Constraining the Application of Erasure Rules: Evidence from Conjunction Reduction
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Constraining the Application of Erasure Rules: Evidence from Conjunction Reduction*

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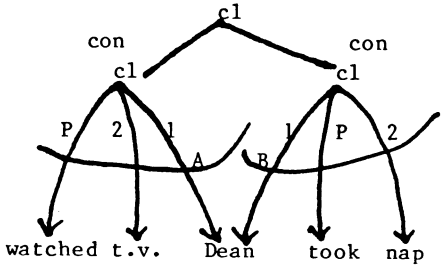
In the book Arc Pair Grammar, Johnson and Postal (1980) give an analysis of verb-phrase conjoined sentences like the one in (1) which predicts that such sentences will behave syntactically as two unreduced clauses conjoined with and.

(1) Dean watched t.v. and took a nap.

I will give arguments to show that this prediction is wrong, that such conjunction reduction (CR) sentences act as if they are composed of a single clause, and that for the Johnson and Postal analysis to be able to capture this fact, rules would have to be able to make reference to information not normally available to them, hence increasing their power in an undesirable way. In addition I will argue that not only shouldn't conjunction reduction be accomplished through the type of rule that Johnson and Postal propose, but that such an analysis should be explicitly prevented as a possibility. I claim that constraining Arc Pair Grammar (APG) in such a way will allow the theory to capture generalizations that it currently cannot make.[1]

Johnson and Postal (p. 228) say that in a sentence like (1), "the 1 arc of the [second] clause is definitely foreign erased, by the 1 arc of the main clause, and thus is a final stratum arc."[2] This analysis entails that each VP is in a separate clause, each of which has a 1 arc (a subject arc) (cf. figure 1). Foreign erasure is a rule which prevents an arc from being an input to the phonology without affecting its status in the syntax. So a foreign-erased arc though syntactically present is phonologically null. In figure 1, arc A erases arc B and Dean, the nominal heading both arc A and arc B, will be pronounced only once--it will occur as the subject of the clause that arc A is in. It will not be pronounced in the position that a nominal heading a 1 arc in the clause containing the arc B would normally be pronounced in.

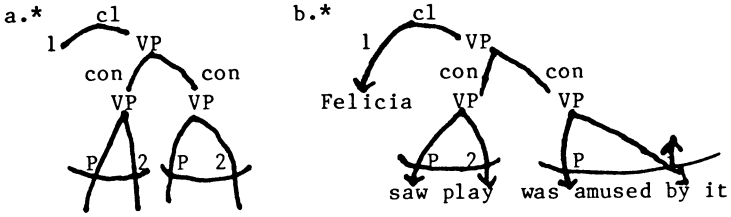
Figure 1[3]



Since foreign erasure has no influence on the grammatical relations in a sentence, a sentence with a foreign erased 1 arc still has a 1 arc in its final stratum. Therefore (1) must consist of two clauses each containing a 1-arc in its final stratum. The relations in the initial and final stratum will be unchanged by a foreign erasure conjunction reduction rule, so both the initial and final strata for sentence (1) will be as in figure 1.

This analysis for conjunction reduction sentences is proposed as an argument that the networks for these sentences do not violate the final 1 law which specifies that every basic clause must have a final 1. It should be pointed out that an analysis with two clauses rather than one at the initial stratum is the only analysis available in the APG framework. A network with initially conjoined VP constituents as in figure 2 is ruled out by definition since APG does not allow initial VP constituents.[4] But even if figure (2)(a) were a possible initial structure, it could not be the initial representation for a sentence like (2) (see figure 2b for this hypothetical network) in which the second but not the first clause is passivized, because APG analyzes all instances of passive as 2-1 advancements. The network in figure 2b has a passive with no advancement at all since the passive VP would be initially conjoined and therefore initially passive, and so it would not be an acceptable analysis for the sentence in (2).[5]

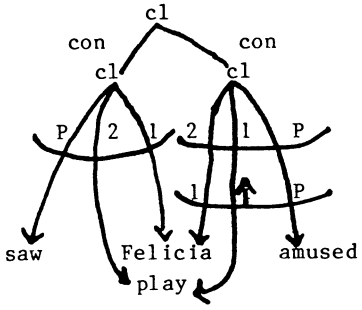
Figure 2



(2) Felicia saw the play and was amused by it.

