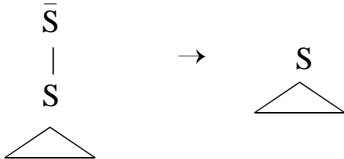
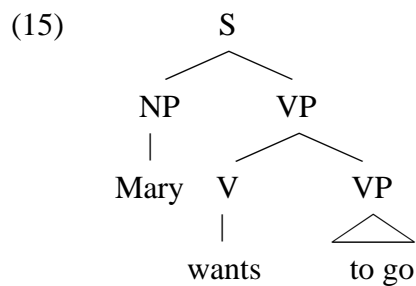
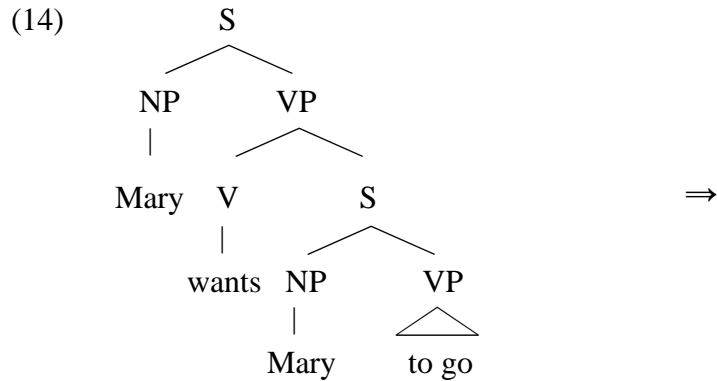


## Shrinking Trees: Some Early History

Howard Lasnik  
University of Maryland  
lasnik@umd.edu

- (1) Chomsky (1981) - LGB - had a need for a distinction between full clauses and diminished clauses. All clauses are, in DS,  $\bar{S}$ , which is opaque to many relations. But sometimes  $\bar{S}$  full clauses are reduced to mere S via ‘ $\bar{S}$ -deletion’.
- (2) 
- (3) This was crucial for government, blocked by  $\bar{S}$ , but permitted through S, implicated in all of the following
- (4) a. ECM Mary believed [<sub>S</sub> him to own a car] vs. \*Mary tried [ <sub>$\bar{S}$</sub>  [<sub>S</sub> him to own a car]]  
b. ECP Mary was believed [<sub>S</sub> *t* to own a car] vs. \*Mary was tried [ <sub>$\bar{S}$</sub>  [<sub>S</sub> *t* to own a car]]  
c. PRO \*Mary believed [<sub>S</sub> PRO to be early] vs. Mary tried [ <sub>$\bar{S}$</sub>  [<sub>S</sub> PRO to be early]]
- (5) Here’s how it works, according to a suggestion late in LGB:
- (6) “... there is an optional rule replacing an  $\bar{S}$  boundary by an S boundary ...” p.303
- (7) Then, when COMP is missing, we have ... [<sub>S</sub> [<sub>S</sub> ...]] ...
- (8) Chomsky observes that this reduces to ... [<sub>S</sub> ...] ... “in the restrictive theory of Lasnik and Kupin (1977)” [i.e., because that theory is set theoretic. The same result would obtain in the framework of Chomsky (1955) for the same reason.]
- (9) Or, as at least hinted earlier in the book,  $\bar{S}$ -deletion is simply deletion of the  $\bar{S}$  node. That would seem a rather curious deletion operation, certainly unlike ellipsis, which deletes an entire constituent, not just the node labeling it.
- (10) But there is actually substantial early precedent for this kind of process.
- (11) Ross (1967) developed a theory of tree pruning that worked a lot like the deletion version of  $\bar{S}$ -deletion hinted at. And it too was about clauses. It simply removed the S node, but not its contents, under certain circumstances.
- (12) S-Pruning: Delete any embedded node S which does not branch (i.e., which does not immediately dominate at least two nodes). p.29
- (13) This is intended to have the effect that when the subject of an embedded sentence is removed (e.g., by EQUI NP Deletion), the clause is reduced to just a VP:

