

A PHONOLOGICAL ACCOUNT OF THE "ADVERB EFFECT" AND *THAT-t* VIOLATIONS

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1.0 *That-t* sentences and the adverb effect

Chomsky and Lasnik 1977 on the basis of sentences like (1) proposed a *that-t* filter that captured the empirical facts of subject extraction from *that*-clauses but did not interact with syntactic theory in any significant way

- (1) *Who_i do you think that t_i saw Bill?

Their filter in (2) rules out a trace when it is adjacent to certain complementizers (=Chomsky & Lasnik 85)

- (2) *[S' ± WH {_{NPE}} .], unless S' or its trace is in the context [NP NP _____]

That is treated as -WH, so then traces are not permitted after +WH comps and *that* A phonetically null comp is not classified as ± WH The last condition on the filter allows subject gaps in relative clauses Chomsky & Lasnik contend that this *that-t* filter is a part of UG, thereby avoiding the problem of how children could learn such an idiosyncratic constraint

The stipulatory nature of the *that-t* filter prompted others to try to derive the constraint from other mechanisms Chomsky 1981:14 suggested that this filter was too "strange" to be a part of UG The particular explanation of choice in Government and Binding Theory has been some kind of ECP explanation that the subject trace is not properly governed This explanation has taken different forms either the comp does not properly govern the subject trace while an empty comp does, or the comp blocks antecedent government by a trace or antecedent

It has been noted since Bresnan 1977 that *that-t* violations can be suspended when sentential adverbials intervene between the comp and the verb, as in (3-5) Culicover 1992 has dubbed this "the adverb effect"

- (3) Robin met the man {Op, that/who} Leslie said that *(for all intents and purposes) t_i was the mayor of the city
(4) This is the tree Op, that I said that *(just yesterday) t_i had resisted my shovel
(5) I asked what_i Leslie said that *(in her opinion) t_i had made Robin give a book to Lee
Culicover (1992:2a-c)

Culicover 1992 has made the most serious attempt to explain these phenomena He assumed that there is an empty functional category Pol(arity) distinct from comp that may head govern the subject trace The reasoning was that many of the sentential adverbs

that rescue *that-t* violations could be analyzed as items that trigger Negative Inversion. The inversion in (7) shows that *only then* in (6) is a Negative Inversion item.

- (6) Leslie is the only person who I said that only then would run for President
 (7) Only then would Leslie run for President

Culicover 1993 has since raised doubts about this analysis. The adverbial is either in spec of Pol (8) or it is adjoined to PolP (9).

- (8) [_{CP} [_{Spec} NP_i] that [_{PolP} SAdv [_{Pol} e] [_{IP} t_i .]]]]
 (9) [_{CP} [_{Spec} NP_i] that [_{PolP} SAdv [_{PolP} [_{Spec} t_i] [_{IP} t_i]]]]

There is no obvious agreement relationship between SAdv and the empty Pol, so it follows that if any phrase or no phrase appears in the spec, empty Pol should license the subject trace. There is also no agreement between the empty Pol and the subject trace by spec-head agreement. Hence (8) predicts that there are no *that-t* violations. In (9), we get agreement between the empty head and the subject trace but now the trace t_i' is ungoverned. If we delete this intermediate trace in LF and let ECP apply only at that level, then the sentence without SAdv should also delete its trace, and again we predict that a *that-t* violation should not occur. Culicover concludes that the *that-t* effect has nothing to do with whether or not a subject trace is licensed by an empty comp.

The basic problem that arises is that if *that* blocks proper government of the subject trace, it is not at all clear why it would not continue to block proper government when a SAdv intervenes. The presence of the SAdv should not undo an ECP violation. Culicover 1993 concludes that *that-t* violations cannot be attributed to the ECP and suggests that Chomsky & Lasnik's original *that-t* filter is empirically more adequate.

2.0 A phonological account of word-order

The following analysis is an initial attempt to provide a phonological account of word order in English. It draws on work by Anderson (ms) who has applied a similar system to the phenomenon of clitic placement in Serbocroatian. The motivation for this analysis stems in part from the consideration that the time has come to evaluate whether or not grammar might consist of a mapping from PF to LF.¹ That is, phonological structure would determine the wellformedness of natural language strings rather than it being interface-driven as in Minimalism or being a LF to PF mapping as in the work of Pesetsky and Brody. This paper will not deal with the LF part of the grammar at all but will concentrate on what PF might look like if it were to be responsible for all word order properties.

