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IMPLICIT COMPARISON CLASSES*

1.

A common view of attributive adjectives like 'tall', 'fast', 'large' and 'heavy' is that they express relations between objects and either some comparison class (hereafter c-class) or an attribute.[1] Thus the adjectives in (1–2) might be thought to express a relation between John and the c-class of men (or the attribute man).

(1) John is a tall man.
(2) John is tall for a man.

If we adopt this view, an interesting question arises when we consider cases where the attributive adjective does not occur in prenominal position. Consider the following examples.

(3) Bill is tall.
(4) That man is tall.

One appealing strategy would be to suppose that there is an implicit c-class in these examples, and to suppose further that that it is fixed in some way by the subject of the sentence. So, for example, (4) might be thought of as shorthand for (4′).

(4′) That man is tall (for a man).

Klein (1980) has put forward an interesting argument against the thesis that attributive constructions like those discussed above involve an empty c-class argument position. This argument turns on the observation that under VP ellipsis, the content of deictic expressions is understood as

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[1] This idea is discussed, among other places, in Montague (1974), Parsons (1972), Kamp (1975), Cresswell (1976), Siegel (1979), Higginbotham (1985), and Ludlow (1985). The idea also appears in Wallace (1972), although Wallace's proposal is actually a bit more involved. For Wallace, 'John is a tall boy' has a logical form akin to 'Mod(John. $\lambda x \lambda y$ tall x y), λx(boy x))'. Roughly, this is understood as expressing a relation between John, the linear ordering taller-than, and the attribute boy. The three place predicate 'Mod' is considered a primitive predicate.

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fixed. Thus in (5), for example,

(5) John likes him and Bill does too.

The instance of *him* in the ellipsed VP must be understood as designating the same individual picked out by the overt instance of *him* in the first conjunct.

Consider the implications of this point for the following example.

(6) That elephant is large and that flea is too.

In (6) it seems possible to read the adjectives as relativized to different c-classes. That is, it is possible to understand this sentence as asserting largeness of an elephant with respect to elephants, and largeness of a flea with respect to fleas. But as Klein observes, given the generalization about deixis and VP ellipsis, we should actually predict only the reading which might be paraphrased as in (7).

(7) That elephant is large for an elephant and that flea is large for an elephant

2.

Is there an answer to Klein's objection? There is if we make certain assumptions about the relation holding between the implicit c-class position and the clause upon which it is dependent for its content. In short, if we assume that the empty c-class position is not a deictic, but is rather a bound variable whose value is fixed by an operator outside of the deleted VP, then we will have the makings of an answer to Klein. Let's see why this is so.

The idea is that (7) may be understood as a case of 'sloppy identity' analogous to that available in (8).

(8) John loves his mother and Bill does too.

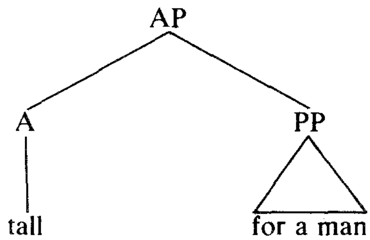
Clearly (8) need not be paraphrased as in (9).

(9) John loves his mother and Bill loves John's mother.

It is more likely that we understand that Bill loves his own mother. This reading is widely held to arise from a structure in which there is a binding relation between *John* and *his* (e.g., in Reinhart (1983)).

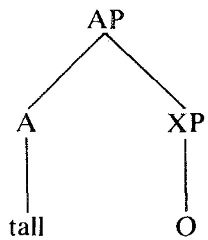
Is there a binding relation holding between clausal subjects and implicit c-classes? Consider the following proposal. Let us assume that attributive adjectives like 'tall', 'small', 'heavy', etc., do in fact take a c-class argument as a matter of their relational structure. In examples like (1–2), the relevant c-class argument is determined by the overt nominal 'man'. The syntax of (2), for example, would be as indicated in (10).