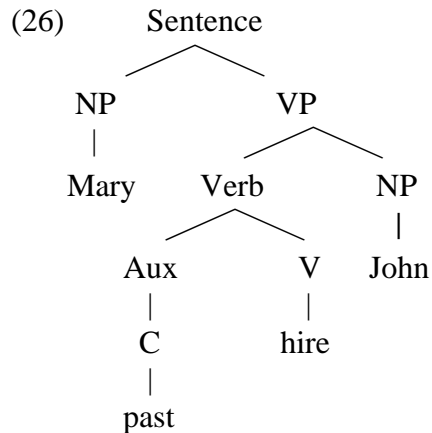


- (16) Ross then makes a very Chomsky-like claim about this operation:
- (17) “This principle should not be thought of as a rule which is stated as one of the ordered rules of any grammar, but rather as a condition upon the well-formedness of trees - one which is stated once in linguistic theory and which applies to delete any non-branching S nodes occurring in any derivations of sentences of any language.” p.30
- (18) Now note that if we take  $\bar{S}$  to be the relevant clausal node for pruning, and assume (as Chomsky implies) that in contexts of  $\bar{S}$ -deletion Comp is entirely eliminated, (12) will exactly give (2).
- (19) Ross presents numerous arguments for pruning, many of which are rendered irrelevant today by dramatic changes in assumptions about underlying structure, but one retains its import:
- (20) Ross attributes to Browne (1966) the observation that in Serbo-Croatian, clitics move to second position in their own clause, and not into any higher clause.
- (21) But under circumstances of what Ross dubs Equi NP Deletion (nowadays usually analyzed as infinitival control complementation) the clitic climbs up to a position preceding the **matrix** verb (such as *željeti* [want]).
- (22) In the circumstance of Equi, the S node of the clausal complement of *željeti* would be pruned, and, as Ross argues, Browne’s observation can be accommodated.
- (23) Slightly later, Rivero (1970) makes a parallel argument for Spanish.

(24) Chomsky (1957) possibly has a hidden use of pruning as part of the classic analysis of English verbal morphology.

Summary of relevant portions of Chomsky's analysis:

- (25) Sentence  $\rightarrow$  NP VP  
 NP  $\rightarrow$  John [Simplifying, to keep the set theoretic phrase marker (PM) from getting too unwieldy]  
 NP  $\rightarrow$  Mary  
 VP  $\rightarrow$  Verb NP  
 Verb  $\rightarrow$  Aux V  
 Aux  $\rightarrow$  C (Modal) (have en) (be ing)  
 C  $\rightarrow$  past [Simplifying again, for the same reason]  
 V  $\rightarrow$  hire



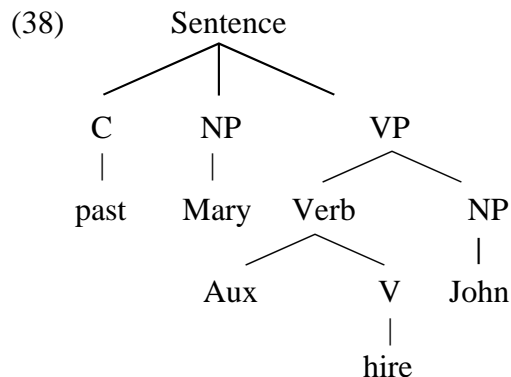
(27) {S, NP VP, NP Verb NP, NP Aux V NP, NP C V NP, NP past V NP, John VP, etc., etc., etc.}

- (28) T<sub>not</sub> - optional  
 Structural analysis:  
 { NP - C - V...  
 NP - C+M - ...  
 NP - C+have - ...  
 NP - C+be - ... }