Let me give a brief overview of Anderson's system. Anderson treats second position (2P) clitic placement as a kind of generalized word formation, that is part of the phonological expression of phrases and so parallel to the rules that introduce affixes on to words. The phonological realization of 2P clitics is not determined by syntax but by

¹ Chomskian raises this idea in his review of *The view from building 20* in *Language*.

phonological/morphological rules which determine the wellformedness of Phonetic Form ²

Anderson presents his theory in an Optimality Framework, holding in particular to the notion that a number of constraints hold concurrently but that these constraints are ranked so that some will win out over the others. For example, there may be a number of affixes in a language that are all realized as prefixes. Then there would be a constraint which requires them to appear on the left periphery of a word. Ranking these constraints will then determine the order of prefixes, so that the most highly ranked constraint will correspond to the leftmost prefix. For affixes that do not appear on the periphery of their domain but internally as an infix of some sort, they will require two constraints, one which requires it on the periphery and one which prohibits it from appearing first in its domain. Anderson suggests a constraint type called **Non-Edge(e)** which keeps an element *e* from appearing on the edge of its domain. This constraint comes in two varieties, either **Non-Initial(e)** or **Non-Final(e)**, depending on whether the element is prohibited from the initial or final edge of its domain. A second constraint type is **Edgemost** which requires an element to appear on the left or right edge of its domain. This, too, comes in two varieties, **EdgeMost(e,L)** or **EdgeMost(e,R)**. An infix will be subject to a **Non-Edge(e)** constraint and one of the **EdgeMost** constraints.

Anderson also includes a constraint called **Integrity(e)** which disallows the placement of outside material within an element *e*. The most typical example of this would be **Integrity(Word)** which does not allow other phonological units to occur within a word. English and most languages of the world have this as a highly ranked constraint, though note that this system allows for a natural explanation for sequences such as (10) which is found in British English.

(10) abso-blooming-lutely

To account for (11), what we need is a specific lexical rule for *blooming* that is more highly ranked than **Integrity(Word)**. Taking *blooming* as an adjective and *absolutely* as an adverb which modifies that adjective, *blooming* will have a constraint **Non-Final(blooming)** and **EdgeMost(blooming,R)** which will be idiosyncratically ranked above **Integrity(Word)**. Further principles of English phonotactics will determine the exact position of *blooming* within its modifying adverb. (11) lists the constraints needed for this system of word order.

(11) **Non-Edge(e): Non-Initial(e) & Non-Final(e)**
Edgemost: EdgeMost(e,L) & EdgeMost(e,R)
Integrity(e)

Let me give some examples of Anderson's approach works for SerboCroatian. SerboCroatian special clitics can typically follow the first XP or the first word of a sentence.

(12) Moja mladja sestra će doći u utorak
 my younger sister fut come on Tuesday
 'My younger sister will come on Tuesday.'

² Hock 1992 presents a similar approach.

- (13) Moja će mladjā sestra doći u utorak
 my fut younger sister come on Tuesday
 'My younger sister will come on Tuesday.'
- (14) Lav Tolstoj je veliki ruski pisac
 Leo Tolstoj is great Russian writer
 'Leo Tolstoj is a great Russian writer'
- (15) Lav je Tolstoj veliki ruski pisac
 Leo is Tolstoy great Russian writer
 'Leo Tolstoj is a great Russian writer'

The second position of the clitic can be handled by the following ranking which ensures that something always precedes the clitic which is otherwise on the left edge of its domain.

(16) **Non-Initial(cl) » EdgeMost(cl,L)**

But we still though have the variation that the clitic can appear either after the first phrase or after the first word Anderson accounts for this variation by arguing that the constraint **Integrity(XP)** can be treated as dominated or as undominated by **EdgeMost(cl,L)** That is the grammar contains two distinct but similar rankings Each sentence must follow one of the rankings An undominated **Integrity(XP)** constraint will allow the clitic to occur after the first phrase If dominated, then the clitic will occur after the first word

(17) and (19) show examples of clitics following an object NP and an adjunct phrase respectively However, a clitic can occur inside these phrases as well, as in (18) and (20), which is the kind of evidence that argues against a purely syntactic analysis of clitic placement

