Relative clauses and LF

1 Notes on variables

(1) **Some math "sentences":**

a.	$1 = 2 - 1$	a sentence with no variables; not context-sensitive
b.	$n = 2 - 1$	a sentence with a variable; context-sensitive
c.	$\forall n\,(2(n + 1) = 2n + 2)$	a sentence with a variable; *not* context-sensitive

- We say (1b) contains a *free variable* because the truth of the sentence depends on the context. In particular, the sentence is true iff the variable "n" is interpreted as 1.
- The truth of sentence (1c), like (1a), does not depend on the context at all.

(2) **Some terminology, using (1c) as an example:**

$$\underset{\textit{binder}}{\forall n}\ \underbrace{\left(2(\underset{\textit{bound}}{n} + 1) = 2\ \underset{\textit{bound}}{n} + 2\right)}_{\textit{scope}}$$

- *Binders* control the interpretation of a particular variable within a certain part of its structure, which we call its *scope*. Here, $\forall$ *binds* the variable n in its scope.
- We call variables that are in the scope of a matching binder *bound variables*.

More on variables in a couple weeks...

2 Relative clauses

(3) Every book which is good is expensive.

Example (3) can be easily given a truth-conditionally-equivalent paraphrase without a relative clause, as in (4):

(4) Every [good book] is expensive.

The relative clause *which is good* must be part of the *restrictor* (first argument) of *every*.

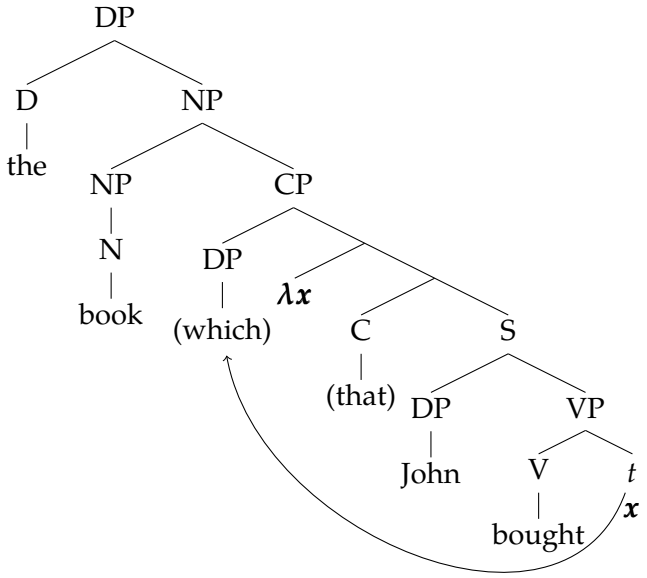
But in general, most relative clauses cannot be rewritten with adjectives in this way:

(5) The book that John bought is expensive.

Notice that the relative clause *has a gap*.

"...the peculiar genius of the relative clause is that it creates from a sentence '...x...' a complex adjective summing up what that sentence says about x." — Quine (1960, §23)

Relative clauses always involve *movement* of the relative pronoun (for example *which*) from the *gap* position to Spec,CP (Chomsky, 1977, and many others).



Exercise: Compute this structure. Assume ⟦that⟧ = Id and ⟦which⟧ = Id.

From last week:

(6) **The interpretation of movement:** (repeated; to be revised later)

Pick an arbitrary variable, such as x.

a. The base position of movement is replaced with a *trace*; $[\![t]\!] = x$, type e.

b. A *λ-binder* λx is adjoined right under the target position of the movement chain.

(7) **How to interpret λs in trees:** (repeated; to be revised later)

$$[\![\ \lambda x \quad \ldots x \ldots\ ]\!] = \lambda x\ .\ \ldots x \ldots$$

We assume that, syntactically, the complementizer *that* (C) triggers movement of the relative pronoun to Spec,CP. They are both optionally pronounced, and they cannot both be pronounced at the same time:

(8) a. the book John bought ____

b. the book which John bought ____

c. the book that John bought ____

d. * the book which that John bought ____

Following Chomsky and Lasnik (1977), we assume a "Doubly Filled COMP Filter" that states that both positions cannot be pronounced at the same time, explaining (8d). Subject relatives, like (3), require *that* to be pronounced if the relative pronoun is not pronounced.

3 Reconstruction

(9) Everyone does not sleep (during class).