In order for (2) to have 2-1 advancement in the second clause, there would have to be two separate clauses with different nominals heading the 1 arcs in their initial strata. The stratal diagram for (2) under the Johnson and Postal analysis would be figure 3. The 1-arc in the first clause erases the 1-arc that goes to Felicia in the second clause.

Figure 3



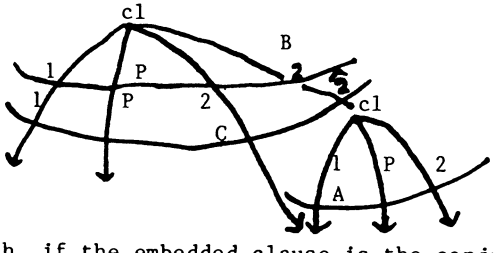
The rule of foreign erasure which gets (1) from figure 1 and (2) from figure 3, is defined to apply to arcs that are in what is called a kissing relationship. This means that the arcs share a head (are headed by the same element) but do not share a tail. Since the arcs do not share a tail it means they cannot be in the same clause since all arcs in the same clause share a common tail, namely the clause node. Given that foreign erasure does not change this structural relation, nor does it alter grammatical relations, rather, it simply makes one of the arcs unavailable to the phonology, the Johnson and Postal analysis of conjunction reduction as simply arc foreign erasure says that the final structure for verb-phrase conjoined sentences is two basic clauses conjoined with and, in no way syntactically different from two

unreduced conjoined clauses. Therefore, given this analysis, conjunction reduction sentences would be expected to behave just like unreduced conjoined sentences.

In what follows I will argue that this is not the case, that conjunction reduction sentences act as if they are composed of a single clause, and that for a conjunction reduction rule based on foreign erasure to be able to capture this fact, rules would have to be able to include reference to surface phenomena predicted by APG not to be a relevant part of determining syntactic structure. I suggest that not only shouldn't conjunction reduction be accomplished through a foreign erasure rule, but that a foreign erasure analysis should be explicitly prevented as a possibility. More precisely, I argue that a constraint should be added to universal grammar to prevent erasure from applying across conjunctions, and claim that with such a constraint the theory of APG will be able to capture generalizations that it currently cannot make both about conjunction reduction sentences and about other constructions such as Equi-structures.

One argument that CR sentences act as if they have only a single clause rather than two clauses in their final strata comes from sentences in which they are embedded under raising verbs. In APG, raising-to-object involves a lower clause arc such as A in figure 4, together with the higher clause arc B, which the embedded clause heads, sponsoring (licensing the existence of) the ascension arc C in the higher clause.

Figure 4



In English, if the embedded clause is the conjunction of two or more clauses, raising cannot occur. So in (3)(b) although it appears as if Sam might have been raised from an embedded conjoined clause in a network otherwise like the one in figure 4, the unacceptability of (3) (c) shows that this is not the case since Sam cannot advance to 1 in the higher clause in a passive construction as 2s normally do.

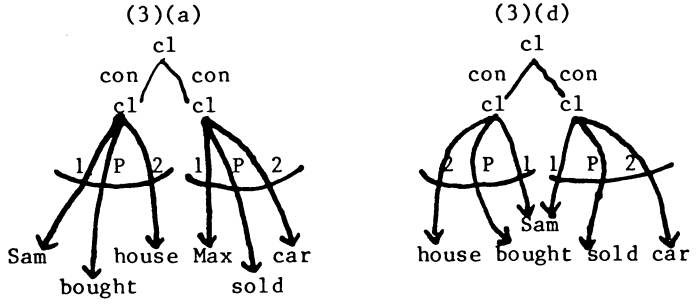
(3) (a) Sam bought a house and Max sold his car.
(b) Mary believes Sam to have bought a house and Max to have sold his car.
(c) *Sam is believed by Mary to have bought a house and Max to have sold his car.