Structural change: X1 - X2 - X3  $\rightarrow$  X1 - X2 + n't - X3

- (29) T<sub>q</sub> - optional [Interrogation "Subject Aux Inversion"]  
 Structural analysis: same as T<sub>not</sub>  
 Structural change: X1 - X2 - X3  $\rightarrow$  X2 - X1 - X3

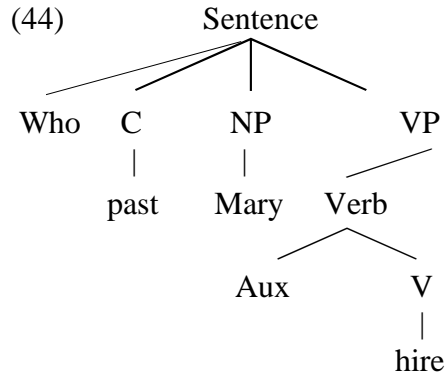
- (30) Auxiliary Transformation ("Affix Hopping")- obligatory  
 Structural analysis: X - Af - v - Y (where Af is any *C* or is *en* or *ing*; v is any *M* or *V*, or *have* or *be*) [This is a family of 20 SAs; the 2<sup>nd</sup> term is a disjunction of 5 items (past, S,  $\emptyset$ , en, ing and 3<sup>rd</sup> a disjunction of M, V, have, be.)  
 Structural change: X1 - X2 - X3 - X4  $\rightarrow$  X1 - X3 - X2# -X4
- (31) Word Boundary Transformation - obligatory  
 Structural analysis: X - Y (where X $\neq$ v or Y  $\neq$ Af)  
 Structural change: X1 - X2  $\rightarrow$  X1 - #X2
- (32) do - Transformation - obligatory  
 Structural analysis: # - Af  
 Structural change: X1 - X2  $\rightarrow$  X1 - do + X2
- (33) (31) and (32) together are trying to say that *do* gets attached to an affix that has failed to hop. [They don't quite say it. See Lasnik (1995) and Lasnik (2000) for discussion.]
- (34) "... the treatment of 'do' as an element automatically introduced to carry an unaffixed affix will have a considerable simplifying effect on the grammar." LSLT p.419
- (35) To determine applicability of T (30) to PM (27), find a member of the latter that satisfies the SA of the former, where satisfaction is identity for a constant and where any string, including the null string, satisfies a variable.
- (36) For example, NP past V NP satisfies the SA of the T, so it can apply (and being obligatory, it must). The *past* morpheme will then right adjoin to V.
- (37) Suppose, though, we had first applied (29) to (27), giving a derived PM that can be graphically represented as:



- (39) There is no member of the new derived PM that satisfies (30). Any string in the set that contains *past* followed by V has intervening symbols. But (30) crucially has no variable between its 3<sup>rd</sup> and 4<sup>th</sup> terms, so adjacency is required.
- (40) Failure of (30) to apply sets the stage for (31) and (32), ultimately deriving:
- (41) Did Mary hire John

(42) Similarly, with WH-questions, SAI blocks Affix Hopping and triggers the supportive *do* complex:

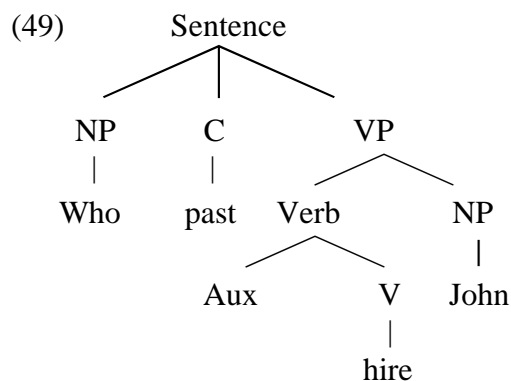
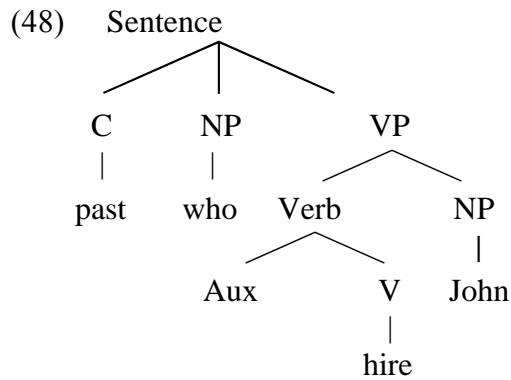
(43) Who did Mary hire



