more on existential *there*

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1 Barwise & Cooper 1981: background

Context:

B&C follow on from work on GQs in mathematical/philosophical logic, and notably, its application to natural language (n.l.) in the work of Montague.

Aims/contributions:

1. Identify universals of determiners and determiner meanings: only some types of possible GQs are expressed by n.l. DPs
2. Define certain linguistic categories and explain certain linguistic phenomena by reference to *formal semantic properties*, e.g. definiteness, existential-*there* construction.

Their work was seminal in both respects.

Differences: from last week (H&K)

- scope represented at "Deep Structure" not LF[1] ("quantifying in")
- indirect as opposed to direct interpretation, following Montague.

However, unlike Montague – and H&K / what we did last week, B&C treat predicate and quantifier denotations as sets rather than their characteristic functions. Semantic composition is by construction specific rules rather than fully type-driven.

B&C	H&K/last week
$[\![\texttt{nurse}]\!]$: a set N of individuals	$[\![\texttt{nurse}]\!]$: $\lambda y_e.\ y \in N$
$[\![\texttt{smokes}]\!]$: a set M of individuals	$[\![\texttt{smokes}]\!]$: $\lambda y_e.\ y \in M$
$[\![\texttt{every}]\!]$ fctn. mapping a set S to: {S': S $\subseteq$ S'}	$[\![\texttt{every}]\!]$: $\lambda P_{et}.\lambda Q_{et}.\ \{x : P(x) = 1\} \subseteq \{y : Q(y) = 1\}$
$[\![\texttt{every nurse}]\!]$: $\{S' : N \subseteq S'\}$	$[\![\texttt{every nurse}]\!]$: $\lambda Q_{et}.\ N \subseteq \{y : Q(y) = 1\}$

Type-driven interpretation is clean but set talk can be more compact (probably why B&C used it). In practice set notation is sometimes abused in type driven settings; e.g.

(1) a. $[\![\texttt{nurse}]\!] \subseteq [\![\texttt{smokes}]\!]$ in place of
b. $\{x : [\![\texttt{nurse}]\!](x) = 1\} \subseteq \{y : [\![\texttt{smokes}]\!](y) = 1\}$

[1] I say LF because QR is assumed widely in the tradition you've been studying and I like it. As Yasu discussed, though, scope can alternately be "represented" in the overt structure if treated as an ambiguity (presence vs. absence of covert type shifting operator in syntax or lexicon).

2 Universals: conservativity

B&C observe, informally, that for n.l. quantifiers the restrictor "sets the stage" for what must be considered. Things satisfying the nuclear scope that do **not** satisfy the restrictor are irrelevant to the truth-conditions; viz. the equivalences:

(2) All/some/no/most/three nurses smoke.
⇔ All/some/no/most/three nurses are nurses **who smoke**.

Though this may seem obvious on reflection it is non-trivial in the sense that it does not hold for many (many!) logically possible GQs.

(3) Equi nurses smoke.
"the number of nurses = the number of smokers"
⇏⇎ "the number of nurses = the number of nurses who smoke"

(4) $[\![\texttt{equi}]\!] = \lambda P_{<e,t>}.\lambda Q_{<e,t>}.\ |x : P(x) = 1| = |y : Q(y) = 1|$

The relation on sets it expresses is coherent and useful, it's just not one a determiner can express.

B&C codify their generalization as a proposed linguistic universal (cf. their U.3):

(5) Determiners denote functions that map their restrictor set – the denotation of their sister NP – to quantifiers that LIVE ON that set.

Q LIVES on A: $X \in Q$ iff $(X \cap A) \in Q$ for all X

The re-statement due to Keenan & Stavi 1986 is better known: determiners in n.l. denote CONSERVATIVE functions

(6) A determine denotation D iis CONSERVATIVE iff:
$B \in D(A)$ iff $(A \cap B) \in D(A)$

On the empirical side the test indicated in (2) can be used to establish that a determiner is indeed conservative. Or, given its (proposed) lexical entry, we can prove whether it is (e.g for 'every': $A \subseteq (A \cap B)$ is equivalent to $A \subseteq B$ by basic set theory).