(10)



In examples like (3–4), however, I will assume that an empty operator is base generated in complement position.[2]

(11)

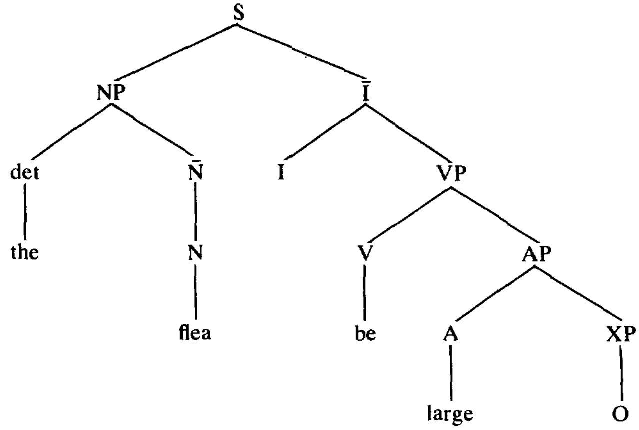


For present purposes we will set aside the issue of O's category.

Under proposals in Chomsky (1982), empty operators are essentially parasitic upon other sentence elements for their content. I will adopt this general view here, and assume that the empty operator in attributive adjective constructions moves and adjoins to the clausal subject at LF, where it co-indexes with an $\bar{N}$ within its government domain. By clausal subject, I mean the logical subject of the clause. Following proposals in Rothstein (1983) and Williams (1983), the logical subject will be reflected in the syntax of the construction. So, for example, the S-structure representation of 'The flea is large' would be as in (12).

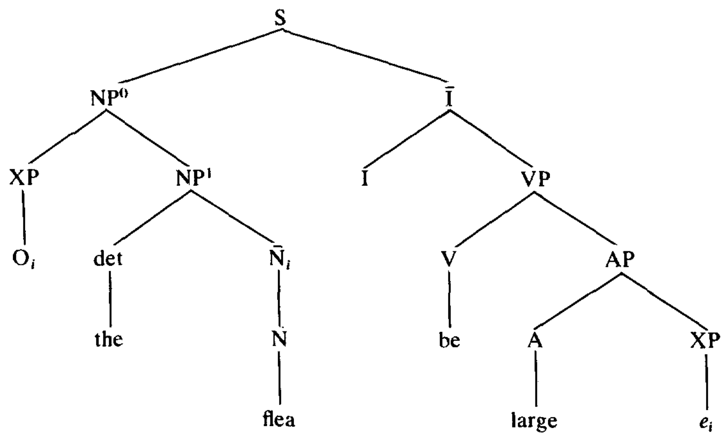
[2] The possibility that an empty operator could be useful here was brought to my attention by Richard Larson.

(12)



The LF representation would be as in (13), where the empty operator has risen to the subject NP and co-indexed with an $\bar{N}$ in its government domain.

(13)



I adopt here the definition of government introduced in May (1985) and adopted in Chomsky (1986). Roughly, the idea is that in (13) the operator O will govern anything that NP^1 does.[3]

Under the definition of c-command in May (1985) the NP to which O adjoins will retain its original c-command domain. Here the idea is that

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[3] We can characterize May's definition of government as follows.

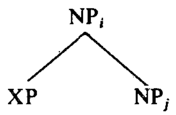
> Government $=_{\text{def}}$ X governs Y iff every maximal projection M-dominating X also M-dominates Y and conversely

M-domination is my term for the revised notion of domination utilized in May (1985). We can define the notion as follows.

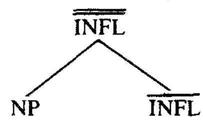
> M-domination $=_{\text{def}}$ X M-dominates Y iff X dominates Y and every other member of X's projection having X's bar level dominates Y.

NP^1 will be able to c-command anything that the newly formed NP^0 c-commands. Likewise, O will have the same c-command domain as NP^0, allowing O to c-command its trace.[4]

So for example, in the following structure, NP_i does not M-dominate XP because there is a member of the projection having the appropriate bar level (namely NP_j) which does not dominate XP.



