【Special Contribution】

A Non-movement Analysis of Operator-Variable Constructions and Its Consequences*

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1. Introduction

Since May (1977), it has been almost unanimously assumed that operator-variable constructions (OVC) as exemplified in (1a) require two positions, the operator position and the variable position and that the extra operator position is created by covert movement operation of Quantifier Raising (QR) as in (1b). One attractive execution of this movement approach is found in Fox (2002), where he adopts the Copy Theory of Movement of Chomsky (1993) and proposes an LF operation called Trace Conversion,[1] which, when applied to the output of QR in (1b), will insert the variable *x*, together with a lambda operator, and replace the second occurrence of *every* by the determiner *the*, giving (1c) as its LF representation.

(1) a. Mary talked to every boy --QR-->
b. every boy [Mary talked to every boy] --Trace Conversion-->
c. every boy λx [Mary talked to the boy x]

* This is a revised version of the paper that I read at the 3rd International Spring Forum of the English Linguistic Society of Japan, held at Aoyama Gakuin University on April 25, 2010, and a slightly revised version of which was presented as a special lecture of the 1st Conference of the Hokkaido Regional Branch of the Japan Association of English Linguistics and Literature, held on August 17 and 18, 2013. I would like to thank the audiences of the two conferences for their insightful questions and comments. I would also like to express my gratitude to two anonymous reviewers for their detailed and insightful comments and suggestions.

Attractive though it is, Fox's proposal violates the Inclusiveness Condition of Chomsky (1995), which requires that no new element be introduced in the course of a derivation.[2] The introduction of the variable *x*, the lambda operator, and the definite determiner *the*, neither of which was in the initial lexical array of (1a), is in blatant violation of the condition. Furthermore, Trace Conversion, when applied to (2b), gives rise to an ill-formed LF representation (2c) with two instances of *the*.

(2) a. Mary talked to all the boys --QR-->
b. all the boys [Mary talked to all the boys] --Trace Conversion-->
c. *all the boys λx [Mary talked to the the boys x]

In Tonoike (2005) I proposed to solve the dual problem and retain Fox's insight, by positing that just as (3b) contains a definite determiner, so does (3a) contain a phonologically null definite determiner indicated by braces. (Here and elsewhere I use braces to represent a phonologically null semantic material.) In this view, all the ingredients of an OVC, namely the operator (O), the variable (V) and the restriction (R), are already present in the quantified DPs and OVCs hold between the operator and the definite determiner, the latter functioning as a variable.[3] In fact, I proposed that a definite determiner, overt or covert, is associated with every operator, as shown in (4b-f).

(3) a. every {the} boy
b. all the boys
O V R
(4) a. Mary visited every {the} boy
b. Mary visited some {the} boy
c. Mary visited no {the} boy
d. Mary visited each {the} boy
e. Mary visited both (the) boys
f. Mary visited all (the) boys

In this paper, I would like to show that the proposed non-movement approach to OVCs has a number of desirable consequences, including those I discussed elsewhere.

2. Initial Consequence: Solution of the Type Mismatch Problem

One initial desirable consequence of the non-movement approach is that it solves what Heim and Kratzer (1998) refer to as the Type Mismatch Problem without the use of the covert operation of QR. The problem, very briefly, is that if operators do not move, it is not possible to assign them to a consistent type. (See Heim and Kratzer (1998) for details.) If we assume that operators are on a separate plane distinct from the two-dimensional plane on which arguments and predicates exist, then operators can be assigned to a consistent type of <t,t>: it takes a truth-value and gives back a truth value.[4]

(5) a. every operator plane
{the} boy proposition plane

b. all operator plane
the boys proposition plane

3. Other Consequences

Heim and Kratzer (1998) cite four phenomena summarized in (6) as possible motivations for QR.

(6) a. Somebody loves everybody. (Quantifier Scope Ambiguity)
b. Every boy says that Mary talked to him. (Bound Pronoun)
c. Every boy believes himself to be smart. (Bound Anaphor)
d. Somebody read every book that Bill did. (Antecedent-Contained Deletion)

I would like to show that these phenomena can be handled properly under the

proposed non-movement approach.[5]

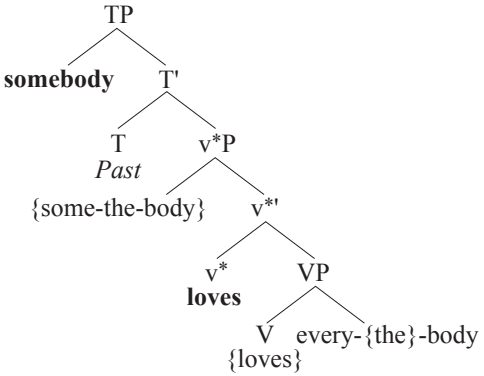
3.1. Quantifier Scope Ambiguity

Scope ambiguity can be accounted for without the use of QR if we adopt two assumptions in (7).

(7) a. A-movement of the subject from Specv*P to SpecTP has to carry only its phonetic shape and its semantic material can be left behind in Specv*P. (Semantic material can piggyback on A-movement if it results in a new reading otherwise unavailable as in *Somebody seems to know the answer* on the *some>seem* reading.)

b. UG offers an option (utilized by English) of overt rightward adjunction operation that affects the c-command relation, and hence the scope relation of the affected element. (Overt QR)

(8) a.



