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This paper examines the following problems:
1) VP ellipsis in coordinated sentences, and its interaction with the scope of quantifiers.
2) VP ellipsis across utterances in discourse.
We conclude the following:
1') A quantifier in the VP of the first conjunct may in some cases be given scope over both conjuncts, contrary to what one would conclude from Williams's (1977) and Sag's (1976a, 1976b) studies.
2') A quantifier in the VP of a first utterance may have scope over a following utterance with a null VP. This case is reduced to the first one by assuming the existence of an early discourse rule that operates on adjacent utterances and coordinates them. The resulting object is the input to semantic sentence and discourse grammar rules.

Finally, some examples that should help decide between the analysis defended in the text and an alternative analysis briefly mentioned are discussed.

1. Williams's and Sag's observations.

Williams (1977, 136) observes that while (1a) is ambiguous between a specific and a nonspecific reading of the object NP, (1b) as a response to (1a) only has the non specific reading.

(1) a. All the lawyers liked some of the decisions.
b. but the doctor didn't.

Similarily, Sag (1976b, 40) reports that while the first conjunct of (2a) is ambiguous (with the prefered interpretation being that where the relative scope of the quantifier expressions is identical to their surface order), (2b) is not and can only be interpreted with 'someone' having wider scope than 'everyone'.

(2) a. Someone hit everyone, but Bill didn't hit everyone.
b. Someone hit everyone, but Bill didn't.

Both Williams and Sag present an analysis that accounts for these facts. In the next section their analyses will be summarized. Then we will consider some facts that are not accounted for under their analyses and we will see how both theories can be modified in order to take care of these facts.

2.1. Williams's account.

The relevant aspects of Williams's analysis are the following ones:

1) Null VPs are generated by the syntactic component in a fully developed form; no lexical items are introduced under the lexical nodes

2) The surface structures that result from the application of transformations are the input to sentences grammar semantic rules, among which the following ones are relevant to the present discussion:

(3) Derived Verb Phrase Rule, (DVPR)

$$(\underset{S}{NP\ VP}) \longrightarrow (\underset{S}{NP}\ (\lambda x\ (\underset{S}{x\ VP})))$$

(4) Quantifier Interpretation (QI)

$$(\underset{S}{\ldots\ Q\ \ldots}) \longrightarrow (Qx\ (\underset{S}{\ldots\ x\ \ldots}))$$

These rules are slightly different from Williams's and apply in the order in which they are given.

(3) The structures that result from the application of sentence grammar semantic rules are the input to discourse grammar rules. The relevant rule here is the VP-Rule. This rule copies the lambda-expressions created by the DVPR into an empty VP. Contrary to sentence grammar rules, discourse grammar rules like the DVPR apply across sentences in a discourse.

(4) All rules of discourse grammar apply after all rules of sentence grammar; this is the principle of "strict utterance".

(5) Logical forms containing free variables are semantically anomalous.

All this enables Williams to explain why, while in isolation, (1a) is ambiguous between the non-specific reading expressed in (5) and the specific reading expressed in (6), it only has the non-specific reading in a discourse where it is followed by (1b).

(5) (∀x(x lawyers(λy(some z (y liked z decisions))))

(6) (some z(∀x(x lawyers(λy(y liked z decisions))))

When (5) provides the antecedent for the null VP of (1b), the resulting logical form (7) is well-formed; however the formula that results when (6) provides the antecedent for the null VP is anomalous, since it contains a variable z that is not bound.

(7) but the doctor didn't (λy(some z(y liked z decisions)))

(8) but the doctor didn't (λy(y liked z decisions))

2.2 Sag's account.

In Sag's analysis, null VPs are the result of a syntactic deletion rule whose applicability is constrained by semantic factors. The rule may apply if the lambda expression that corresponds to the semantic translation of the target VP is an alphabetic variant of the lambda expression that corresponds to the semantic translation of the VP that serves as the intended antecedent for the null VP. As for the definition of 'alphabetic variant', I will quote Sag (1976a, 536) at length:

> "Intuitively, two λ-expressions are alphabetic variants, if they differ only with regard to variable letters... For two λ-expressions, λx(A) and λy(B), to be alphabetic variants, every occurrence of x in A must have a corresponding instance of y in B, and vice-versa....However, if there are any variables in A that are bound by some quantifier outside of λx(A), then the corresponding variable in λy(B) must be bound by the same operator in order for alphabetic variance to obtain...Crucially, if λx(A) contains a variable bound outside of λx(A) (for instance, z in (∀z) (John, λx(x loves z)) and λy(B) contains a corresponding variable bound outside of λy(B) (even one bound by an analogous operator, for instance, w in (∀w) (John, λy(y loves w))) the two λ-expressions are not alphabetic variants..."