3 Existential 'there'

- B&C propose a semantic characterization of WEAK vs. STRONG DETERMINERS.
- The semantics of the existential-'there' construction, as they propose it, is such that only weak determiners result in informative (contingent) statements;
- it is because strong determiners lead to uninformativity that they can't appear.

Strong determiners, in Milsark's sense, are those that that are either POSITIVE STRONG or NEGATIVE STRONG (formal properties). Weak determiners are those that are neither.

3.1 positive strong

D is POSITIVE STRONG iff $A \in [\![\texttt{D}]\!](A)$ for all A, models M in which $[\![\texttt{D}]\!](A)$ is defined

informally: *Det As are As* is necessarily true for any *A*, if not a presupposition failure.

(7) a. Every/most/the nurse is a nurse. Strong, T
b. No/some nurse is a nurse. Weak, can be T or F
Less than two/at least two nurses are nurses.

(a) are tautologies, while (b) are contingent.

Nb.: on at least one reading. (b) may also have strong readings, which may sound trivial. It is not essential that (a) or (b) sound natural (on the relevant reading). Pragmatic factors may be at play, and the classification follows from the lexical entries:

E.g. *every* is positive strong since every $S \subseteq S$; *some* isn't since $N \cap N$ is non-empty iff N is.

The question of existence presuppositions on the restrictor are relevant here. *every* would count as positive strong even w/o this definedness condition, since $\varnothing \subseteq S$ for all S.

most (and related) will count as positive strong, plausibly, only if they have such a ps.

(8) a. *most R S* iff $|R \cap S| > |R - S|$
b. *most R S* iff $|R \cap S| > \frac{1}{2}|R|$ (or some vague $n > \frac{1}{2}$)
c. *most R S* iff $\frac{|R \cap S|}{|R|} > \frac{1}{2}$

Given (a) or (b) $R \in [\![\texttt{most}]\!](R)$ is contingent; F if $R = \varnothing$ but T in all other cases

most and other strong determiners are often assumed to have an existence ps. as a lexical definedness condition. Note that B&C (table 1, p.180) seem to say that only definites and *both* and *neither* have lexical definedness conditions. More on this issue below.

3.2 negative strong

D is NEGATIVE STRONG iff $A \notin [\![\texttt{D}]\!](A)$ for all A, models M in which $[\![\texttt{D}]\!](A)$ is defined

informally: *Det As are As* is necessarily false for any *A*, if not a presupposition failure.

(9) a. Neither nurse is a nurse. Strong, F
b. No/some nurse is a nurse. Weak, can be T or F
Less than two/at least two nurses are nurses.

(a) is contradiction if defined, while (b) are contingent.

(10) $[\![\texttt{neither}]\!] = \lambda P_{et} : |\{x : P(x) = 1\}| = 2.\ \lambda Q_{et}.\ \{x : P(x) = 1\} \subseteq \{y : Q(y) = 1\}$

As an exercise you can confirm that Milsark's other Strong determiners (including names qua GQs), but not his Weak ones, have the formal property of being positive or negative strong[2]. I.e. these properties seem to correctly characterise Milsark's distinction.

[2] Bonly give one example of the latter. I can't think of other simplex ones

3.3 Analysis of existential 'there' construction

At this point you might (if you didn't read) think the analysis of existential 'there' sentence is that the restrictor NP is also the nuclear scope:

(11) There are some tame lions.
iff ⟦some⟧(⟦tame lions⟧)(⟦tame lions⟧)

(12) *There is every tame lion.
iff ⟦every⟧(⟦tame lion⟧)(⟦tame lion⟧)

And that the following is their proposal about the distribution of weak strong:

- w/ strong determiners we get uninformative (tautological or contradictory) truth conditions, and this is what makes the sentences unacceptable.
- while w/ weak determiners we get informative (contingent) ones.

Almost but not quite. The latter is their proposal, but the semantic analysis is rather that the nuclear scope is E, the domain.

(13) There are no tame lions.
iff ⟦no⟧(⟦tame lions⟧)(E)

But because determiners are Conservative, the analyses amounts to the same thing.