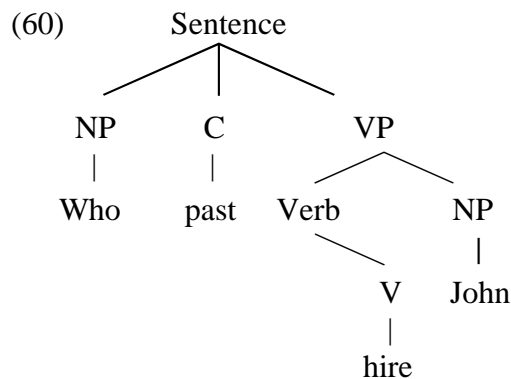
(45) Chomsky (1957) raises the interesting question of why supportive *do* isn't triggered when it is a subject that is questioned:

(46) Who hired John

(47) He presents a very clever analysis where SAI takes place, in this case separating *past* from *hire*. But then wh-movement effectively undoes what SAI did, making the affix and verb adjacent once again.

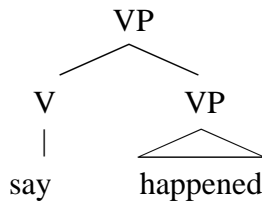


- (50) But there is a hidden assumption here, one directly relevant to the theme of this paper and this workshop.
- (51) Let's try to find a member of the PM that is pictorially represented just above such that the SA of AH is satisfied. Well, the best we can do is evidently the following, or one of the related strings:
- (52) NP past Aux V NP
- (53) But this does not satisfy the SA. *Past* and V are not adjacent, as Aux intervenes. There is no string in the entire set that has *past* immediately followed by V. So we should get (54)a and not (54)b.
- (54) a. Who did hire John  
b. Who hired John
- (55) Speculation: Chomsky was assuming that once the contents of Aux were transformationally removed, Aux itself is eliminated. This is very close to a consequence of a modification of tree pruning attributed by Ross (1967) to Yuki Kuroda:
- (56) "...if the head of a phrase ... is deleted, the phrase should be deleted with it." p.68
- (57) If we take C to be the head of Aux, the Aux node will then be deleted.
- (58) A slight clarification is in order: As we saw earlier, Ross's pruning, and, I assume, Kuroda's, did not actually delete constituents, but rather constituent labels, rather like one interpretation of LGB's  $\bar{S}$ -deletion.
- (59) However, if Aux now has no contents at all, the deletion of the Aux node means nothing at all remains, just what is required to restore the required adjacency between *past* and V for Affix Hopping:



- (61) Perlmutter (1968) makes interesting use of pruning in the earliest account of the correlation between pro-drop and absence of *that*-trace effects.
- (62) Perlmutter first observes that there are languages, like French, that generally require overt subjects of clauses, and that generally disallow extraction of a subject over a complementizer.
- (63) On the other hand, in languages like Spanish, null subjects are allowed as is extraction of a subject over a complementizer.
- (64) He proposes a parameterized filter:  
Any sentence other than an Imperative in which there is an S that does not contain a subject in surface structure is ungrammatical.