I have introduced a new term rather than redefine *domination*, for domination is after all, a pure property phrase structure geometry. May's (1985) remarks on the matter are a bit unclear. He states that "to be **dominated** by an occurrence of a projection, maximal or otherwise, is to be dominated by **all** occurrences of the member nodes of that projection. Hence, a phrase that is Chomsky-adjoined to a given projection is **not**, in fact, dominated by that projection, but only by part of it" (p. 57, emphasis his). As stated, this view would be much stronger than the one we have characterized as M-domination. Taken literally, his remarks would mean that in the following structure $\overline{\text{INFL}}$ would not M-dominate NP because a member of the INFL projection does not dominate NP.

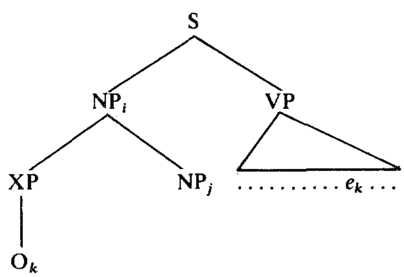


According to May (personal communication), this stronger interpretation is not intended (his examples in the book bear this out), and what is in fact intended is the notion of M-domination characterized above.

[4] We can characterize the May (1985) definition of c-command as follows.

c-command $=_{\text{def}}$ X c-commands Y iff every maximal projection M-dominating X M-dominates Y, and X does not M-dominate Y.

For example, in the following structure, O will c-command its trace because NP_i does not M-dominate XP. S is the only projection that M-dominates XP and S also dominates the trace of O.



For similar reasons, NP_j will retain its original c-command domain. NP_i does not M-dominate NP_j, for there is a member of the projection (namely NP_j itself) which does not dominate NP_j.

Informally, the semantic role of the operator O is to 'transmit' the semantic value of any $\bar{N}$ with which it is coindexed. Thus in the case of (13), the operator will transmit the value of 'flea' to its coindexed trace. A helpful way to think of this operation would be that the operator O is a set-forming operator, taking the value of $\bar{N}$ as a restriction on set membership. So, in an example like 'that flea is large O', the operator will adjoin to 'that flea' and form a set restricted by the $\bar{N}$, which in this case has fleas as its semantic value. (See appendix for details.)[5]

Let's back up and see if this analysis will answer Klein's objection. Consider (6) again.

(6) That elephant is large and that flea is too.

On the analysis sketched, the S-structure representation of (6) would be along the lines of (6a)

(6a) [That elephant] is large O_i and [that flea] is too.

If the VP in (6a) is to be recopied, the result will be as in (6b).

(6b) [That elephant] is large O_i and [that flea] is large O_j.

After the empty operator has undergone QR and coindexed with the $\bar{N}$, the result is as indicated in (6c).

(6c) [O_i [That elephant$_i$]] is large e_i and [O_j [that flea$_j$]] is large e_j

In short, the comparison class in the second conjunct need bear no relation to the comparison class in the first.[6]

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[5] Of course, no explicit class formation actually need take place.

[6] One might think that the movement of the operator O actually takes place at S-structure rather than LF. In principle, I have no objection to constructing such accounts at S-structure, but in this case the evidence seems stacked heavily against the S-structure approach.

First of all, it is not clear whether one can still answer Klein's objection if the movement is to take place at S-structure. If movement takes place before the VP is recopied there are bound to be difficulties. Second, it seems that movement of the operator O is subject to different movement restrictions than one would expect from S-structure movement. For example, movement of O seems to be clause bound. Consider (i–ii).

(i) The flea claimed that the animal was large.
(ii) This flea considers the animal large.

