Relative Clauses and Domain Restrictions and Functional NPs–Oh my!

I. Background

Generalized Quantifiers and Nouns (Montague 1974)

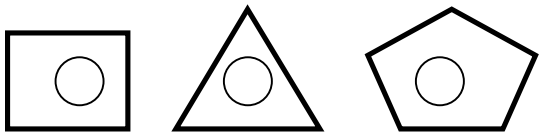
(1) Every student dances.
(2) No student dances.
(3) Some student dances.

- verb phrases (*dances*) denote sets of individuals
- nouns (*student*) also denote sets of individuals
- quantifiers denote some relation holding between these two sets

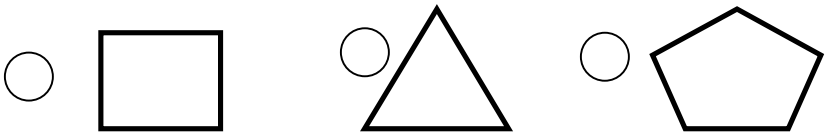
quantified NPs (*every student*, *no student*, *some student*) denote the set of sets

 = set of students

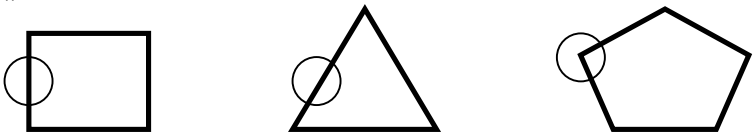
(4) ||every student|| = the sets of sets S such that set of students $\subseteq$ S



(5) ||no student|| = the set of sets S such that S $\cap$ set of students = $\varnothing$



(6) ||some student|| = the set of sets S such that S $\cap$ set of students $\neq \varnothing$



In (4-6) above, so long as the set denoted by the VP is a member of the sets defined above (i.e. satisfies the requirements to be S), the sentence in question will be true.

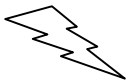
Relative Clauses

(7) every student who drinks dances
(8) no student who smokes dances
(9) some student who bakes dances

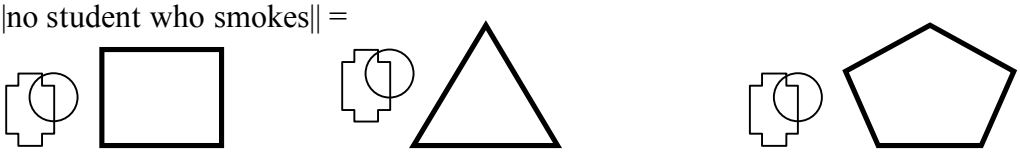
Relative clauses (*who drinks*, *who smokes*, *who bakes*) also denote sets of individuals.

(10) ||who drinks|| = {x: drinks'(x)} 

(11) ||who smokes|| = {x: smokes'(x)} 

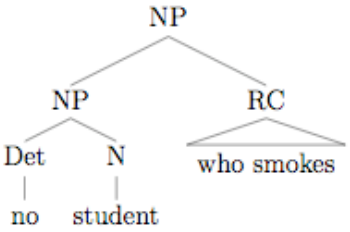
(12) ||who bakes|| = {x: bakes'(x)} 

||no student who smokes|| =

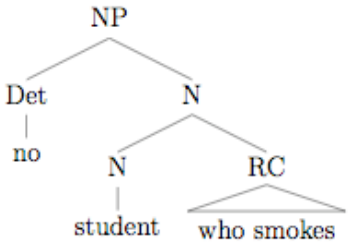


Two ways to combine NP with relative clause:

NP-S:

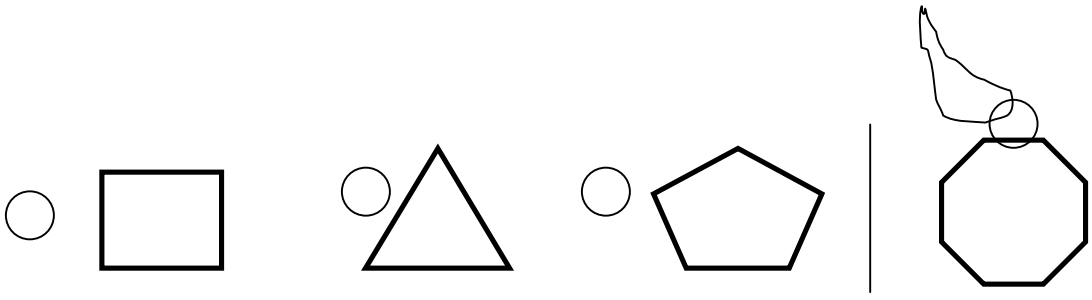


Det-Nom:



Partee's (1975) argument against NP-S:

||no student|| =



Deriving *no student who smokes* in a Det-Nom way:

(11) a. ||student|| ∩ ||who smokes|| = {x: smoke'(x) & student'(x)}

b. apply the meaning of *no* to (11a):
||no student who smokes|| = the set of sets S such that S ∩ {x: smoke'(x) & student'(x)}=∅