- (65) The assumed basic phrase structure for S is something like  
S → Comp NP VP
- (66) Ruling out the relevant Comp-t sentences in French is straightforward, and the same for English. Both have the parametrized surface filter.
- (67) Slightly trickier is the case of English subject extraction in the absence of a complementizer:
- (68) ✓What did he say [ \_\_ happened]
- (69) Why isn't the embedded clause in violation of (64)?
- (70) Perlmutter attributes this to pruning: "... when *that* is deleted , the S-node above the embedded sentence is pruned away."
- (71) The VP of (68) becomes:



- (73) Since the embedded clause is no longer a sentence, (64) is rendered irrelevant.
- (74) A bit of a puzzle arises at this point. Perlmutter indicates that his proposal accounts, among other things, for the obligatoriness of pleonastic subjects in English:
- (75) \*(There) is a daffodil under the pillow
- (76) With no apparent complementizer, why couldn't this sentence be pruned? One might propose limiting pruning to embedded clauses, as in Ross's original proposal. But the problem emerges even in embedded clauses:
- (77) Mary said \*(there) is a daffodil under the pillow
- (78) Very interestingly, Norbert Hornstein, in an August 14 posting on his blog, points out the identical problem for a recent attempt by Chomsky in terms of properties of labeling to unify the two phenomena Perlmutter was concerned with:
- (79) "... deleting a *that* does not license null subjects ... "
- (80) Postal (1974) discusses a number of phenomena where embedded clauses behave as if they were reduced. One is the clitic climbing briefly described above, but there are many more.
- (81) Postal actually explicitly rejects pruning and, instead, proposes that under certain circumstances clauses simply behave as if they were somehow reduced without actually being reduced. He calls such clauses in such circumstances 'quasi-clauses'.
- (82) This raises the question of whether not just non-finite clauses with missing subjects are more permeable 'quasi clauses'.
- (83) In fact, a survey of the literature finds occasional mention of control clause permeability being roughly mimicked by finite complements if, and only if, those complements have bound pronominal subjects. A small sample follows:

→Gapping

- (84) John read books and Mary read magazines
- (85) John wanted to read books and Mary ~~wanted to read~~ magazines

- (86) \*John wanted Bill to read books and Mary ~~wanted Bill to read~~ magazines  
 (87) ?John thinks that he will see Susan and Harry ~~thinks that he will see~~ Mary  
 [Nishigauchi (1998), attributed to an anonymous reviewer]  
 (88) "... the clausemate restriction on Gapping is alleviated by an intervening pronoun."  
 (89) \*John thinks that Bill will see Susan and Harry ~~thinks that Bill will see~~ Mary  
 (90) John<sub>i</sub> thinks that he<sub>i</sub> will see Susan and Harry<sub>j</sub> ~~thinks that he<sub>j</sub> will see~~ Mary  
 (91) In particular, the alleviation requires a **bound** pronoun.

→**Reciprocal Binding**

- (92) John and Mary visited each other  
 (93) John and Mary want to visit each other  
 'Each wants to visit the other' Higginbotham (1981)  
 (94) \*John and Mary want Bill to visit each other  
 (95) John and Mary think they like each other Higginbotham (1981), Heim et al. (1991)  
 (96) a John and Mary think they (that is, John and Mary) like each other.  
 b John thinks that he likes Mary and Mary thinks that she likes John  
 (97) \*John and Mary think that I like each other (would = Each of John and Mary thinks that I like the other.)

→**Multiple Sluicing**

- (98) Someone talked about something  
 ?but I don't know who about what  
 (99) Someone wanted to talk about something  
 ?but I don't know who about what  
 (100) Someone wanted Mary to talk about something  
 \*but I don't know who about what  
 (101) A certain boy decided to talk to a certain girl  
 I forget which boy to which girl Barrie (2007)  
 (102) ?Each professor<sub>i</sub> said he<sub>i</sub> was working on a different one of these topics, but I can't  
 remember which on which one [Lasnik (2013), from Jason Merchant,  
 personal communication]  
 (103) \*Each professor said Susan was working on a different one of these topics, but I can't  
 remember which on which one  
 (104) A certain boy<sub>i</sub> said he<sub>i</sub> would talk to a certain girl  
 I forget which boy to which girl Barrie (2007)