In both of these examples, 'large' does not seem to express a relation between the animal and the c-class of fleas. In each case the c-class seems to be animals, or at worst animals of a type familiar to the flea. Thus, though the animal may be large by flea-like standards of animal size, the comparison class is not fleas. It is animals. Notice, however, that if subjacency is the relevant restriction on movement, the missing reading should be avail-

3.

The solution sketched above answers Klein's objection, but it is fair to ask whether the mechanisms proposed here are not ad hoc and motivated only by the desire to answer Klein. This worry turns out to be unfounded, however, as the mechanisms proposed here interact in a number of profitable ways with various grammatical constructions. A good example of this interaction is provided by cases in which the operator O adjoins to complex NPs. Consider, for example, cases like (16–18), where the NP contains a relative clause or a prepositional phrase.

(16) A flea known to every animal is large.

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able. To take (i), for example, O could adjoin to either NP as indicated in (i)a and (i)b. Notice that both readings are predicted, for in each case at most one bounding node is crossed.

(i)a. The flea claimed that $[_S [_{NP} O_i [_{NP}$ the animal] was large $[_{XP} e_i]]$

(i)b. $[_{NP} O_i [_{NP}$ The flea]] claimed that $[_{S}$ the animal was large $[_{XP} e_i]]$

Ignoring the above arguments, one might suggest that there is positive evidence that the movement of O obeys subjacency. The argument might begin with the following example.

(iii) *$[O_i$ [That [flea]$_i$]] is an animal which is large e_i

Now we already have an account of why fleas cannot be the comparison class (namely, 'that flea' is not the subject of the internal clause, so O cannot adjoin to it), but let us set aside our explanation and see how an alternative explanation would fare – one in which subjacency accounts for the possible readings.

The S-structure argument would be that movement to 'that flea' is blocked because the operator cannot land in COMP (which is already filled) so that the operator must cross both the internal S and NP boundaries (as in (iii)a).

(iii)a. $[_S [_{NP} O_i [_{NP}$ that $[_{\bar{N}_i}$ flea]]] is $[_{NP} [_{NP}$ an animal] $[_{\bar{S}}$ which $[_S$ e is large e_i]]]]

The problem with this supposed positive evidence, however, is that the cyclic landing site for O would not be COMP, but rather NP. Or at least such an assumption is natural given the fact that O ultimately does not come to rest in COMP, but as specified earlier, adjoins to NP. Thus a new problem arises.

The problem concerns the question of why O cannot escape to the subject NP by first adjoining to the NP 'an animal' and then moving to the subject NP. A possible answer would be that when O Chomsky-adjoins to NP it creates a new NP node from which it must subsequently escape. This is clear in (iii)b.

(iii)b. $[_S [_{NP} O_i [_{NP}$ that $[_{\bar{N}_i}$ flea]]] is $[_{NP} [_{NP}$ __ $[_{NP}$ an animal]$_j$]
$[_{\bar{S}}$ which $[_S$ e_j is large e_i]]]]

But this way out is blocked in the analysis of bounding in Chomsky (1986), an analysis under which adjunction to the NP would eliminate the bounding node.

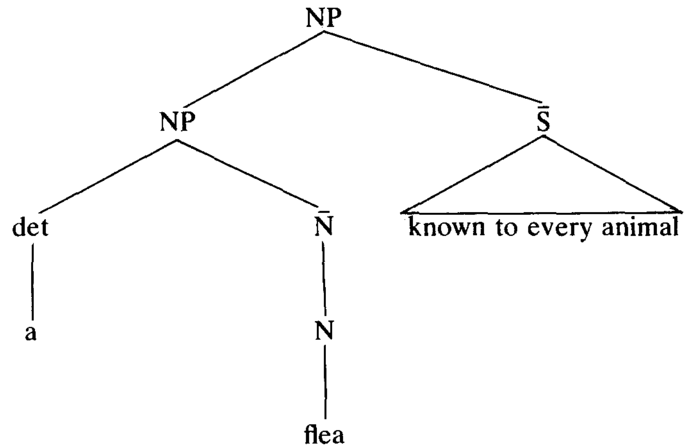
(17) That bucket with gold in it is large.