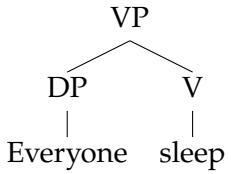
a. 1 iff $\underbrace{\forall x \in D_e \left[\underbrace{x \text{ is animate} \rightarrow \text{it's not that } [\underbrace{x \text{ sleeps (during class)}}_{\text{scope of } not}]}_{\text{scope of } \forall} \right]}$ $(\forall > not)$

b. 1 iff it's not that $\underbrace{\left[\forall x \in D_e \ [\underbrace{x \text{ is animate} \rightarrow x \text{ sleeps (during class)}}_{\text{scope of } \forall}] \right]}_{\text{scope of } not}$ $(not > \forall)$

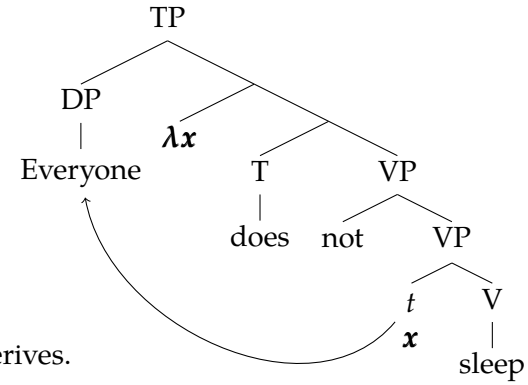
The two readings in (9) represent a *scope ambiguity*. There are two operators that "take scope"—$\forall$ and negation—and one scope contains the other. We say $\forall$ in (9a) takes *wider* scope, and write $\forall > not$ to indicate this.

Recall from the problem set that there are advantages to adopting a VP-internal subject, interpreted through movement. We will adopt this here.

Step 1: Build subject in Spec,VP



Step 2: Add *not* + T, move subject DP to Spec,TP

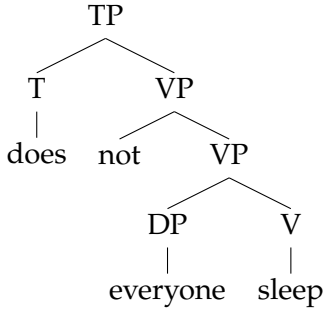


Exercise: Let's see what meaning this tree derives.

We call the meaning that is reflected on the surface form—here, (9a)—a *surface scope* reading.

How do we get reading (9b)? One option: *pretend the movement didn't take place*.

At Logical Form (LF): Pretend the movement didn't happen



Exercise: Interpret this tree.

We call this the *inverse scope* interpretation. The process of "ignoring" movement at LF is called *syntactic reconstruction*.

4 Logical Form

We have opened up the possibility that *what we pronounce* is different than *what we interpret*.

(10) Structure is built in Syntax. Syntax has two outputs:

a. *Phonological Form (PF)*: what is pronounced

b. *Logical Form (PF)*: what is interpreted

Additional operators may take place at these "interfaces"—in particular, covert movement (like QR) and reconstruction may take place at LF.

A hypothesis developed by May (1977), Huang (1982), and others is that operations at LF are *syntactic* operations, (generally) subject to the same constraints as visible syntax. Here is one argument for this. Consider example (11):

(11) **A sentence with a scope ambiguity:** (ex from Fox, 2003)

A (different) student likes every professor.

a. 1 iff there exists a student x [for every $y \in D_e$ [y is a professor $\rightarrow$ x likes y]]

b. 1 iff for every $y \in D_e$ [y is a professor $\rightarrow$ there exists a student x [x likes y]]

Suppose the second reading in (11) is the result of covert movement (QR) of *every professor* to a position higher than *a student* at LF:

(12) LF: [every professor] λx a student likes x

Now recall that *overt* movement is subject to the Coordinate Structure Constraint (13):

(13) **The Coordinate Structure Constraint (Ross, 1967):**

a. Which professor does John like ___?

b. * Which professor does John [[like ___] and [hate the dean]]?

(14) **Embedding within a conjunction blocks wide scope of *every professor*:**

A (#different) student [[likes every professor] and [hates the dean]]. (ex from Fox, 2003)

a. ✓ 1 iff there exists a student x [for every $y \in D_e$ [y is a professor $\rightarrow$ x likes y and x hates the dean]]

b. * 1 iff for every $y \in D_e$ [y is a professor $\rightarrow$ there exists a student x [x likes y and x hates the dean]]

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