If sentences with CR have two clauses in their final strata, then with respect to raising, they are predicted to behave just like (3) (a) which doesn't have reduction. In other words, the prediction is that the overt 1 in the CR sentence cannot become a 2 of the higher clause, and that it will not be able to advance to 1 in the higher clause. Yet this is not the case as can be seen by looking at (3)(e) and (f). In (3)(e) like (3)(b) it looks as if raising has applied. But we can see that in the case of (e) unlike (b) it really has applied, since the raised nominal can advance to 1 in the higher clause as seen in (3)(f). So the reduced sentence (3)(d) acts syntactically different with respect to raising than the unreduced (3)(a).

(3) (d) Sam bought a house and sold his car.
(e) Mary believes Sam to have bought a house and (to have) sold his car.
(f) Sam is believed by Mary to have bought a house and (to have) sold his car.

By the Johnson and Postal analysis of (3)(a) and (d), the representations for these sentences differ in two ways as shown in figure 5. The network for (d) but not the one for (a) has arcs initially in a kissing relationship, and has had a rule of foreign erasure apply to erase one of the kissing arcs.

Figure 5

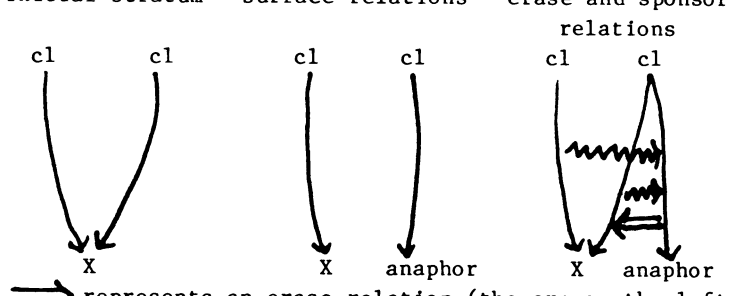


For their analysis to account for the difference in the behavior of these two sentences with respect to raising they will have to be able to explain it on the basis of one or both of these factors since these are the only things differentiating the two representations. I will show that making reference to the kissing relationship alone cannot explain the difference in the behavior of (3)(a) and (d), and will argue that any way in which foreign erasure could be referred to would lead to an undesirable rule form.[6]

One possible way of trying to account for the raising facts is to say that the rule of raising has a restriction on it specifying that an arc can only raise out of a conjoined clause if it is in an initial kissing relationship with the arc bearing the same grammatical relation in its sister clause. That this is not sufficient for explaining the differences can be seen by looking at sentences like the ones in (4) in which the kissing relationship has been resolved by anaphoric replacement (see figure 6) rather than by foreign erasure. The resulting sentences are nevertheless unacceptable unlike (3)(e) and (f) which would be claimed to have erasure.

(4) (a) *Mary believes Sam to have bought a house and he sold his car/him to have sold his car.[7]
(b) *Sam was believed by Mary to have bought a house and he sold his car/him to have sold his car.

Figure 6 Anaphoric Replacement



⟹ represents an erase relation (the arc on the left of the arrow erases the arc on the right of it)
⇝ represents a sponsor relationship (the arc on the left of the arrow sponsors the one on the right of it)

So in spite of an initial kissing relationship, the unacceptability of (4) shows that the arc from the first clause can

still not be raised. This means that the only acceptable situation in which raising can occur out of a conjoined clause is when kissing has been resolved by foreign erasure (assuming the Johnson and Postal analysis). The restriction would have to specify that a network with an ascension arc sponsored by an arc in a conjoined clause was only acceptable if the arc from the lower clause that sponsored the ascension arc (the "raised" arc) had erased all arcs that it had a kissing relation with in its clause's conjoined sisters.

But a rule making reference to this type of information would be a very strange type of rule. Rather than referring to grammatical relations or even just to the structural configuration of an arc with regard to other arcs, such as whether they share a head, the rule must refer to what an arc has done, so to speak, to another arc. Since APG predicts that syntactic facts follow from grammatical relations and not from surface facts such as whether an arc is available to the phonology or not, this is not a desirable addition to possible rule forms.

But this analysis is bad for another reason as well. Since the only cases where raising occurs out of conjoined clauses are cases with conjunction reduction, hence cases where at least superficially the embedded clause looks as if it has only one 1-arc for two VPs, and since conjunction reduction by this analysis is foreign erasure, this analysis then claims that if an arc is phonologically null, it acts syntactically null, even though the rule making it phonologically null is explicitly designed to ensure that the arc is still syntactically present. A raising rule that made reference to foreign erasure would then be a rule that allowed sentences to act syntactically as if they were something different from what they really were (it would allow two sentences to act as one), as long as they looked superficially as if they were what they acted like syntactically. Without such tricks, a foreign erasure analysis of conjunction reduction incorrectly predicts that CR sentences will act syntactically as if they are two sentences.

