would not have found the PEI property and its relation to narrowing, or the notion of middle negation, to take just two examples. And as we have seen, the analysis with *Poss* applies straightforwardly to expanded prenominal possessive DPs (*At least two of most planets' rings are made of ice*) and to postnominal possessives (*At least two rings of most planets(') are made of ice*).

References

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[4] As far as we can see, Barker never motivates this choice. He illustrates his truth definition with a detailed discussion of sentence (i) (pp. 181–4).

(i) Most students' papers wander.

But in the situation described, the universal and the existential readings are in fact equivalent, since it is assumed that each student who wrote a paper is such that all of the papers she wrote wander. In situations where a majority of students wrote several papers only a few of which wander, the universal reading is distinct from the existential one that Barker gives, and much more plausible.