Referat: Robert May (1977)
The Syntax-Semantics Interface
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Logical Form and Quantifier Raising

What is Logical Form

In the late 1970s, Noam Chomsky and Robert May developed a new, third level of syntactic representation, in addition to Deep-Structure (DS) and Surface-Structure (SS), namely *Logical Form* (LF). *LF is the level of representation which fully determines the semantics of a sentence*. It is the equivalent of Phonetic Form (PF), a representation of the sound of a sentence derived from its surface structure. LF is derived from SS by the same sort of transformational rules which derive SS from DS. The model developed here assumes the following order of components:

DS → SS → LF
　　　↳ PF

This model entails the "supremacy" of syntax over the semantics, in that the syntactic form is derived to completion before any semantic interpretation is given. It posits *a one-way channel of influence*: the syntax generates the semantics, whereas the latter does not have any influence on the former.

LF is sometimes referred to as *a covert level of representation*, because the output of this level is not actually pronounced by the speaker.

What is Quantifier Raising

The most important rule mapping from SS to LF is the rule of Quantifier Raising, or QR for short. This rule generates logical forms for sentences containing one or more quantifiers in the following manner:
QR: Adjoin Q (to IP)

Q is the realization of SpecNP, either as a quantified element such as 'every', 'some', 'a', 'many', 'three', etc. or as DET, which ranges over the definite determiner, demonstrative and reflexive pronouns, possessive noun phrases, etc.

Adjoin is the operation which generates (covert) movement of the designated NP to a higher position in the syntactic tree (i.e. to a c-commanding SpecIP). This is also known as a *move-α* operation.

(1) a. $[_{IP}$ Cecil played $[_{NP}$ $[_{Q}$ every] scale]]
b. $[_{IP}$ $[_{NP}$ $[_{Q}$ every] scale$]_{t}$ $[_{IP}$ Cecil played t]]

(2) a. $[_{IP}$ $[_{NP}$ $[_{Q}$ some] body] saw Dexter]
b. $[_{IP}$ $[_{NP}$ $[_{Q}$ some] body$]_{t}$ $[_{IP}$ t saw Dexter]]

Sentences (1) and (2) demonstrate QR from both object and subject positions.
The sentences in b are "logical forms".

Motivation for the existence of QR
i. QR is instrumental in giving sentences which display quantifier scope ambiguities a proper explanation.
Rule (combinatory): For any given IP clause which contains *n* quantified noun phrases, there are *n!* possible formally distinct well-formed logical forms which may be associated with it.

(3) a. $[_{IP}\ [_{NP}\ [_{Q}$ every] man] loves $[_{NP}\ [_{Q}$ some] woman]]

sentence (3a) is ambiguous between two reading - one asserting that for each and every man, there is some woman or other that he loves, the other asserting that there is a woman, such that she is loved by every man.
Note that the sentence contains two NPs which satisfy QR: 'every man' and 'some woman'. There are two ways which satisfy the Conditions on Proper Binding, through which the two NPs can be raised:
(3) b. $[_{IP}$ [every man$]_{t1}$ $[_{IP}$ [some woman$]_{t2}$ $[_{IP}\ t_1$ loves t_2]]]
c. $[_{IP}$ [some woman$]_{t2}$ $[_{IP}$ [every man$]_{t1}$ $[_{IP}\ t_1$ loves t_2]]]

QR generates two distinct logical forms which correspond to the two distinct readings of sentence (3a) We therefore get a *one-to-one relation* between derivations and readings, thereby dissolving the apparent ambiguity of the sentence.

According to the above rule, sentence (4) is predicted to be six-ways ambiguous (how?):
(4) Everyone brought a present for many of my friends

ii. QR provides an explanation for ambiguity in intensional contexts.
The sentences in example (5) can each be interpreted in two ways:
(5) a. John wants to marry a Norwegian
b. Harry is seeking a unicorn

In sentence (5a) for example - either there exists a specific woman, say Astrid, who is Norwegian and whom John wants to marry, or John is making a general plan to marry some woman who has qualities which he believes constitute a Norwegian (this, of course, does not entail the existence of any Norwegian).