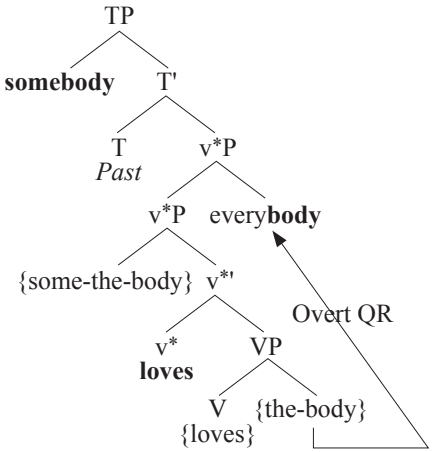
b. [Pres [$_{v*P}$ some-the-body v* [$_{VP}$ loves every-the-body]]] (LF)

What (7a) says is that as illustrated in (8a), A-movement of the subject has to carry only its sound marked by bold type and its meaning in braces can be left behind in Specv*P. Normal type represents the combination of the sound and the meaning. The LF representation (8b) can be obtained from (8a) simply by peeling off its sound. It is reasonable to assume that (8b) is the LF representation of (6a) (in one of its readings), because semantically it does not

make sense to say that the existential quantifier *some* has scope over Tense. In (8b) as well as in (8a), the subject asymmetrically c-commands the object. This captures the *some* > *every* reading of (6a).

What (7b) says is illustrated in (9a).

(9) a.



b. [Pres [$_{v*P}$ [$_{v*P}$ some-the-body v* [$_{VP}$ loves the-body]] every]] (LF)

A rightward adjunction operation, which I referred to as Overt QR, is an instance of Merge, and it can apply to (8a), adjoining the direct object to v*P, giving (9a). This results in the LF representation in (9b). Here I am departing from the standard copy theory of movement and am assuming that what is adjoined to v*P in (9a) is the sound of *everybody* plus the meaning of *every*, but the covert definite determiner *{the}* and the meaning of the restriction *body* are left behind in the object position. Now in the LF representation (9b) as well as in (9a), the adjoined object asymmetrically c-commands the subject in Specv*P, capturing the *every* > *some* reading of (6a). Thus, scope ambiguity does not need a covert operation like QR. All that is necessary is to allow overt rightward adjunction.[6]

3.2. Elimination of Binding Theory and Resolution of the Inclusiveness Condition Violation by Referential Indices.

A second desirable consequence of the proposal is that it can eliminate Binding Theory altogether and referential indices that come with it. Traditionally the bound variable reading of *him* and *himself* in (6b-c) has been captured by an LF rule that converts pre-LF representations like (10a-b) to (11a-b), respectively.

(10) a. Every boy_i says that Mary talked to him_i. (Bound Pronoun)
b. Every boy_i believes $himself_i$ to be smart. (Bound Anaphor)
(11) a. every boy λx [the boy x says that Mary talked to x]
b. every boy λx [the boy x believes x to be smart]

While this LF rule has the desired effect of turning proforms into variables, it makes a crucial use of "referential indices," and their use violates the Inclusiveness Condition because there is no independent evidence that referential indices are part of UG.

Violation of the Inclusiveness Condition does not arise under the Merge Theory of Binding of Tonoike (2008b). Following but extensively revising the movement approaches to binding of Hornstein (2001) and others, I have proposed that pronominalization and reflexivization are driven by a need for a predicate to assign a theta role, and are instances of Sideward Movement in a slightly extended sense of Nunes (2004). In other words, Sideward Movement can extract a DP, leaving a copy of its head D, and the extracted DP can later be merged in a theta-position.

Under the merge theory of binding (10a-b) will look like (12a-b), respectively, when pronominalization and reflexivization are to take place, or (13a-b), if we assume that extra copies of the definite determiners are contained in the underlying structure. (I will leave the choice open for future research.) Notice that here the distinction between the operator plane and the proposition plane is suppressed for ease of exposition.

(12) a. [$_{v*P}$ _____v* [$_{VP}$ say that Mary talked to every {the} boy]]
b. [$_{v*P}$ _____v* [$_{VP}$ believes every {the} boy's self to be smart]]
(13) a. [$_{v*P}$ _____v* [$_{VP}$ say that Mary talked to every {the}/{the} boy]]
b. [$_{v*P}$ _____v* [$_{VP}$ believes every {the}/{the} boy's self to be smart]]

In both (12a-b) v* is in need of a DP to which it can assign the subject theta role. In (12a), suppose *every {the} boy* has been chosen as the bearer of the theta role. Sideward Movement can take out the DP, leaving a copy of its head D. This DP can then be merged in Specv*P, giving the core v*P structure in (14a-b).