(14) ⟦some⟧(⟦tame lions⟧)(E)
iff ⟦some⟧(⟦tame lions⟧)(⟦tame lions⟧ $\cap E$) by Conservativity
iff ⟦some⟧(⟦tame lions⟧)(⟦tame lions⟧) since $A \cap E = A, \forall A \subseteq E$

In effect, the nuclear scope *is* also the restrictor, but not syntactically speaking (after all, how would that come about compositionally). B&C say that it's 'there' (in this construction) that contributes E, the nuclear scope (cf. Appendix 2) but there are other possibilities.

4 Issues

4.1 Truth-conditions

Francez 2007 notes that the truth-conditions are too strong; (a) (has a reading) that allows there to be coffee in existence, suggesting the nuclear scope is less than E.

(15) a. There is no coffee.
b. ⇏ There is no coffee at Starbucks.

But of course this effect could be due to contextual domain restriction of the overt NP (to [coffee in the house]). Weak dets only require us to check the intersection of the scope and restrictor, so that can make it look like the scope is not E.

Francez points out that the following, on a reading that concerns the party, seems to quantify over *all* imaginable foods, and says they were (instantiated) at the party (i.e. the nuclear

scope seems to be restricted).

(16) There was every kind of food imaginable. [at the party] Francez 2007

Unclear what to make of this though since we don't understand why strong determiners are grammatical at all in such cases.

4.2 Exception to their characterization?

only can appear in existential-'there' sentences on its ostensible determiner use, but it's positive strong given its (textbook) definition.

(17) There are only MPhil students. $[\![\texttt{only}]\!](A)(B)$ iff $B \subseteq A$

4.3 Grammaticality and triviality

Keenan 1987 and many others pointed out that uninformative sentence (tautologies, contradictions) are not generally perceived as ungrammatical or deviant, in the way that strong determiners are with existential-'there'.

(18) a. It's raining and it's not raining.
b. War is war.

Likewise for sentences reflecting the very property claimed to make a (corresponding) existential-'there' sentence ungrammatical.

(19) a. Every nurse is a nurse.
b. *There is every nurse.

Gajweski 2002 proposes a way around this issue (which also arose for later analyses of other phenomenon in the same vein as B&C's):

The intuitive idea is that uninformativity only leads to ungrammaticality if it arises due to logical (functional) vocabulary alone – changing the other (open class, contentful) words to something else, could not possibly yield an informative statement.

(20) The LOGICAL SKELETON of a sentence s is derived by replacing each non-logical vocabulary item in s with a *distinct* variable of the same type.

(21) s is L-analytic iff s's logical skeleton receives the denotation 1 (or 0) under every variable assignment. L-analytic $\Rightarrow$ ungrammatical

(22) a. Every v_1 is a v_2. not L-analytic
b. There is every v_1. L-analytic

(23) It's v_1 and it's not v_2 not L-analytic

To make this idea predictive/precise a characterization is needed for "logical vocabulary". Gajewski adopts a semantic characterization in terms of PERMUTATION INVARIANCE due to Van Benthem (use to characterize logical constants in formal/logical languages).

B&C are aware of some exceptions to Milsark's generalisation. They seem to propose (p.183) that those cases in which a strong det. does not lead to ungrammaticality, are cases in which a tautology is being expressed.

(24) Who could possibly play Hamlet?
Well, there's John ... cf. also every student, *the short man*, etc.

> The speaker is using a tautology here to avoid making direct assertion that John could play Hamlet but nevertheless implicating that this is a possibility.

Unclear that this fits all the exceptions, and it leaves open why 'War is war' etc. *never* seems to be ungrammatical. A Gajewskian response might hold that L-analyticity can be ignored in some circumstances.

4.4 Syntax of post-copula

B&C point out that their analysis seems to depend on a syntactic assumption that all material following ("coda") the (minimal) DP ("pivot") is internal to it as in (a). Some syntactic analyses of the time argued for such a structure (Jenkins 1975, Williams 1984), others a clause-like structure (Chomsky, Safir, Stowell) as in (b).[3])

(25) There are two people drunk/sick. B&C (1a)
a. [be [two [people drunk]]] "DP analysis"
b. [be [two people] [drunk]] "clausal analysis"

On the clausal analysis, the semantics works just like 'Two people are drunk'; the expletive subject contributes nothing.