(18) That glass with orange juice in it is large.

In (16) the c-class is not fleas known to every animal, but fleas simpliciter. In (17) the c-class can be either buckets or gold-filled buckets (stress 'that' to get the latter reading). In (18) the comparison class can be either glasses, or juice-filled glasses.

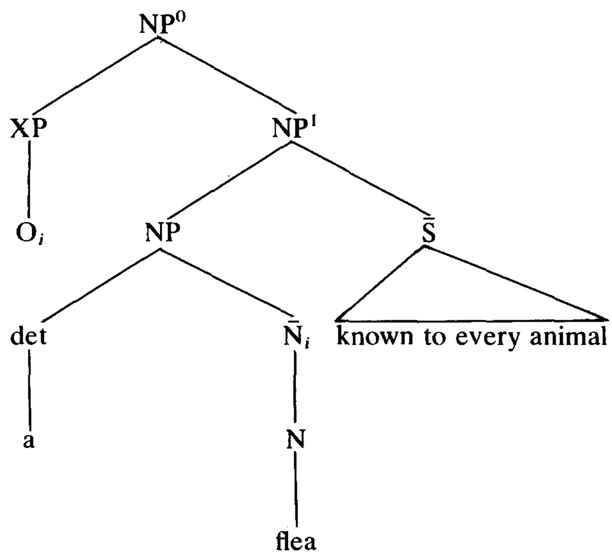
The relative clause case in (16) is easily dealt with if we assume a standard analysis like that in (19).

(19)



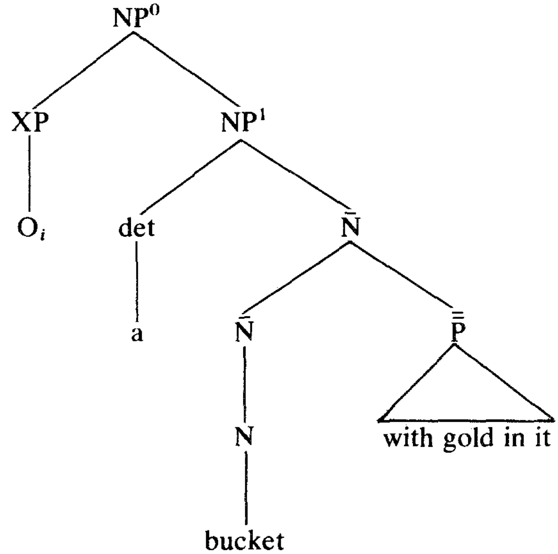
The obvious explanation would be that when O adjoins to NP it will not govern anything within the NP-internal S, for it cannot govern across maximal projections. This is apparent in (20).

(20)



How about examples (17–18)? Hornstein and Lightfoot (1981) citing independent evidence drawn in part from Baker (1978) have suggested that the structure of these examples pattern as indicated in (21).

(21)



This structure suggests an interesting account for the availability of the optional c-classes. The operator O, when attached to such an NP can coindex with either $\bar{N}$. If it coindexes with the upper $\bar{N}$, the relevant comparison class is buckets with gold. If it coindexes with the lower $\bar{N}$, the comparison class is buckets.

Compare these examples with (22–23), however, where it seems that the information contained in the prepositional phrase might well be relevant in delimiting the comparison class.

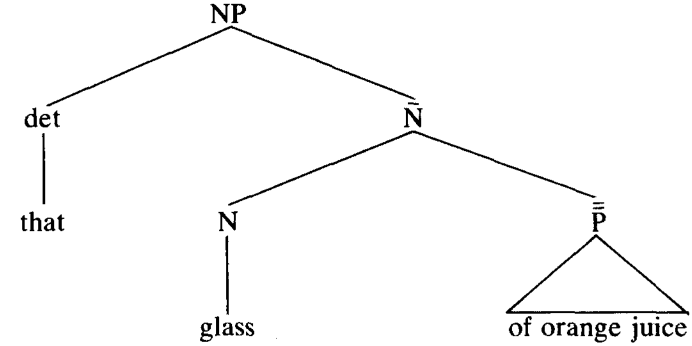
(22) that bucket of gold is large.
(23) that glass of orange juice is large.