(14) a. [$_{v*P}$ every {the} boy v* [$_{VP}$ says that Mary talked to {the}]]
b. [$_{v*P}$ every {the} boy v* [$_{VP}$ believes {the}'s self to be smart]]

I am assuming that definite determiners (overt or covert) alone serve the referential function, and hence coreference is captured by the identity of definite determiners that has resulted from Movement (Merge).[7] The copy of the definite determiner in (14a) is spelled out as *him* due to its ϕ-features and Case feature. This spell-out is obligatory because that is, it is assumed, the only way to eliminate the uninterpretable Case feature. The string *{the}'s self* in (14b) is spelled out as *himself*. The LF representations of the two examples contain the v*P structures in (14). The two instances of the definite determiner in each structure are identical copies. This captures the identity of the two arguments. These can be translated, if desired, into more familiar logical expressions in (15).

(15) a. every x boy v* says that Mary talked to x
b. every x boy v* believes x's self to be smart

Thus under this merge theory of binding, pronouns and reflexives are spell-outs of copies of definite determiners left behind as a result of movement, and coreference is captured by identity of the definite determiners. The bound

variable interpretation of the proforms in (6b-c) is captured simply by the identity of the copies of a definite determiner shared between the binder and the bindee. This eliminates use of referential indices, as well as the covert operation of QR.[8]

3.3. Elimination of Deletion Operation

Before moving onto discussion of ACD cases, I would like to discuss VP deletion in general as a third desirable consequence and as a step toward a proper treatment of ACD. The third consequence is the elimination of deletion operation in dealing with so-called "deletion" phenomena. Following Postal (1966) and Ross (1967), I assume that VP deletion is proverbalization, so to speak, and like pronominalization, it should result from Sideward Movement, rather than deletion.

3.3.1. Strict Identity

Consider the case of strict identity in (16a) at the stage of derivation in (16b). Notice that in (16b) proper names, *Bill*, *Mary* and *John* appear with a definite determiner that is not associated with any operator. This guarantees unique reference of each of these proper names. (It is important to keep in mind that (null) definite determiners on *Mary*, *Bill* and *John* (for that matter) are distinct from each other.)

(16) a. John loves Mary and Bill does, too.

b. v^* $[_{v^*P}$ {the} Bill v^* $[_{VP}$ love {the} Mary]] → Proverbalization

In (16b) we have two syntactic objects, v*P and v*. The latter is in need of a complement, which can be supplied by applying Sideward Movement to the underscored VP, merging it with v*. Just like in pronominalization, proverbalization leaves a phonologically null copy behind. This gives the two syntactic objects in (16c).[9]

c. $[_{v*P}$ v* $[_{VP}$ love {the} Mary] → Merge of the subject *{the} John*
$[_{v*P}$ {the} Bill v* $[_{VP}$ {love the}]]]

Merge of the subject DP gives the two substructures in (16d). The regular course of derivation turns them eventually into (16f).

d. $[_{v*P}$ {the} John v* $[_{VP}$ love {the} Mary]]] → Merge of Pres and *does*
$[_{v*P}$ {the} Bill v* $[_{VP}$ {love the}]]]
e. $[_{TP}$ Pres $[_{v*P}$ {the} John v* $[_{VP}$ love {the} Mary]]] → A-movement
$[_{TP}$ does $[_{v*P}$ {the} Bill v* $[_{VP}$ {love the}]]]
f. $[_{TP}$ **John** T $[_{v*P}$ {the John} v*$[_{VP}$ love <u>{the}</u> Mary]]]
$[_{TP}$ **Bill** does $[_{v*P}$ {the Bill} v* $[_{VP}$ {love <u>the</u>}]]]

The LF representation of (16a) contains two substructures in (16f), and strict identity is captured by the identity of the two underscored copies of the null definite determiner associated with *Mary*. There is one difference between pronominalization and proverbalization. Usually a null head D left behind by pronominalization has a Case feature, which forces it to be spelled out as a pronoun. A copy left behind by proverbalziation lacks such morphological features, hence the copy remains null, giving it an appearance of having been deleted.

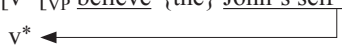
3.3.2. Sloppy Identity

Now, consider (17a) under the sloppy identity reading in (17c).

(17) a. John believes himself to be smart and Mary does, too.
b. Mary believes him (=John) to be smart. (strict)
c. Mary believes herself (=Mary) to be smart. (sloppy)

Suppose we have the two syntactic objects in (18a).

(18) a. {the} Mary's
[v* [$_{VP}$ believe {the} John's self to be smart]] → Proverbalization
v*



The genitive subject position of the head noun *self* contains two DPs. Here I am assuming that any number of DPs can be conjoined and form a coordinated DP, which is treated as a single constituent by the operation Merge. The light verb v* is in need of a VP, which can be supplied by Sideward Movement of the underscored VP, leaving a copy that is null except for *Mary*, as shown in (18b)

b. [v* [$_{VP}$ believe {the} John's self to be smart]] → Reflexivization
[v* [$_{VP}$ {believe the} Mary's {self to be smart}]]

Reflexivization can apply to the two syntactic objects, giving two v*Ps in (18c).

c. [$_{v*P}$ {the} John v* [$_{VP}$ believe {the}'s self to be smart]]
[$_{v*P}$ {the} Mary v*[$_{VP}$ {believe the's self to be smart}]]

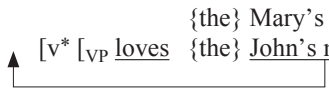
The sloppy identity reading is captured by the identity of the two instances of the null definite determiners on each line in (18c). The derivation takes a due course, giving (18d) and the LF representations in (18e).

d. PF
[$_{TP}$ **John** T [$_{v*P}$ {the John} v* [$_{VP}$ believe {the}'s self to be smart]]]
[$_{TP}$ **Mary** does [$_{v*P}$ {the Mary} v* [$_{VP}$ {believe the's self to be smart}]]]
e. LF
[$_{TP}$ T [$_{v*P}$ x John v* [$_{VP}$ believe x's self to be smart]]]
[$_{TP}$ does [$_{v*P}$ y Mary v* [$_{VP}$ believe y's self to be smart]]]

Basically the same account applies to (19a), with the underlying two syntactic

objects in (19b).