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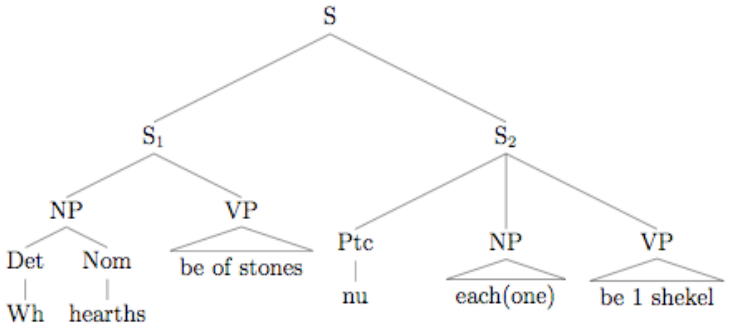
Bach & Cooper (1978): relative clauses can only compositionally combine with NPs in an NP-S fashion in Hittite:



Every hearth which is made of stones costs 1 shekel

The Bach & Cooper trick:
student, then, is really *student R* = {x: student'(x) & R(x)}.

(12) a. ||student R|| = {x: student'(x) & R(x)}
b. apply the meaning of *no* to (12a):
||no student R|| =
the set of sets S such that S ∩ {x: student'(x) & R(x)} = ∅
c. fill in R with the meaning of ||who smokes||:
||no student R who smokes|| = the set of sets S such that S ∩{x: student'(x) & smokes'(x)} = ∅

This is the same final meaning as in the Partee (1975) Det-Nom analysis.

II. Domain Restrictions (von Fintel 1994, Stanley & Szabo 2000)
(13) Every student dances.
(14) No student dances.

- contextually salient restrictions denote sets of individuals
- these sets intersect the set of individuals denoted by the noun to restrict the domain of individuals that are quantified over

(13') ||every student|| with respect to contextually salient restriction R
= the set of sets S such that {x: student'(x) & R(x)} ⊆ S
(14') ||no student|| with respect to contextually salient restriction R
= the set of sets S such that S ∩ {x: student'(x) & R(x)} = ∅

III. Relative Clauses as Domain Restrictions
four ways you could recast the Bach & Cooper approach:

a. R is in the quantifier ||every|| = {<X,Y>: X ∩ R is a subset of Y}

i. the quantifier is what we said it means in Section I and shifts to a quantifier with a restriction on the individuals it quantifies over
||every|| = {<X,Y>: X is a subset of Y}, shifts to{<X,Y>: X ∩ R is a subset of Y}

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ii. the quantifier comes with the restriction in the lexicon
||every|| = {<X,Y>: X ∩ R is a subset of Y}

b. R is in the noun = {x: noun'(x) & R(x)}
i. the noun is what we said it means in Section I and shifts to a restricted noun
||noun|| = {x: noun'(x)}, shifts to {x: noun'(x) & R(x)}

ii. the noun comes restricted in the lexicon (Stanley & Szabo 2000, Stanley 2002)
||noun|| = {x: noun'(x) & R(x)}

Whichever strategy we choose, we'll end up being able to compose the full quantified NP before combining with the relative clause because of this R variable (easy to translate into a variable-free system, but details thereof omitted for brevity).

IV. Functional NPs

A potential problem arises: functional NPs (Jacobson 2002, Sharvit 1999)

(15) The woman who every man loves is his mother.

(Brief background note: definite determiner *the* picks out the contextually salient individual which is an N. Therefore, *the postman* refers to the contextually salient unique individual which is a postman.)

(15') *the woman who every man loves = his mother*

his mother is a functional noun phrase (equivalent to *the mother of him*), the function *f* such that *f(x) = x's mother*

But if *his mother* is a functional NP, then so is *the woman (who every man loves)*

Do higher order functional domain restrictions occur as contextually salient restrictions?

Consider the following scenario:
At a music school recital, each student is required to play six pieces.

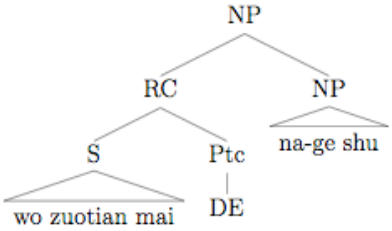
(16) A: The piece that every man hates the most is the last one he played.
B: What about *Hot Cross Buns*?
A: Of course every man hates that song *the most* but the piece that every man hates the most that he played is the last one he played.

V. Considerations

Extraposition
The man came yesterday who said he'd fix the toilet.
Every student danced at the party who came with a parent.

Stacking
Every student who drinks who came to the party danced.

Chinese relative clauses



wo zuotian mai de na-ge shu
I yesterday bought which the book
'the book that I bought yesterday'

Lexicalized generalized quantifiers
someone, nobody, everything, etc.

VI. To sum up

- NP-S analysis of RCs requires extra argument slot R
- extra slot needed for domain restriction
- functional domain restrictions and relatives clauses exist

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