A second case where a foreign erasure analysis incorrectly predicts that CR sentences will act as two sentences rather than one, is in predicting the occurrence and scope of time adverbs. In single nonconjoined clauses in English, time adverbs can be phrasal and occur sentence finally, or they can be sentential and occur sentence initially--(5)(a) and (b) respectively. But a sentence cannot have both a sentential and a phrasal adverb as seen in (5)(c).

(5) (a) Ella went to a movie on Friday.
(b) On Friday Ella went to a movie.
(c) *On Friday Ella went to a movie on Saturday.

In conjoined clauses without reduction, if a time adverb precedes both clauses it optionally has scope over both clauses, but this is not a necessary reading. (6)(a) could have an interpretation where Bob moved out on some day after Friday. And as seen in (6)(b), the second clause can have a phrasal time adverb in it in spite of the fact that the first clause has a sentential time adverb in it without there being a change in acceptability for the sentence as a whole.

(6) (a) On Friday Ella bought a car and she/Bob moved out.
(b) On Friday Ella bought a car and she/Bob moved out on Saturday.

However in a sentence with conjunction reduction, if a time adverb is sentence initial, it necessarily has scope over the entire sentence, as in (7)(a). An interpretation where Ella moved out after Friday is not available, and as with single clauses, there cannot be another time adverb following the VP as seen in (7)(b).

(7) (a) On Friday Ella bought a car and moved out.
(b) *On Friday Ella bought a car and moved out on Saturday.

There is no way to account for these facts by an erasure analysis. The erasure rule for conjunction reduction would have to specify that erasure could not occur if the clause of the eraser had a sentential time adverb and the clause of the erasee had any sort of time adverb at all.[8] In this case a rule would have to be able to make reference to the existence or nonexistence of arcs (time adverb arcs) that were not in any special structural configuration with the arcs partaking in the rule (the nominal arcs). In addition, the erase rule would have to specify that when an arc was erased, scope relations of time adverbs changed. In particular, the scope of the adverbs would change to become what they would be if there were only one clause instead of two in the conjunction reduction sentence. So with regard to time adverbs as with raising, when there is conjunction reduction, the two clauses act as if they are a single clause with a single 1-arc.

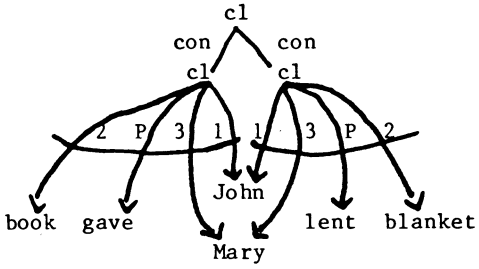
A third case in which an erasure analysis would have to make two clauses act as one is in the determination of word order in

conjunction reduction sentences. If we adopt an erasure analysis, then in sentences with passive in both clauses, for example (8)(a), both 1s and ↑1s must get erased. This can be seen in figure 7. Mary starts out as an initial 3 in both clauses, and John starts out as the initial 1 in both clauses as in figure 7a. The arcs to Mary must advance to 2 and then to 1 in both clauses, for both clauses to be passive. This corresponds to the network in 7b.

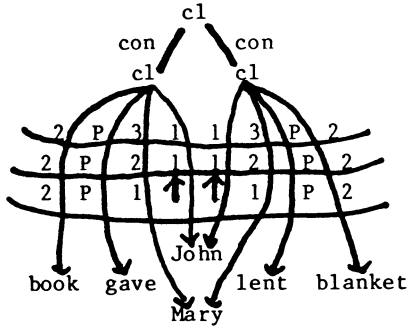
(8) (a) Mary was given a book and (was) lent a blanket by John.

Figure 7

a.



b.