(19) a. John loves his mother and Mary does too.

b. 

→ Proverbalization

b. [V*P v* [VP love {the} John's mother]] → "Reflexivization"
[V*P v* [VP {love the} Mary's {mother}]]

c. [v*P {the} John v* [VP love {the}'s mother]] → Merge with T
[v*P {the} Mary v* [VP {love the's mother}]]

d. [TP T [v*P {the} John v* [VP love {the}'s mother]]] → A-movement
[TP does [v*P {the} Mary v* [VP {love the's mother}]]]

e. [TP **John** T [v*P {the John} v* [VP love {the}'s mother]]]
[TP **Mary** does [v*P {the Mary} v* [VP {love the's mother}]]]

f. PF
[TP John T [v*P v* [VP loves his mother]]]
[TP Mary does [v*P]]]

g. LF
[TP T [v*P x John v* [VP love x's mother]]]
[TP does [v*P y Mary v* [VP love y's mother]]]

Thus, sloppy identity VP deletion is in fact VP sideward movement plus reflexivization. No deletion operation of any kind is needed.[10]

3.4. Antecedent-Contained Deletion

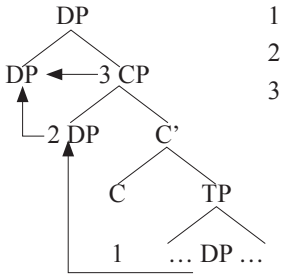
Let us now consider ACD cases like (20), which are considered to provide strong support for the existence of QR due to the obligatory inverse scope reading.

(20) Somebody read every book that Bill did. (=6d)

Since ACD crucially involves relativization, it is necessary first to establish a

theory of relativization. In Tonoike (2008a) I proposed a DP movement approach to relativization illustrated in (21).

(21)

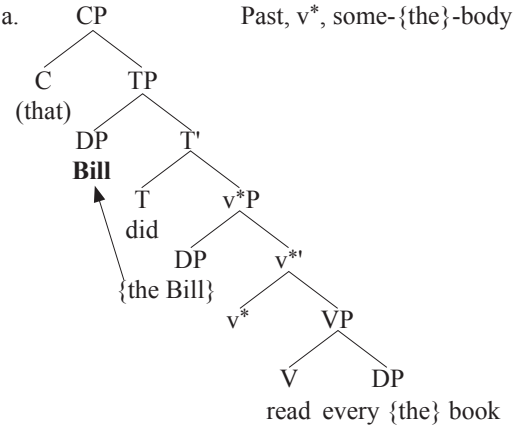


1 *Wh*-Movement
2 DP Extraction
3 CP Adjunction

Under this proposed approach, relativization consists of three operations: *Wh*-Movement (1) extracts a DP to SpecCP, with the relative C functioning as a probe.[11] DP Extraction (2) is a type of Sideward Movement and extracts the DP to be merged elsewhere.[12] CP Adjunction (3) adjoins the relative CP to the DP, before the latter gets merged elsewhere. I assume without argument that this is the correct theory of relativization.

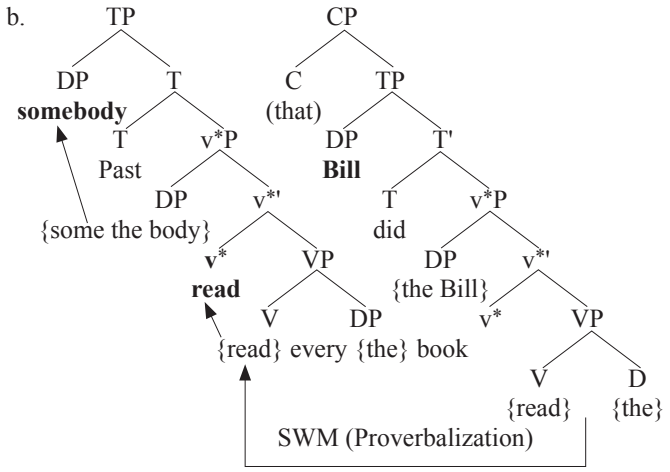
The derivation of (20) starts with a substructure and the remainder of the lexical array in (22a), and it goes through the steps given in (22b-e).

(22) a.