- (17) Sovetske goste je primio i predsjednik Republike Austrije Jonas
 Soviet guests past received also president republic Austria Jonas
 'The president of the Republic of Austria, Mr Jonas, also received the Soviet guests'
- (18) Sovetske je goste primio i predsjednik Republike Austrije Jonas
 Soviet past guests received also president republic Austria Jonas
 'The president of the Republic of Austria, Mr Jonas, also received the Soviet guests'
- (19) Prošle godine su otvorili ugostiteljsku školu
 last year perf opened hotel-and-catering school
 'Last year they opened a hotel-and-catering school'
- (20) Prošle su godine otvorili ugostiteljsku školu
 last perf year opened hotel-and-catering school
 'Last year they opened a hotel-and-catering school'

3.0 English word order

I wish to account for English word order using the same kinds of mechanisms described by Anderson for Serbo-Croatian clitics I too, will assume an optimality kind

However, an immediate problem arises if an adverbial expression is added to (25), because it could now appear clause initial and thereby prevent a violation of the **Non-Initial(V_i)** constraint incorrectly

(27) *Unfortunately slept Jane

Apart from the position of the verb *w r t* the front edge of the clause in (26), (26) and (27) have a second fault. The subject follows the indicative verb which English never allows

This points us to an important issue: if word-order is not determined by the syntax, how are grammatical relations identified? This analysis does not have the luxury of a hierarchical structure to uniquely determine subjects and objects, especially for a language like English. The only structure this analysis has is a linear order. Fortunately, this is sufficient for identifying grammatical relations.

The basic idea is that those NPs in the immediate domain of the verb have their grammatical relation identified on the basis of which side of the verb they occur on. The key to identifying the immediate domain is that precedence is given to major lexical categories as they are encountered in linear order. A lexical category to the left takes precedence over a category to the right. For example, if we encountered a string like (28)

(28) The boy who was on top of the log ate the hot dog

the NP *the log* could never be parsed as the subject of *ate* rather than the object of the preposition *of*, because *of* appears first in the string. Therefore, *of* must parse its domain first and any NP following the preposition will be identified as its object.

Using the concept of immediate domain we can give the following parsing strategy for the grammatical relations of English in (29)

- (29) For all Ns in the immediate domain of V
- a) The subject is to the left of V
 - b) The direct object is the rightmost N in the domain
 - c) The indirect object is between V and the direct object

With the parsing strategy of (29), the ungrammaticality of (27) can now be attributed to the lack of a subject and the anomaly of having a direct object in an intransitive sentence.

As we have formulated our principles so far, all the sentences in (30-33) would be allowed

- (30) Unfortunately John ate the radish
 (31) John unfortunately ate the radish
 (32) John ate the radish unfortunately
 (33) 'John ate unfortunately the radish

We have not said very much about adverbials in our constraints. It turns out that by not mentioning them, they are allowed to appear fairly freely between various phrases in the verbal domain, and so their placement in (30-32) comes fairly cheaply. However, it is well-known that English does not allow adverbials between the verb and its direct object as in (33)

Fortunately, we already have the kind of constraint in this system that will treat (33) as illformed. In addition to an **Integrity(V)** constraint, English also has the parochial integrity constraint in (34)

(34) **Integrity(V_i/N)**

When a transitive verb is followed by a NP in English, the NP acts just like a bound morpheme in not allowing any other phonological material to intervene between it and the verb

For the purposes of this paper, one last constraint is needed that will govern sentences in English where some NP is fronted in the sentence, such as wh-questions (35) and focus sentences (36)

(35) Who did John think Jane said ate the cake?

(36) The cake, John thought Jane said Joe ate

The constraints that we have given so far do not handle these kinds of sentences. The fronted constituent in each case is outside the domain of the verb where it is an argument. As a consequence, it is also unable to be parsed by the strategies in (29) which are defined only for Ns in the immediate domain of V.