Given this, (2b) is derived from (2a), but only under the interpretation represented in (9), not that represented in (10) or (11):

(9) (Ex) (x, λy((∀z(y hit z))) but ¬Bill, λq((∀p)(q hit p))

(10) (∀z) (Ex) (x, λy(y hit z)) but ¬Bill, λq((∀p)(q hit p))

(11) (∀z)(Ex) (x, λy(y hit z)) but¬(∀p)(Bill, λq(q hit p))

Only in (9) are the underlined expressions alphabetic variants.

3. Null VPs and 'each' in conjoined sentences.

Consider sentences (12) and (13):

(12) A Canadian flag was hanging in front of each window, and an American one was too.

(13) A kitty was sleeping in each corner, and a puppy was too.

These sentences are well-formed, and the quantifier in the VP has scope over the quantifier in the subject position. Within William's framework, (14) would be a simplified representation of (12), with the quantifier in the VP having wider scope than that in the subject position. This representation is not well-formed, since the second conjunct contains a variable x that is free.

(14) (∀x Ey (y λz(z was hanging in front of x)))
and (Es(s λz(z was hanging in front of x)))

Under Sag's proposal, if (15) is taken as the source of (12), the representation with the quantifier in the VP having scope over the subject will be as in (16).

(15) A Canadian flag was hanging in front of each window, and an American flag was hanging in front of each window too.

(16) ((∀x) (Ey) (y, λz(z was hanging in front of x)))
and (∀u)(Er)(r,λw(w was hanging in front of u)))

This however is not appropriate for deletion since the two lambda-expressions are not alphabetic variants: in the first conjunct 'x' is bound from outside of the lambda-expression by '∀x', while in the second conjunct 'u' is bound from outside of the lambda-expression by another instance of a quantifier, i.e. '∀u'.

4. Across-the-Board quantifier scope.

Two types of proposals come immediately to mind to deal with the above facts. Considering first Williams's framework, one might suggest to apply the VP-rule before

quantifier scope assignment. This would mean abandoning William's strict utterance principle. In addition it would give us unwanted results in the case of examples (1b) and (2b). The parallel solution within Sag's framework would be to relax the definition of alphabetic variance so that the two lambda-expressions in (16) count as alphabetic variants by dropping the requirement that corresponding variables in two identical lambda-expressions must be bound by a unique operator when bound from outside the lambda-expressions, and simply allow these variables to be bound by different occurrences of the same operator. This would however result in the two lambda-expressions in (11) to count as alphabetic variants, and prevent us from explaining why (2b) doesn't have the reading corresponding to (11).

A more attractive proposal is simply to allow 'each' in (3) and (4) to take wider scope than the quantifiers appearing in William's and in Sag's examples, i.e., allow 'each, to have scope over both conjuncts. Instead of (14),(12) would thus be given a representation like (17):

(17) $\forall x\begin{pmatrix}(Ey\ (y\ \lambda z(z \text{ was hanging in front of } x)))\\ \&(Es(s\ \lambda z(z \text{ was hanging in front of } x)))\end{pmatrix}$

The quantifier '$\forall x$' binds the two occurrences of 'x'. The only additional observation that one should make is that under Williams's framework, quantifier raising would have to violate the coordinate structure constraint; however, after application of the VP-rule, the quantifier binds a variable in each conjunct in an across-the-board fashion, with no violation of the coordinate structure constraint being apparent. Within Sag's framework, a logical form like (17) would result from allowing quantifier raising to apply in an across-the-board fashion in exactly the way proposed for syntactic rules by Williams (1978).

5. Quantification across utterance boundaries.

Examples like (12) are not restricted to single sentences, as can be seen from (18):

(18)a -A Canadian flag was hanging in front of each window.
b.-Yes, and an American one was too.