As seen in figure 7b there are kissing 1s and kissing ↑1s, but as seen in (8)(a) there is only one phonological instance of each. This means that in a sentence like (8)(a), both a 1-arc and an ↑1-arc would have to be foreign erased. However it turns out that 1s and ↑1s have to erase in opposite directions after linear order is determined. (9) shows that 1s must erase from left to right since (9)(b) where erasure has gone in the other direction is unacceptable. (8) in comparison with (9) shows that ↑1s erase

right to left since (8)(b) where a ↑ has been erased on the right is unacceptable (with the same meaning as (8)(a)).

(8) (b) *Mary was given a book by John and (was) lent a blanket.
(9) (a) John saw the house and decided to buy it.
(b) *Saw the house and John decided to buy it.

Therefore, for erasure to account for conjunction reduction, foreign erasure rules must be able to make reference to linear precedence facts. Before foreign erasure could apply, the clauses would have to be linearly ordered and the rule for English would have to specify that for ls the rule operated in one direction and for ↑s it operated in another.[9] There are several reasons why this is not a good solution. First, allowing foreign erasure rules to make reference to these facts changes to some extent the concept of what a foreign erasure rule is. Foreign erasure is intended to be the licensing of a phonologically null element simply on the basis of another element being present. But the simple presence of the other element is not sufficient. What is necessary is the presence of another element in a particular linear relationship to the one that is phonologically null.

Another problem with having word order facts captured through directionality in the conjunction reduction foreign erasure rule is that it misses the generalization that the CR ordering facts appear to follow from other linear order facts in the language, namely that in English ls precede Ps and ↑s follow Ps. But it doesn't even make sense to say this with regard to word order in CR sentences unless they are composed of a single clause, because if there are two clauses, a phonologically null element could be linearly ordered properly with respect to its own clause but still end up in the "wrong" position with regard to the conjoined clause as a whole.

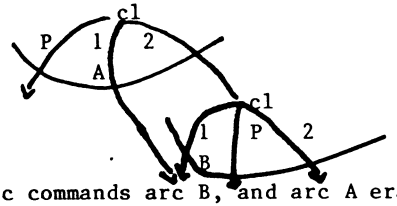
The position of phonologically null elements must be determined with respect to both clauses, and an analysis treating CR sentences as two clauses must incorporate directionality into rules of foreign erasure, and treat it as accident of the language that the word order of phonologically overt ls and ↑s in CR sentences is exactly the same as if they were the only syntactic ls and ↑s in the sentence as well. So by having erasure rules make reference to linear precedence, the generalizations about word order must be stated twice in the language, once in the linear precedence rules and once in the rule for conjunction reduction. And as was the case with the analyses of raising and time adverbs, foreign erasure, though not affecting syntactic

configuration or grammatical relations would make a sentence act syntactically different than its counterparts without foreign erasure.

To summarize, if conjunction reduction is simply foreign erasure of an arc, the grammar has to have built into it a number of mechanisms which ensure that a phonologically null element, although syntactically present, acts as if it is syntactically null. Hudson (1976) characterized conjunction reduction as deletion occurring when coreferential items have the same structural function. This characterization helps to explain why a foreign erasure analysis can't work for APG. An analysis which treats CR sentences as two clauses cannot capture the fact that the remaining surface element takes on the syntactic role of the erased element to its verb or verb phrase.

Not only doesn't foreign erasure capture this generalization, it in principle shouldn't. Foreign erasure is characterized as a relation between two elements such that the existence of one is sufficient for the nonexistence of the other. But this can only be the case if the elements are already in a relationship in which one has control in some sense over the syntactic role of the other. This cannot be the case in coordinate constructions. Coordinate clauses are of equal and independent status, elements in one do not control elements in another, and therefore, foreign erasure should not be expected to apply from one to the other. There are cases, however, where the proper relationship of control does seem to hold, and these are cases where the eraser arc commands the erasee. An arc A arc commands an arc B if the tail of B is the head of an arc sharing a tail with arc A (see appendix). In kissing structures, this happens when the erasee is in a complement or subordinate clause of the clause of the eraser. And foreign erasure does seem to get the right results in cases like these, Equi being one such example. (An Equi structure is shown in figure 8).

Figure 8



arc A arc commands arc B, and arc A erases arc B.