In accordance with Intensional Logic, intensional contexts introduce an intensionality variable ˆ (up or cap). QR makes it possible for this variable to receive either wide or narrow scope relative to other intensional variables or quantified phrases. As predicted, in sentences (5a,b) this generates two possible reading of each sentence, thereby dissolving the ambiguity by providing a one-to-one relation between derivations and readings.

iii. QR displays parallel behaviour to wh-movement.
May posits that QR is an instance of the *move-*α operation. Since wh-movement is also an instance of the *move-*α operation, one would expect, and can indeed find, parallelism in the behaviour of the two. Evidence can be found in the interaction of QR with "islands" - structures, out of which movement is not allowed.

a. Subjacency
The *Subjacency island* prevents elements moving over more than one boundary (the definition of boundary varying as a parameter from one language to another). Positing that Subjacency also operates on covert QR movement, we can explain why sentence (6) is ambiguous, while the sentences in (7a,b) are unambiguous.
(6) Everyone spray-painted a BMW, which was blue
(7) a. Everyone who spray-painted a BMW got dirty
b. John defeated some politician who runs in every election

In sentence (6), two readings are available: Either each person spray-painted a different car, or everyone spray-painted one car together. However, in sentence (7), the only available reading is the one which has both QP's in their original position - *everyone* (*some politician)* takes wide scope over *a BMW* (*every election*).

The impossibility of an inverse scope reading in sentences (7a,b) can be explained by the *Subjacency island*. The CP node of the relative clause prevents elements from moving outside of it. QR thus creates an ungrammatical structure when it attempts to create an inverse scope reading, since it causes a QP found inside the relative clause to take scope outside of it.

b. The Coordinate Structure Constraint (CSC) [May 1985]
Ross's *CSC* determines that:
(a). no conjunct may be moved
(b). nor may any element contained in a conjunct be moved out of that conjunct.

Example (8) bellow exemplifies the impossibility of both overt and covert movement out of the coordinate structure "Peter hates every faculty member and adores a princess":
(8) a. *Whom does Peter hate and adores a princess.
b. Someone hates every faculty member and adores the princess (unambiguous).
(not: for every faculty member there is somebody different that hates it and adores the princess)

It thus seems prudent in this case also to assume that CSC restricts the covert movement generated by QR in a similar fashion to the way it restricts overt movement generated by wh-movement.

i*v. explains the apparent deviant behaviour of some wh-constructions.*
Sentences (9) and (10) appear to have the same structure, yet (9) is grammatical while (10) is not.
(9) Which man in Cleveland did you meet?
(10) *Which man in some city did you meet?

Both sentences contain a question, which is generated by wh-movement. Note that the wh-movement always precedes QR in the derivation, since it maps from DS to SS, while QR maps from SS to LF.

The derivation of sentence (10) thus proceeds in two steps (which are relevant here):
(a) First, the NP *which man in some city* is moved to SpecCP to give the following SS representation: $[_{CP}\ [_{SperCP}$ Which man in some city$]_t\ [_{IP}$ did you meet t]].
(b) Next, the QR rule applies in LF. Remember that QR is defined as adjoining a QP to IP. We only have one IP in sentence (10), therefore we can only derive the following structure: $[_{CP}\ [_{SperCP}$ Which man in $\alpha]_t\ [_{IP}$ [some city$]_\alpha\ [_{IP}$ did you meet t]]].
This movement violates the Condition on Proper Binding, since the NP *some city* does not govern its trace α. QR thus explains why sentence (9) is grammatical, and sentence (10) is not.

Definitions
C-command
A node A c-commands a node B iff
(i) A does not dominate B and B does not dominate A;
(ii) The first branching node dominating A also dominates B.
M-command
A m-commands B iff
(i) A does not dominate B and B does not dominate A;
(ii) The first maximal projection dominating A also dominates B.
Government
A governs B iff
(i) A is a governor ({N, V, P, A}, $I_{[+\ tense]}$, $C_{prepositional}$);
(ii) A m-commands B;
(iii) There is no XP that dominates B and does not dominate A, except IP.
A-Binding
A binds B iff
(i) A c-commands B;
(ii) A and B are co-indexed
Conditions on Proper Binding (applying at S-Structure):
A: An anaphor must be bound in its GC.
B: A pronoun must be free in its GC.
C: An R-expression must be free.
GC (Governing Category)
The GC for A is the minimal NP or IP with a subject containing A and the governor of A.

Source: Beginning Grammar Summary, TAU WS 05/06.