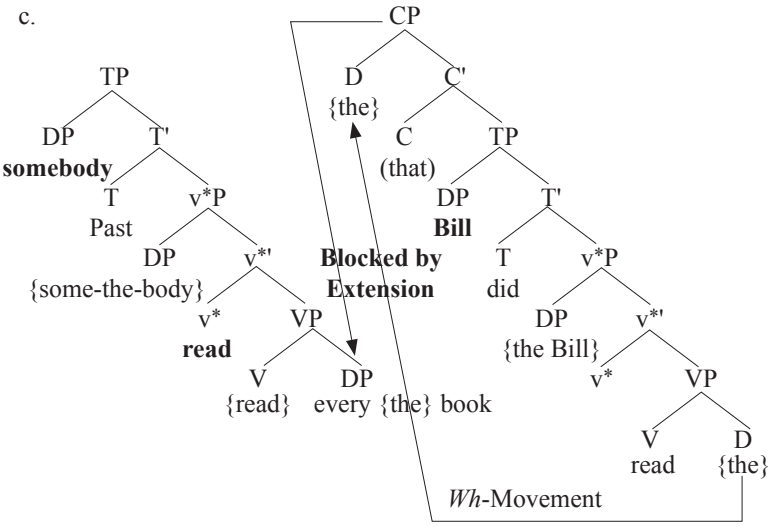


Past, v*, some-{the}-body

The transitive light verb v* in the lexical array needs a VP, which can be supplied by Sideward Movement of the VP in (22a) as illustrate in (22b), where the subject *some-{the}-body,* and Past are further merged and the subject has undergone A-movement.

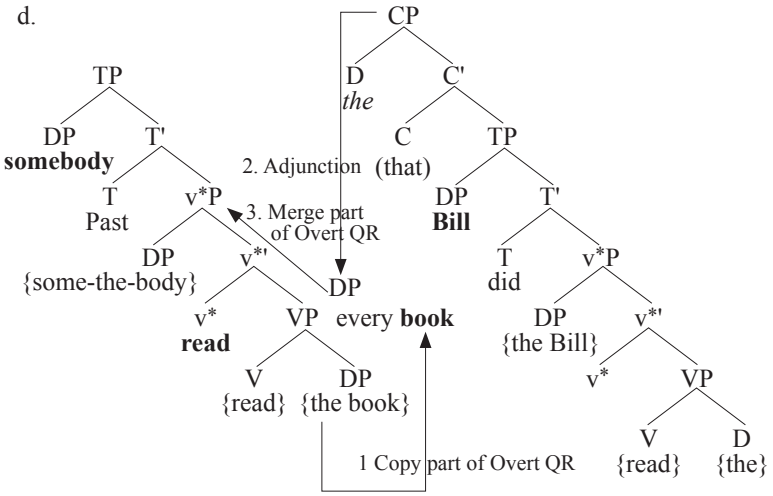


Sideward Movement leaves a null copy behind. Notice that the copy of the DP is a null copy of the head D. The null D undergoes *Wh*-Movement as shown in (22c). In this case DP Extraction need not have applied because the extraction has been achieved by Sideward Movement of the VP. All that is necessary is to adjoin the relative CP to the DP. But there is a catch. This adjunction is blocked by the Extension Condition, which requires that merge extend the target, the target in this case being the whole TP.[13]

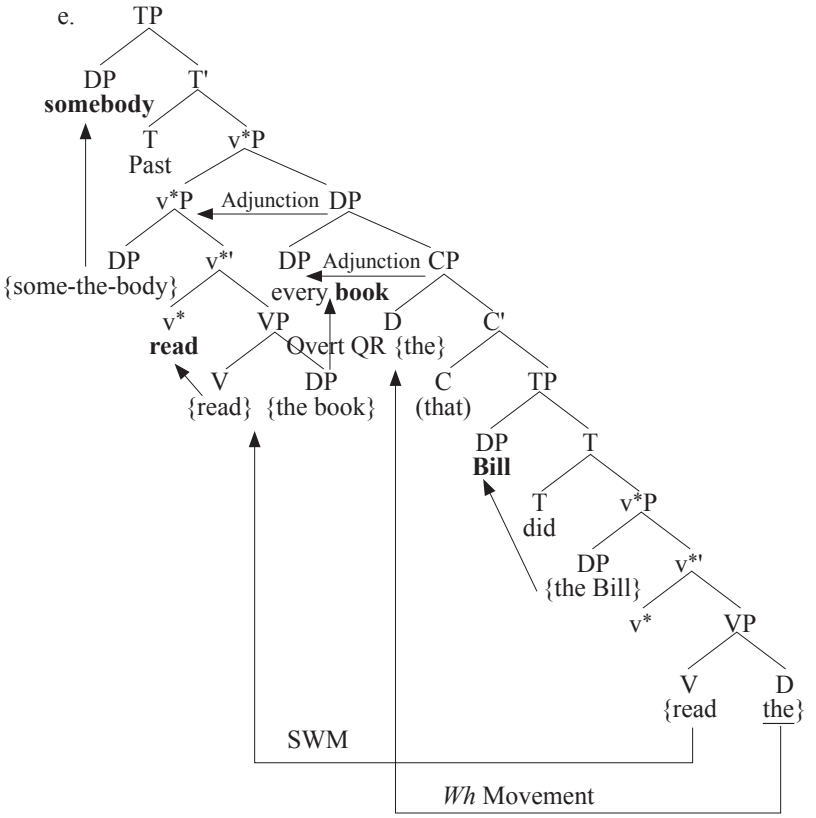


So it looks as though this derivation is doomed to crash.