I would like to propose that foreign erasure be explicitly restricted to occur only in such cases where the erased element is

dependent on the role of the non-erased element, in other words to cases where the erased element is in a complement or subordinate clause. I suggest that a constraint such as (10) should be added to universal grammar saying that foreign erasure only occurs when the erased element is arc commanded by the arc erasing it. This means essentially that the arc that is erased is governed by the tail node of the arc erasing it.

(10) Foreign Erase (A,B) --→ Arc Commands (A,B)[10]

Since kissing relations cannot exist between surface arcs (the arcs that are input to the phonology), ruling out foreign erasure across clauses means that CR sentences will always have to be a single clause in their final stratum because the only other way to resolve kissing relations while maintaining two clauses is through anaphoric replacement. Since this leaves a pronoun rather than a phonologically null element, this could not produce CR sentences.[11, 12] Therefore, this constraint ensures that conjunction reduction sentences will universally consist of only one clause in their final strata.

Placing a constraint like (10) in universal grammar allows APG to capture two generalizations that it currently cannot make. First, it universally characterizes CR sentences as having only a single clause in final structure. From this follows the generalization that CR sentences act syntactically as if they are composed of one clause, and in particular the fact that word order follows from the independently stated linear precedence rules for each language.

Secondly, if all foreign erasure occurs from higher to lower clauses universally, then the fact that this is the appropriate structure for Equi will automatically follow and will not have to be stated in the rules of Equi in each language. This type of generalization has already been made for raising structures through the Nominal Arc Successor Law which ensures that a successor governs its predecessor. So universally the ascension arc in raising structures must govern the arc in the lower clause that sponsored it. This prevents, for example, arcs being raised from one conjoined clause into another. A constraint like (10) would allow for the same sort of generalization across languages, namely, that Equi rules always apply into complement or subordinate clauses. Without this constraint every language must specify the appropriate structure in which Equi can apply within its language--specific Equi rule.

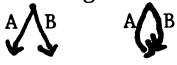
Therefore, a universal constraint that restricts foreign erasure to applying only in cases where the eraser governs the

erasee prevents the necessity of restating linear order facts in erasure rules. It allows universal grammar to capture the generalization that in CR the clauses act syntactically as if they are a single clause. And it both simplifies the statement of Equi rules and captures the generalization (which is already assumed) that Equi erasure is always from a higher to a lower clause.

Appendix

Most of the definitions and laws in this appendix are stated informally, for formal definitions see Johnson and Postal (1980). Where page numbers are given, they refer to pages in that book.

1--subject 2--direct object 3--indirect object cl--clause
↑--1-chomeur, "unemployed 1", a 1 that has been "bumped out" by a successor.
P--predicate con--label for arcs going to conjuncts
sponsor relation (informal definition, p. 61)--Sm sponsors Sn means "that the occurrence of Sn is (partially) justified by, or is dependent upon, the occurrence of Sm"
erase relation (informal definition, p. 61)-- Sr erases Ss means "That the occurrence of Ss is sufficient for the nonoccurrence of Sr in the phonologically relevant 'surface aspect' of the sentence in question."
foreign (p.109)--not a neighbor; arcs not sharing a tail
neighbor (p.41-42)--Neighbor(A,B) ↔ Tail(A)=Tail(B); elements sharing a tail; there are two neighbor constructions--



tail--the end of an arc that doesn't have an arrow at it
head--the end of an arc that has an arrow at it
foreign erase--erasure by one arc of another in a kissing relation
basic clause (p.209)--the "subset of basic constituents whose points are labelled Cl"
basic constituent (p.211)--having a self sponsoring point, not dominating con arcs
(see p.47 for a definition of 'point')
final 1 law (p.228)--every basic clause must have a 1-arc in its final stratum
P-arc tail label law (p.200)--the tail of every initial P-arc must be labeled cl (clause)
kisses (p.41-42)--when arcs share a head but not a tail; 