Not much needs to be said to account for (18a-b): as the presence of 'and' makes it clear, the second utterance must be taken as conjoined to the first one. I will thus assume that successive sentences in a discourse are taken to be coordinated to one another, whether there is a conjunction or not, whether the sen-

tences are of the same syntactic/semantic type or not, as suggested for example by (19):

(19)a -A Canadian flag was hanging in front of each window!
b -Didn't you notice that an American one was too?

6. Work for the future.

In section 4. I have dismissed the proposal whereby the VP-rule would apply before quantifier raising, in part because it would make a wrong prediction about the interpretation of examples like (2b). In the case of examples like (12), there is no difference in reading whether we adopt the solution defended in 4., or whether we allow VP-copying to apply before quantifier raising. With some quantifiers it would however make a difference in reading, and the analysis defended here can thus be tested. Consider then the following example:

(20) A Canadian flag was hanging in front of most windows, and an American one was too.

If (20) has a reading whereby it is not necessary that both an American and a Canadian flag are hanging in front of most windows, then it means that (20) has a reading corresponding to (21), all details omitted:

(21)((Most x) (a Canadian flag was hanging in front of x)) and ((most y) (an American flag was hanging in front of y))

Although my informants are not totally confident about their judgments, a good number accept (20) as describing the state of affairs depicted in (22), where each occurrence of W stands for a window, each occurrence of C for a Canadian flag, and each occurrence of A for an American flag. Intuitively, I consider 10 windows to be enough to count as most of 13 windows, but not 7.

(22) W_1 W_2 W_3 W_4 W_5 W_6 W_7 W_8 W_9 W_{10} W_{11} W_{12} W_{13}
C_1 C_2 C_3 C_4 C_5 C_6 C_7 C_8 C_9 C_{10}
A_1 A_2 A_3 A_4 A_5 A_6 A_7 A_8 A_9 A_{10}

If these are the facts it is obviously a problem for the analysis defended here. And obviously, the analysis that reverses the order of quantifier raising and the VP-rule wouldn't automatically come out as the correct analysis, given the interpretation of (1a-b) and (2b).

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The problem created by (20), if the facts are correct, is not an isolated one, as indicated by the following two types of cases. First, substituting 'many' for 'most' in (20) also seems to allow for a reading where the windows with a Canadian flag may be distinct from the windows with an American flag. Secondly, (23) appears to be ambiguous along the lines of (24) and (25), the preferred reading depending on stress and intonation.

(23) A Canadian flag was hanging in front of each window, but an American flag wasn't.

(24) ∀x((a Canadian flag was hanging in front of x) and ¬(an American one was hanging in front of x))

(25) ∀x(a Canadian flag was hanging in front of x)) and ¬(∀x(an American flag was hanging in front of x))

(25) is the problematic reading for the analysis defended here, and this reading is particularly prominent when (23) is read with contrastive stress on 'each'. My only conclusion at this time is that the contrasts noted between the readings of sentences like (1a-b), (2b) vs (12),(13) vs (20), (23) present us with a challenging and difficult area for further research.

7. Multiple questions.

In this last section I will briefly turn to facts supporting the hypothesis that quantifier raising, or at least wh-quantifier raising, precedes the VP-rule, if one adopts the interpretive approach to null VPs

Consider (26):

(26) *Which boy read which book and which girl did too?

It is well-known that an unmoved wh-phrase must be assigned scope over a clause headed by a wh-phrase that commands it, and that it may not be assigned scope over a higher clause. Given this, the representation for (26) must be (27) or a similar one with 'which book x' and 'which boy y' switched:

(27) $(_{\bar{S}_1}\ (_{\bar{S}_2}$ which book x $(_{\bar{S}_2}$ which boy y(y read x)))$_{\bar{S}_2}$, and $(_{\bar{S}_3}$ which girl z(z read x too))$_{\bar{S}_3})_{\bar{S}_1}$

The phrase 'which book x' cannot be given scope as high as $\bar{S}_1$, and (26) is ungrammatical because the occurrence of '$\bar{x}$' in the second conjunct of (27) is free. This ac-

count would not be possible if the VP-rule applied before the rule that gives unmoved wh-phrases their scope. If the rule that gives non-wh quantifiers their scope is the same rule that gives wh-quantifiers theirs, or if it is part of the same component, then it follows that the rule must apply before the VP-rule, in accordance with Williams's principle of strict utterance.

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