A constituent structure like (a) is independently possible elsewhere, a so-called reduced relative clauses

(26) Most of the people (who were) sick left the party.
a. [the [people [~~who were~~ drunk]]]

4.4.1 Distributional problems w/ the DP analysis

But as B&C point out a reduced relative is not available for the same DP in other grammatical positions (?)

(27) *Two people drunk/sick left the party. B&C (2a)

Keenan 1987 makes the same point with a further example:

(28) a. There are no students who you know enrolled in the class. Keenan 1987
b. *[No students who you know enrolled in the class] asked about you.

[3]This comes in many varieties but the important issue at hand is whether the DP constituent includes the coda.

Finally, if (25) involves a reduced relative this leaves unexplained Milsark's invididual/stage level contrast, since we should expect a r.r. to be possible.

(29) a. *There are many people tall
b. There are many people who are tall.

4.4.2 Evidence from extraction against DP analysis

Keenan 1987 says that relativization (wh-movement) from pivot position argues for the clausal analysis. Coda material is 'stranded' under relativization like the predicate of a SC, and unlike NP modifiers.

(30) a. John painted [the shelves in my living room] purple. Keenan 1987
b. [The shelves in my living room that John painted purple]
c. *The shelves that John painted in my living room purple.

(31) a. There were shelves in my living room. Keenan 1987
b. *The shelves in my living room that there were (disappeared).
c. The shelves that there were in my living room.

(32) a. Who is there performing at the Academy this week? McNally 1992
b. *Who do the musicians admire performing at the Academy this week?

4.4.3 Extraction and the clausal analysis

Williams 1984 notes that extraction of the coda isn't possible, as an argument AGAINST the clausal analysis.

(33) How sick were the children?

(34) a. *How sick were there children?
b. There were children very sick.

4.4.4 Assessing the evidence

Taking on board the preceding McNally 1992 and Francez 2007 conclude that neither the DP nor clausal analysis is correct and treat codas as adjuncts. For Francez in effect the coda modifies (restricts) an implicit domain variable that functions as the nuclear scope of the pivot DP.

It seems to me though that this leaves unexplained the fact (?) that the things that can be codas, are exactly those that can (in at least some sentence) be a DP internal modifier of NP.

As an exercise you might think about whether it's possible to save B&C's analysis even if codas are say DP adjuncts.

5 Strong determiners and presupposition

B&C importantly observe that there's a connection between strength in Milsark's sense and (what we call) presuppsitionality. Milsark's strong determiners generally imply their restrictors are non-empty.

(35) a. Is every tame lion healthy?
b. Are there no tame lions?

(a) implies that there are tame lions; (b) – in which the determiner is (unambiguously) weak, obviously doesn't.

For strong determiners that are definites, *the* and *both*, existence is (even more) robust and B&C propose it is a lexical presupposition = definedness condition. For *every* and *most* they suggest that it's an implicature. Basically, they say

(36) a quantifier Q is a SIEVE if it contains some but not all $S \subseteq E$.

In other words, sieves distinguish between sets/properties; they don't systematically give T, or F, for every possible nuclear scope argument.

DPs formed with *every* and *most* denote sieves only if the NP restrictor is non-empty. E.g. where *nurse-*$\varnothing$, *every nurse* maps every set to true. B&C suggest something to the effect that using a quantifier implicates that it denotes a sieve. Like B&C (I assume) Yasu and I think there's a plausible pragmatic motivation to use a quantifier only when it denotes a sieve.

However:

This idea does not distinguish between strong and weak quantifiers: *some* and *no* for example also denote sieves only if their restrictor is non-empty. It seems to be assumed by B&C and in subsequent literature – including our experimental findings – that weak (uses of) determiners can appear without existence implications more easily than strong determiners. (Even when not at pain of triviality, as in (35b)).

(37) Are any lions tame? Does the zoo have sm tame lions?

Also the existential inference does not behave like an implicature, but rather like a presupposition, e.g. it projects from questions and negative contexts.

(38) I doubt that every tame lion is healthy.

Finally, as mentioned above, for *most* to count as 'positive strong' as B&C define it, existence must actually be a definedness condition.

References

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