motivated chomage (p.356)--an arc can only bear a chomeur relation if another arc bears the relation, in the same stratum that the chomeur is first in, of the arc that it is the successor of (eg. the 1-arc for a 1-chomeur arc); for something to be a chomeur, it must have been "bumped out" of the relation it previously held
ascension arc--an arc in a higher clause sponsored by an arc in a lower clause
stratal uniqueness law (p.243-244)--there can only be one 1-arc, one 2-arc, and one 3-arc, in the same clause in the same stratum.
parallel assassin law (p.129)--if arc A is a neighbor of arc B and A erases B, then A must be the successor of B
maximal two sponsor law (p. 122)--an arc cannot have greater than two sponsors
successor (p.106)--an arc A that shares a head with an arc B that sponsors it, is the successor of arc B
predecessor (p.106)--an arc B that sponsors and shares a head with an arc A is the predecessor of arc A
overlay arcs (p.259-261)--overlay arcs are arcs outside of a clause but sponsored by arcs within it; they are used to account for "unbounded movement" phenomena
arc-commands (p.257)--arc A arc-commands arc B if the tail of A remote-governs the tail of arc B
remote-govern (p.35)--if node a governs node b, and node b governs node c, then node a remote-governs node c
govern (p.43)--a node a which is the tail of arc A governs a node b if b is the head of arc A
nominal arc successor law (p.257)--an arc A that is the successor of an arc B arc-commands arc B

Footnotes

*I would like to thank Jan Jake, Michael Livnat and Sue Ann Kendall for their help in the early stages of this paper. Without them it would never have gotten off the ground. I would also like to express my appreciation to the people at the U of I and UB who listened to and commented on earlier versions of this work, and in particular would like to thank Donna Gerdts for her comments, criticisms, time and energy which she gave so willingly in spite of such short notice from me. And finally, I'd like to thank John Richardson for helping me see what I was getting at even when he wasn't sure of what it was.

[1] I have tried to strike a compromise in this paper between defining terminology in the text as it is introduced, and taking long digressions from the main points to explain all of the arc-

pair terminology and laws which I use. To solve this problem, although I do define some things within the text, many of the definitions and explanations of APG laws have been put separately into an appendix. So if in reading this paper some of the terminology is unclear, please check the appendix before giving up.

[2] I assume that Johnson and Postal mean nothing more by the term "main clause" than "unreduced clause" since they provide no explanation for their use of this term.

[3] I use stratal diagrams with arc pair notions incorporated in them rather than using pair networks because I think stratal diagrams are easier to read. The diagrams should be taken as shorthand for pair networks, and I will usually refer to them as networks.

[4] Initial VPs are ruled out by the P-arc tail label law which specifies that every self-sponsoring P arc has a clause node as its tail. Therefore, every initial P must be an immediate constituent of a clause, and cannot be a constituent of any smaller unit. Note that this law does not rule out the possibility of VPs in final strata since the Ps in final strata do not have to be self-sponsoring. Non-self-sponsoring Ps can arise, for example, through rules like clause union.

[5] A network like (2)(b) is also unacceptable in APG because it violates motivated chomage.

[6] There are two other equally unacceptable possible ways, besides the ways discussed below in the text, to capture the raising facts. One way would be to allow both lower clause P-arcs to sponsor ascension arcs (hence the raising morphology on both verbs in (3)(b)), and have erase apply in the higher clause. This doesn't work for several reasons, one is that it violates stratal uniqueness because there would be two 2s in the higher clause. A second reason is that the arcs would not be in a kissing relationship in the higher clause (since they would share a tail), so foreign erasure could not apply. Additionally, erasure of a coreferential arc within a single clause is prohibited by the parallel assassin law. Even if we could get around these problems, this analysis would still wrongly predict that (4)(a), where replace rather than erase occurs, would be okay.

The second possibility would be to have the kissing arcs together sponsor a single ascension arc. This, however, violates the maximal two sponsor law since the embedded clause arc also sponsors the ascension arc, and since there can be more than two conjoined clauses. But even if the law were somehow modified for conjunction cases, such a construction would be simulating a collapsing of arcs and hence of clause structure as well, even

though technically there would still be two clauses in the embedded clause. If this is really what is necessary, then it seems to me that it would be better to capture this fact through a rule that actually did change clause structure rather than through a rule that just pretended to. Additionally, even though this solution would technically account for the raising facts, it would not help in the problems associated with word order discussed below in the text.