In (22) it seems that the c-class is buckets of gold, and not buckets simpliciter. In (23) the c-class is glasses of orange juice, not glasses alone.

Hornstein and Lightfoot have argued that there is a syntactic difference between examples like (17–18) and (22–23). They claim that the NP in (23), for example, has a syntactic form like that in (24),[7] where there is only one $\bar{N}$ to provide the comparison class.

[7] One way to motivate the different structures would be to argue there are differences in the thematic grids of these lexical entries and it is these differences which ultimately account for the structural differences between examples like (18) and (23).

(24)



We would also predict that in sentences like (25), either the class of butterflies, or the class of European butterflies may be the salient comparison class.

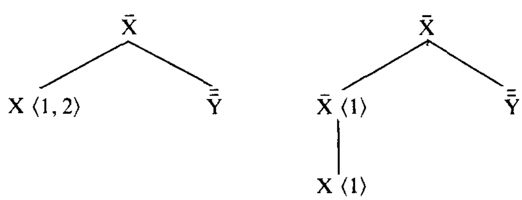
(25) That European butterfly is large.

Or at least the prediction is straightfoward if we assume the following structure for the NP in (25).

The argument would begin with the observation that 'glass' is ambiguous between 'glass ⟨1⟩' which is used to speak of the things we drink from, and 'glass ⟨1, 2⟩' which is derived from the former entry by what might be thought of as a measure-forming function. The latter entry would be used to express a two-place relation – that x is a glass-full of y. Presumably 'glass ⟨1, 2⟩' appears in 'glass of O.J.'.

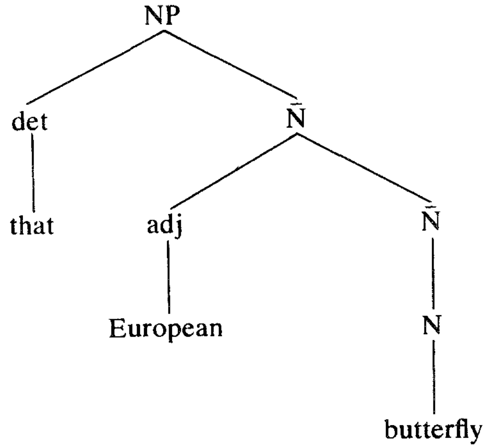
Derived nominals like 'student' are generally assumed to have the relational structure of the verbs from which they are derived, thus, since 'to study' is a two-place verb, it would be assumed that the structure of the nominal would be 'student ⟨1, 2⟩'. It is often argued however, that an argument position may be existentially closed under certain circumstances (e.g., when we simply say that John is a student). If we indicate closure by starring the closed position in the thematic grid, then we will have a contrast between between 'student ⟨1, 2*⟩' which would appear in 'student with long hair' and 'student ⟨1, 2⟩' which would appear in 'student of physics'.

An interesting generalization is now available to us, i.e., that we would expect $\bar{X}$ theory to evince a contrast like the following.



I am indebted to Rich Larson for discussion of this point.

(26)



Again, when O adjoins to such an NP it may co-index with either $\bar{N}$ for the c-class.[8]

4.

It is interesting to note that with some determiners, it appears the selected c-class will not be fixed by the $\bar{N}$ itself, but in some sense a more general c-class.[9] Consider cases like the following.

(27) No flea is large.
(28) Every elephant is large.