However, there is a small window of opportunity for the CP to adjoin to the DP. Recall that Overt QR can apply to the object DP. Since Overt QR is also an instance of merge, it consists of two elementary operations, separation of the DP, leaving a null copy of D behind, and merge of the DP to v*P. Therefore, if Overt QR applies, we have, for a brief moment, three separate syntactic objects in (22d), the main clause, the DP and the relative CP.



The CP can adjoin to the DP without violating the Extension Condition. The relativized DP thus created is the same DP which was on its way to being adjoined to v*P, and therefore it can go on to be adjoined to v*P, unaware, so to speak, of the large luggage that it is now carrying. The resulting structure is (22e) and it leads to the LF representation in (22f).[14]



f. LF: [Past [[some-x-body v* read y book every] [that Bill did read y]]]

This accounts for the obligatory inverse scope reading of (20): The only way for the relative CP to be adjoined to the DP without violating the Extension Condition is for the latter to undergo Overt QR. Note that in (22e) the operator *every* c-commands both instances of the variable *the*.

Thus the fourth consequence is that the non-movement approach can adequately deal with ACD cases without a covert operation like QR, thus paving a way to eliminating covert operations as well as deletion operations altogether.

3.5. *Wh*-Movement

A fifth consequence concerns interrogative *Wh*-Movement. Since I am arguing that non-*wh*-operator-variable constructions hold in situ, to be consistent, I should also claim that *wh*-operator-variable constructions hold in situ. So (23a) should be derived from something like (23b), where the OVC holds in situ between *which* and the null determiner.

(23) a. Which book did Mary read?
b. C Mary did read which {the} book
c. **Which book** did Mary read {which the book}

Then it should follow that *Wh*-Movement should be driven not by the need to create an OVC but by some other need. I propose that it is driven by the need to mark the left edge of a *wh*-clause for English-like languages, which is encoded in C. This conjecture is supported by the paradigm in (24).

(24) a. Mary read which book?
b. *You don't know Mary read which book.
c. You don't know which book Mary read.

In (24a) *Wh*-Movement can but need not apply because being a simplex clause it does not contain two possible edges of a *wh*-clause to be distinguished by *Wh*-Movement. When a *wh*-phrase is contained in a complement clause as in (25b-c) it has to be raised to the complement SpecCP to mark the left edge of the complement clause, to distinguish it from the left edge of the matrix clause. It should be noted that under this view both A-movement and A'-movement are movement of the sound.

3.6. Sluicing

A sixth consequence is that Sluicing examples like (25a), which appears to be derived by ellipsis of *he bought* as shown in (25b) and have the semantic representation given in (25c), can be dealt with by movement, eliminating

syntactic deletion as well as semantic copying.

(25) a. Jack bought something but I don't know what.
b. Jack bought something but I don't know what ~~he bought~~.
c. ∃ x Jack bought x, but I don't know what x he bought x

Sluicing examples like (25a) are characterized by the two factors in (26).

(26) a. They contain two OVCs with the same variable.
b. They appear to have undergone TP-Deletion.

These two common denominators can be made to follow automatically if more than one operator is allowed to be associated with the same determiner and if TP can undergo Sideward Movement, leaving a partially null copy.

Consider a stage of derivation in (27a), where the two operators *some* and *what* are associated with the same definite determiner. Applying Sideward Movement to the underscored TP, merging it with C, gives the two sub-structures in (27b). (Here I am glossing over some of the v*P internal structure, including the fact that *some* and *what* are on the operator plane.)

(27) a. C C [$_{TP}$ **Jack** T [$_{v*P}$ {the Jack} bought some-{the} thing]
what
Sideward Movement of TP

b. C [$_{TP}$ **Jack** T [$_{v*P}$ {the Jack} bought some-{the} thing]
C [$_{TP}$ T [$_{v*P}$ {the Jack bought} what-{the thing}]

On the 2nd line the whole TP is there but is phonetically null except the *wh*-operator *what*. Further merge of *know* etc, yields (27c), whose rough LF representation will look like (27d).[15]

c. C [$_{TP}$ {the} Jack bought some-{the} thing]
but I don't know C [$_{TP}$ {the} {bought} what-{the thing}]

d. C [$_{TP}$ {the} Jack bought some x thing]
but I don't know C [$_{TP}$ {the} bought what x thing]

Here each operator binds one of the two identical variables. Notice that in this case there is no reason to apply *Wh*-Movement if it is movement of the sound as I assumed above, since there is no phonological material intervening between C and *what*.[16] This accounts for the island immunity of Sluicing noted by Ross (1969), quoted in (28a).

(28) a. They want to hire someone who speaks a Balkan language, but I don't remember which.
b. *They want to hire someone who speaks a Balkan language, but I don't remember which Balkan language they want to hire someone who speaks.

The derivation starts with (29a) with two operators, *which* and *a*, binding the same variable, namely the null definite determiner. (Notice that the distinction between the two planes is again suppressed. In a two-plane representation *which* and *a* will both be on the operator plane.)