[7] It's not at all clear why a sentence with an anaphoric replacer should act differently from two independent sentences in this case since in their final arc structures they are identical. If a sentence like (3)(b) initially has two clauses with raising in each and then some kind of gapping or identity deletion rule applies, then the latter rule will have to be blocked if there are anaphoric relations holding between the 1s of the clauses. Alternatively, it may be that (3)(b) has a conjoined clause embedded under a single verb but that the verbs in the conjoined clauses are initially nonfinite. Then the version of (4)(a) without raising morphology in the second clause would be ruled out by a requirement that if one of the verbs in a conjoined clause is nonfinite the others must also be. And the case with the raising morphology could be ruled out by a constraint on initial strata that there not be both nonfinite verbs and a kissing relation between the 1s of the nonfinite clauses.

[8] I have presented the arguments here as if the difference between phrasal and sentential time adverbs is simply a matter of word order, but I suspect that a more accurate analysis is to treat sentential time adverbs as resulting from overlay relations. This analysis would be able to explain the scope facts straightforwardly. In the case of two clauses conjoined, an adverb could bear an overlay relation either to its basic clause, and have scope only over its own clause, or it could bear an overlay relation to the higher conjoined clause as a whole, and have scope over both/all of the conjuncts. If the second clause had a time adverb, the overlay arc for the sentential adverb could only bear a relation to the first conjunct since if it were an overlay arc to the whole conjoined clause, the one time adverb per VP constraint seen in (5)(c) would be violated in the second clause.

In the case of CR, if these sentences are a single clause in final structure, then any time the second VP had a time adverb in it, if another time adverb bore an overlay relation to the clause, the constraint would necessarily be violated. Also if there were only one clause, the overlay relation would necessarily be born to both VPs, explaining the scope of the adverb over both VPs, since there would only be one clause node for the overlay arc to attach

to.

[9]An alternative to having a conjunction reduction rule sensitive to linear precedence relations would be to have conjunction reduction apply before linear precedence is determined, and then have the linear order of the conjoined clauses with respect to each other be determined by which clause had which erased elements in it. For example, an ordering rule for English conjoined clauses could specify that clauses having foreign erased 1-arcs followed clauses with 1-arcs that weren't foreign erased. But this solution is not really any better. Linear precedence is predicted to follow from grammatical relations rather than surface relations, so having ordering rules make reference to foreign erase relations is undesirable. But even more importantly, such an analysis should be avoided because it still misses the generalization that CR sentences act like a single clause with respect to the determination of word order.

[10]This constraint also rules out a foreign erasure analysis of gapping and right node raising constructions, but it does not rule out the foreign erasure that occurs in raising and clause union. The foreign erasure that occurs in raising and clause union is from successors to predecessors, and successors always govern their predecessors (other possibilities are ruled out by the nominal arc successor law). Since (10) allows foreign erasure where the eraser governs the erasee, these rules fall into the class of examples where foreign erasure would still be licensed. Gapping and right node raising by foreign erasure would be ruled out since erasure would be across conjoined clauses. I think this is the right analysis though there would have to be some other rule of phonological deletion which could make reference to identity of elements.

[11]Actually (10) by itself doesn't completely guarantee that conjunction reduction sentences have to have only a single clause in their final stratum. It is possible to have one of the kissing arcs replaced by an anaphoric replacer which could then self-erase. However there independently need to be strict constraints on self-erasure, even though at this point it is not clear what they are, since not all anaphors can self-erase and still produce good sentences. In addition since I have argued that one of the reasons that foreign erasure is not a good analysis is that the CR sentences act as if they are composed of a single clause, the self-erasure analysis would be riddled with the same problems. I suspect that self-erasure of anaphors should also be constrained to cases where the kissing arc of the replaced one governs the anaphoric replacer.

[12]It is not clear what mechanism could resolve the kissing relation in a way that would produce only one clause either, but if a new type of rule is created to solve conjunction reduction sentences, one having an outcome of one clause rather than two would nevertheless be preferred since only a rule treating these sentences as a single clause in final structure would capture the appropriate generalizations. In addition the rule suggested by Frantz (1976) for equi-subject clause union, rather than consisting of a rule of equi followed by clause union, is a rule which allows kissing arcs to collapse simultaneously with the clause union. This type of analysis might also work for conjunction reduction. The kissing ls would collapse together creating a single clause with the remaining bits of the two original clauses getting conjoined in the process.

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