Here it seems highly unlikely that the c-class is either fleas or elephants. This is so for it would be an odd state of affairs if no flea was large relative to the class of fleas and no elephant was large relative to the class of elephants. Of course these cases only occur when the domain of discourse is not restricted. For example, if we are looking at a particular herd of elephants and I say 'Every elephant is large' it seems perfectly reasonable to suppose that every elephant (in the herd) is large for an elephant. This point is driven home quite nicely when we consider cases like (29–30)

[8] This can be seen as an extension of Higginbotham's (1985) analysis of constructions like 'big European butterfly', where either the $\bar{N}$ (European butterfly) or the N (butterfly) can fix the comparison class. The difference, besides the requirement that only $\bar{N}$s can fix the comparison class, is that here the analysis is extended to cases where the $\bar{N}$ and the comparative adjective are discontinuous.

[9] This point was brought to my attention by Tom Wasow.

(29) All of the elephants are large.
(30) None of the fleas are large.

Here it is obvious that the c-classes are elephants and fleas respectively.[10]

So what accounts for the fact that the c-class is not fixed immediately by the $\bar{N}$ in the cases where there is no domain restriction and there is an appropriate determiner? One suggestion would be that if the value of the c-class is fixed in the usual way in these examples the result is a sentence which describes a state of affairs that is impossible. It just can't be that all elephants are large for elephants, and the only way it could be true that **no** flea is large for a flea would be if every flea was the same size. It is reasonable to suppose that in the face of such absurd interpretations, language users assume the speaker intended some more general c-class, which is something like objects generally, or perhaps mid-sized earth-bound objects.

5.

Often, of course, O will adjoin to an NP with no accessible $\bar{N}$s. Proper names are good examples of such NPs. Consider, for example, (31–32).

(31) Kareem Abdul-Jabbar is tall.
(32) Mt. Everest is tall.

Obviously if Everest were no taller than Jabbar we would not consider it tall. In (31) the c-class might be persons (or basketball players, etc.). In (32) the c-class might be mountains (or objects generally, etc.).

A plausible story is that when the operator O adjoins to a name, the c-class will be fixed by the context of utterance. Here, we can follow Klein and introduce a function $\mathbb{U}$ that picks out, for every context of utterance c, a subset of U (the universe of discourse) which will serve as the c-class.

This will of course work in other cases of NPs besides proper names. It will apply for demonstratives as well. The rule is that when O can find no $\bar{N}$ in its government domain, the c-class will be fixed by the context of utterance. (Again, see appendix for details.)

From time to time one hears arguments that naming expressions have as parts of their lexical entries, certain features (±human, ±animate, etc.) which syntactically encode properties of the objects which they name. So, for example, 'Kareem Abdul-Jabbar' might carry the features

[10] I am indebted here to discussions with Rich Larson and Jamie Rucker.

(+human, +animate) and 'Everest' might carry the features (−human, −animate, +mountain). The question arises as to whether these features might be used to specify the c-class for O. Such a gambit would be, I believe, misguided.

The problem is that no matter how many features we use to augment our lexical entries, we will never have enough. Every object belongs to an (uncountable) infinity of classes, and in the right circumstances, any of these classes might become the relevant c-class. Moreover, even if there were **enough** features, the question would arise as to **which** of the features for a given name determines the c-class in a given context of utterance. It seems a mechanism will be needed which can map from contexts to features. But such a mechanism can hardly be more elegant or predictively adequate than a mechanism which maps directly from contexts to c-classes.

One might be tempted to take advantage of the function from contexts to c-classes and argue that the c-class is fixed by context in **every** case. This would be a mistake. A purely contextual analysis would have no way of accounting for the fact that it is only governable $\bar{\text{N}}$s that seem to be able to supply the content of the c-classes. Consider, once again, examples (18) and (23) from above.

(18) That glass with orange juice in it is large.
(23) That glass of orange juice is large.

In an utterance of (18), the c-class is either glasses or juice-filled glasses. In an utterance of (23) the c-class is glasses of orange juice. Now it is clear that these will be the respective c-class possibilities even if the utterances were made in identical circumstances. It follows that contextual information is too course-grained to (by itself) fix the c-class.