→**Quantifier Scope Interaction**

- (105) At least one student fooled each of the professors  
 (106) At least one student has tried to fool each of the professors Kayne (1998)  
 (107) At least one student saw each of these new books  
 (108) At least one student has asked to see each of these new books Kayne (1998)  
 (109) At least one man/some man thinks he's in love with each of these women  
 each > at least one possible Kayne (1998)  
 (110) At least one man/some man thinks Bill's in love with each of these women.  
 each > at least one not possible  
 (111) See Grano and Lasnik (2015) for an approach to this phenomenon in terms of phases.  
 Sadly for present purposes, the approach does not involve tree shrinking, nor can I think  
 of an account that might



## References

- Barrie, Michael. 2007. Control and wh-infinitivals. In *New Horizons in the Grammar of Raising and Control*, ed. William D. Davies and Stanley Dubinsky, 263-279. Dordrecht: Springer.
- Browne, Wayles. 1966. On the problem of enclitic placement in Serbo-Croatian. Ms. MIT, Cambridge, Mass.
- Chomsky, Noam. 1955. The logical structure of linguistic theory. Ms. Harvard University, Cambridge, Mass. and MIT, Cambridge, Mass., .[Revised 1956 version published in part by Plenum, New York, 1975; University of Chicago Press, Chicago, 1985].
- Chomsky, Noam. 1957. *Syntactic structures*. The Hague: Mouton.
- Chomsky, Noam. 1981. *Lectures on government and binding*. Dordrecht: Foris.
- Grano, Thomas and Howard Lasnik. 2015. How to neutralize a finite clause boundary: Phase theory and the grammar of bound pronouns. Ms. Indiana University and University of Maryland,
- Heim, Irene, Howard Lasnik and Robert May. 1991. Reciprocity and plurality. *Linguistic Inquiry* 22: 63-101.
- Higginbotham, James. 1981. Reciprocal interpretation. *Journal of Linguistic Research* 1: 97-117.
- Kayne, Richard. 1998. Overt vs. covert movement. *Syntax* 1: 128-191.
- Lasnik, Howard. 1995. Verbal morphology: *Syntactic structures* meets the Minimalist Program. In *Evolution and revolution in linguistic theory: Essays in honor of Carlos Otero*, ed. Héctor Campos and Paula Kempchinsky, 251-275. Washington, D. C.: Georgetown University Press. [Reprinted in Howard Lasnik, *Minimalist analysis*, 97-119. Oxford: Blackwell, 1999].
- Lasnik, Howard. 2000. *Syntactic Structures revisited: Contemporary lectures on classic transformational theory*. Cambridge, Mass.: MIT Press.
- Lasnik, Howard. 2013. Multiple Sluicing in English? *Syntax* 16.
- Lasnik, Howard and Joseph J. Kupin. 1977. A restrictive theory of transformational grammar. *Theoretical Linguistics* 4: 173-196. [Reprinted in *Essays on restrictiveness and learnability*, Howard Lasnik, 17-41. Dordrecht: Kluwer, 1990 ]
- Nishigauchi, Taisuke. 1998. 'Multiple Sluicing' in Japanese and the functional nature of *wh*-phrases. *Journal of East Asian Linguistics* 7: 121-152.
- Perlmutter, David. 1968. *Deep and surface constraints in syntax*. Doctoral dissertation, MIT, Cambridge, Mass.
- Postal, Paul M. 1974. *On raising: One rule of English grammar and its theoretical implications*. Cambridge, Mass.: MIT Press.
- Rivero, Maria-Luisa. 1970. A Surface Structure constraint on negation in Spanish. *Language* 40: 640-666.
- Ross, John Robert. 1967. *Constraints on variables in syntax*. Doctoral dissertation, MIT, Cambridge, Mass. Published as *Infinite syntax!* Norwood, N.J.: Ablex (1986).