(29) a. C they want to hire someone who speaks $\overset{\text{which}}{\text{a}}$ {the} Balkan language

Sideward Movement of TP yields (29b), and further merge of *know* etc., yields (29c).

b. C they want to hire someone who speaks a {the} Balkan language
C {they want to hire someone who speaks} which {the Balkan language}
c. C they want to hire someone who speaks a {the} Balkan language but I don't remember C {they want to hire someone who speaks} which {the Balkan language}

Thus, Sluicing as found in (25a) and (28a) is a result of Sideward Movement of TP, not that of deletion. It also makes a crucial use of the core proposal about the OVC, namely the use of definite determiners as variables.

3.7. Gapping as Pronged Structure + v*P Sideward Movement

The final consequence concerns Gapping examples like (30a). It is not a direct consequence of the non-movement approach, but it is a natural extension of the proposal in the sense that it makes use of multiply-filled structure and Sideward Movement. Consider the derivation of (30a).

(30) a. John ordered red wine and Mary white wine.

It can be derived by Sideward Movement of v*P, if two argument positions, like those of the subject and the object, can be filled with a coordinated DP as in (30b). Sideward Movement of the v*P gives the two substructures in (30c), the core structures of a gapped sentence. The verb is not pronounced because, unlike Ds, it has no morphological features that forces it to be spelled out.

b. T [$_{TP}$ T [$_{v*P}$ John v* ordered red wine]] ---> SWM of v*P
(Mary: John; white wine: red wine)

c. [$_{TP}$ T [$_{v*P}$ John v* ordered red wine]
[$_{TP}$ T [$_{v*P}$ Mary v* {ordered} white wine]]

Though Gapping does not directly involve OVC, it receives a natural account within the proposed framework of non-movement approach to OVC because of the introduction of three-dimensional multiply filled structure.

4. Conclusion

To conclude, the partial independence between operators and variables created by the proposed non-movement approach to OVCs paves a way to eliminating both covert movement operations like QR and deletion operations

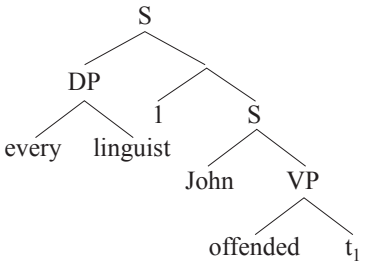
like VP deletion, Sluicing and Gapping as well as covert LF copying operations. The non-movement approach to OVC also provides a unified notion of coreference without recourse to referential indices and traces, thus eliminating a set of notions that lack conceptual necessity.

Appendix: Interplanar Functional Application

Here I would like to give a demonstration of how Functional Application can be modified to apply between the two planes to give desired interpretations. For that purpose let us see Heim and Kratzer's treatment of operator-variable construction with (covert) QR. In their analysis, the derivation (1a) after the application of QR gives (1b).

(1) a. John offended every linguist

b.



They say that interpretation of (1a) goes as follows:

> Inside the VP, the transitive V of type <e, <e,t>> composes by FA [Functional Application] with the trace of type e, yielding a VP meaning of type <e,t>. This composes (again by FA) with the subject's meaning, here of type e, to yield a type t meaning for the lower S.

This covers interpretation up to the lower S node. What happens after that does not concern us here because we have abandoned QR. What is important for us is that the lower S gets a meaning of type t.

Now in the proposed analysis of OV constructions, the relevant part of (1a)

has the following two-plane representation.

(2) every operator plane
[John [offended the linguist]] proposition plane

Notice that in this representation the operator *every* is on the operator plane and hence is separated from its associated DP *the linguist* on the proposition plane. Suppose interpretation proceeds first on the proposition plane and the result then composes with what is on the operator plane: The transitive V of type <e, <e,t>> composes by FA with the object DP *the boy*, of type e, yielding a meaning of type <e,t>. This composes with the subject's meaning of type e, yielding a type t meaning (just as the interpretation within the lower S in (1b) above). This meaning of the proposition plane then composes with the meaning of *every* of type <t,t> and yields a meaning of type t.

Now it is easy to see how (3a) with the structure in (3b) is interpreted.

(3) a. Some publisher offended John
b. some operator plane
[the publisher [offended John]] proposition plane

The meaning of the proposition plane is of type t. When that composes with the meaning of *some* on the operator plane, again of type <t,t>, the result is a meaning of type t.

Finally when two operators are involved as in (4a), application of FA between the two planes gives the desired meaning in (4b).

(4) a. Some publisher offended every linguist.
b. some every operator plane
[the publisher offended the linguist] proposition plane

The meaning of the proposition *the publisher offended the linguist* is of type t as usual. That meaning composes with that of *every*, of type <t,t>, and yields a

meaning of type t, which in turn composes with the meaning of *some*, of type <t,t>, and yields a meaning of the desired type, namely t. The relative scope between *some* and *every* is determined, not by the order of application of FA, but by the (extended) c-command relationships between them, though the two actually coincide. Thus, the only thing that is necessary for the current system to work is to allow FA to apply between the two planes, which is a natural consequence of adopting the two-plane representation.