A fan of radical pragmatism might respond to this objection by arguing that the structure of the uttered sentence constitutes part of the context of utterance. This move gains nothing, however, for it concedes the need for the relevant sentential structure, and presumably also concedes the need for a mechanism by which this structure can play a role in fixing the c-class. In short, it concedes the need for a proposal like that sketched in this paper. One can, of course, disguise the role of syntax here by embedding an identical proposal in the model theory of a larger pragmatic theory, but such a maneuver is at best deceptive. If one has conceded that sentential structure constrains the possible interpretations in examples like the above, then one has effectively conceded that the explanation for the difference in possible interpretations lies within the domain of syntax, not semantics or pragmatics.

APPENDIX

Consider the following truth-theoretic semantics for example (13) above. Following Higginbotham (1985) I introduce the predicate Val(x, X, c, f) to be read as "x is the semantic value of sub-phrase marker X in context c under assignment f." I'll also introduce ($f =_e g$) understood as saying that f differs from g at most in what it assigns to e.

(1) Val(True, $[_S [_{NP^0} O_i [_{NP^1}$ the ... $\bar{N}_i$ ...]] $[_{VP}$ ... e_i ...]], c, f)
if there is a unique x s.t.,
Val(x, NP^1, c, g) and Val(x, VP, c, g)
and for some $g =_e f$
$y = \{z$: Val(z, $\bar{N}_i$, c, g)$\}$ and $y = g(e_i)$

(2) Val(x, $[_{NP}$ det $\bar{N}]$, c, f) iff Val(x, $\bar{N}$, c, f)

(3) Val(x, $[_{\bar{N}}$ N$]$, c, f) iff Val(x, N, c, f)

(4) Val(x, $[_{\bar{N}^0}$ A $\bar{N}^1]$, c, f) iff Val(x, A, c, f) and Val(x, $\bar{N}^1$, c, f)

(5) Val(x, $[_{VP} [_V$ 'be'$]$ AP$]$, c, f) iff Val(x, AP, c, f)

(6) Val(x, $[_{AP}$ A XP$]$, c, f) iff Val($\langle x, y\rangle$, A, c, f) and Val(y, XP, c, f)

(7) Val(x, $[_{XP}$ $e_i]$, c, f) iff $x = f(e_i)$

(8) Val($\langle x, y\rangle$, $[_A$ $\alpha]$, c, f) iff Val($\langle x, y\rangle$, α, c, f) (where α is an adjective)

(9) Val(x, $[_N$ $\alpha]$, c, f) iff Val(x, α, c, f) (where α is a noun)

(10) Val($\langle x, y\rangle$, 'large', c, f) iff x is large for a y

(11) Val(x, 'flea', c, f) iff x is a flea[11]

when no $\bar{N}$: Suppose there is a category NAME which immediately dominates naming expressions (e.g., 'Socrates').

(12) Val (True, $[_S [_{NP^0} O_i [_{NP^1}$ NAME$]] [_{VP}$ ... e_i ...]], c, f) iff for
some x, Val(x, NAME, c, f) and Val(x, VP, c, f)
and there is a unique y s.t. for i coindexed with
O, ($\exists g =_e f$), $y = \mathbb{U}(c)$ and $y = g(e_i)$
where $\mathbb{U}$ is a function from contexts to comparison classes

(13) Val(x, $[_{NAME}$ $\alpha]$, c, f) iff Val(x, α, c, f) (where α is a name)

(14) Val(x, 'Socrates', c, f) iff x is Socrates

[11] One might suppose that rules (14–15) can be generalized, but such a supposition is incorrect. These are the clauses which do the real work in the truth-theoretic semantics, for (as Higginbotham has stressed) they tell us what the competent speaker of English knows when he or she knows the meaning of 'large' etc. A general rule of the form 'Val(x, α, c, f) iff x is $[\![\alpha]\!]$' is uninformative – at least in the relevant sense.

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