Notes

1. Trace Conversion consists of Variable Insertion in (i) and Determiner Replacement in (ii).
   (i) Variable Insertion:
   (Det) Pred ---> (Det) [Pred λy (y=x)]
   (ii) Determiner Replacement:
   (Det) [Pred λy (y=x)] ---> the [Pred λy (y=x)]
2. To be precise, it reads as follows: The interface levels consist of nothing more than arrangements of lexical features (Chomsky (1995: 225)).
3. The lambda operator is now captured as a structural relationship holding between *every*/*all* and the rest of the sentence.
4. Yukinori Takubo (p.c., September 2, 2013) pointed out that this proposal makes sense only if it is coupled with an interpretive rule for <t,t> type. An anonymous reviewer gave me a similar comment. See Appendix for how Functional Application, when appropriately extended, can be used to give desired interpretation.
5. In the following exposition I continue to assume that operators exist on the operator plane and are associated with definite determiners on the proposition plane, but this fact will be suppressed for ease of exposition unless noted otherwise.
6. An anonymous reviewer raised a natural question of how the relative scope of the two operators *some* and *every* is captured in this system. Since I am assuming that operators are on the operator plane, separate from, though linked to, the proposition plane, scope is captured by the (appropriately extended) c-command relationship between operators on the operator plane.
7. Strictly speaking there should be a phonologically null definite determiner, before *Mary*, distinct from the one associated with *every*. This is so because I

am assuming that only definite determiners serve a referential function. But here it is omitted for simplicity.

8. An anonymous reviewer pointed out that the trapping effect of Lebeaux (1995), illustrated in (ia-b) below, will receive a natural account under the proposed framework. Nobuhiro Miyoshi (p.c., August 17, 2013) also made a comment to the same effect during the special lecture mentioned in the acknowledgements.

   (i) a. Two women seem to be expected to dance with every senator.
   b. Two women seem to each other to be expected to dance with every senator.

   The trapping effect refers to the fact that while (ia) is scopally ambiguous, (1b), with the anaphor *each other*, has only the *two>every* reading.

   Under the current proposal, the meaning of *two women* can but need not piggyback on the A-movement in (ia), but in the case of (ib) with *each other*, the same DP, originating in the complement subject position, must undergo Sideward Movement to a matrix position, presumably to Spec of *seem* phrase (after it is merged with *each other* and *to*), before undergoing A-movement to SpecTP of the matrix clause. Sideward Movement, being a theta movement, must take the semantic material along, accounting for the *two>every* reading This is shown in (ii) below.

   (ii) [$_{VP}$ [to two {the} women] seem [$_{TP}$ to be expected to {the} dance with every senator]]

   When this structure is merged with T, *two {the} women* undergoes A-movement to SpecTP. Regardless of whether this A-movement piggybacks the meaning or not, the DP in question is in the matrix clause where it is impossible for every senator to c-command it even if the latter undergoes Overt QR inside the complement clause.

9. In the second line of (16c), the "trace" of the VP can contain a phonologically null copy of *Mary* as in {love the Mary}, but I have omitted the phonologically null copy of *Mary* since I am assuming that only definite determiners have a referential function.

10. An anonymous reviewer pointed out two possible problems with the Sideward Movement analysis of VP ellipsis. One is the fact, noted by Webber (1978) and Fiengo and May (1994), that VP ellipsis allows split antecedents as seen in (i). The other is the fact that VP ellipsis can take place across utterance boundaries as in (ii).

   (i) I did everything that Mary did. Mary swam the English Channel and Mary climbed Kilimanjaro, and I did too. (Fiengo and May 1994: 195)

(ii) A: John criticized Tom.
B: Bill did, too.

Both cases involve a discourse either within one speaker (i) or between two speakers (ii). In Tonoike (2008b) I proposed that in discourse what has already been generated can be used as part of the lexical array for the next expression to be generated, as can be seen in the following examples involving pronouns.

(iii) It is obvious that {the} John loves {the} Mary. I think they={the}&{the} should get married.

(iv) a. A: What happened to {the} John?
b. B: He={the} just left.

In (iii), the two phonologically null determiners in the first sentence are conjoined and used as the subject of the second sentence. It is spelled out as *they* due to its Nominative Case. In (iv), the copy of the phonologically null determiner {the} in A's utterance (recreated in B's mind) is used as the subject of B's sentence. It is spelled out as *he* due to its Nominative Case.

Basically the same is true of (i) and (ii). The relevant parts have the following representations.

(v) I did {swim the English Channel}&{climb the Kilimanjaro}.

(vi) Bill did {criticize Tom}, too.

The VPs thus formed needs not have a spell out because they lack a feature that needs to be spelled out to be eliminated like Case features in pronominalization.

11. Strictly speaking, *Wh*-Movement extracts a focused XP containing a DP in cases like "the book the title of which I forgot."
12. DP Extraction can be extraction of a DP from within XP in SpecCP in cases mentioned in Note 11.
13. The Extension Condition reads as given in (i).
(i) GT and Move α [must] extend K to K', which includes K as a proper part.
(Chomsky 1995: 190)
14. The copy of the null definite determiner in SpecCP can be spelled-out as *which*, if the relative C does not have the phonetic shape *that*.
15. Notice that only the two null definite determiners are associated with *Jack*, the null definite determiners associated with *some* and *which* being represented as variable x.
16. That *Wh*-Movement does not apply here follows also from the fact that Sluicing takes place under the same conditions that license *wh*-in situ questions. See Tonoike (2011) for details.

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