What is needed is an integrity constraint for sentences, and an edgemost constraint for focused elements as in (37)

(37) **Integrity(S) >> EdgeMost(focus,L)**

Integrity(S) gives us another domain in addition to those mentioned earlier and **EdgeMost(focus,L)** allows a focused constituent to appear on the left edge of that domain. Two further points are important here. First, it is a semantic question as to what qualifies as a focus element in English. Wh-words will normally be focused when used interrogatively, and NPs can certainly be focused as well. Second, this approach to word order also suggests that the identification of a focused NP with the argument structure of the appropriate domain is not done in the word order or by parsing strategies as in (29). Rather this is done in the semantics. In the simplest case, the focused element is connected to a domain where an argument is missing as determined by word order principles. In (36) for example, the system of word order finds no direct object within the domain of *ate*. *The cake* is then identified with the object argument of *ate* because the two are semantically compatible. The word order principles then are very free in what kind of constituents it allows in focused sentences. The principles given here would treat the word order in (38) as well-formed.

(38) ^The cake, John thought Jane said Joe ate the pie

But I do not claim that every string allowed by these word order constraints is well-formed English. Some strings allowed by the word-order constraints will be ill-formed semantically. See Szabolsci and Zwarts 1991 for an example of this. A fuller of discussion of these issues are outside the purview of this paper.

3.1 *that-t* violations

We are now in a position to deal with *that-t* constructions. Let's consider two topicalized sentences.

- (39) John I believe ate the cake
 (40) *John I believe that ate the cake

What we want is for the constraint **Non-Initial(V_i)** to rule out (40) but not (39). For constraints like **Non-Initial(e)**, we need there to be a boundary of some sort so that initiality and edges can be computed. In the default case, the beginning of a sentence can be taken as a boundary for purposes of these constraints. Looking at (40), it is obvious that we also want the complementizer *that* to introduce a boundary. We can introduce a rule in English like (41) which says that the item in question is followed by a phonological boundary which will be used to compute other constraints.

- (41) comp]

(41) is not a constraint that is ranked w r t other constraints but at this point simply a phonological stipulation or a part of the abstract phonology of the language. It is not unmotivated, though, as the **Non-Edge** constraints, which at this point are limited to verbs and 2P clitics, appear to be sensitive only to the edges of sentences. When the complementizer *that* is used, it ambiguously introduces a new sentence and therefore a new sentence boundary. Once this boundary is recognized, we see that (40) violates **Non-Initial(V_i)** as it appears first in its domain.

Likewise, for (39) there is no boundary introduced for the embedded clause without a *comp* or the sentence should be ruled out by **Non-Initial(V_i)** again. The verb *ate* is not at the edge of the sentence and there is no edge introduced by the phonology inside the sentence.

The Adverb Effect can be seen now as a way of rescuing **Non-Initial(V_i)**. In (42), the AdvP which follows the *comp* now keeps the embedded verb from appearing in initial position following the boundary introduced by the *comp*.

- (42) [Leslie is the person I said that] under no circumstances would run for president

I have now explained what has been seen as a parochial constraint in English analysis on the basis of the language-specific phonology of English. This phenomenon has not received an adequate explanation on the basis of syntax.

4.0 Warlpiri

One attractive implication of this analysis is that it gives linguists a means of giving a unified account for the word order of configurational and nonconfigurational languages. Hale 1983 cites Warlpiri, an Aboriginal language of central Australia, as an example of the latter. It exhibits the following characteristics which have been taken to characterize nonconfigurational languages: 1) free word order, 2) syntactically discontinuous expressions and 3) null anaphora. In this paper, I will touch on a few details of Warlpiri for the purpose of showing that they can also be accounted for in a word order framework like the one I am developing for English. Perhaps, though, what is more surprising is that this way of looking at things shows how Warlpiri is not as radically divergent from English (and other configurational languages) as perhaps has been thought.

For a transitive sentence, Warlpiri allows the subject, the object and the verb to be in any order with the proviso that the element which functions as an auxiliary appear in second position in the sentence.

- (43) Ngarrka- ngu ka wawirri pantirni
 man ERG AUX kangaroo spear NONPAST
 The man is spearing the kangaroo
- (44) Wawirri ka pantirni ngarrka-ngku
- (45) Pantirni ka ngarrka-ngku wawirri

From Hale (1983: 1-3)

And so on. However, (46) is not possible where the verb and the direct object precede the AUX.

- (46) *Wawirri pantirni ka ngarrka-ngku

Syntactic treatments of Warlpiri often give a phrase structure rule like (47) where AUX occurs first in the sequence (Simpson 1991, inter alia).

- (47) $S \rightarrow (\text{AUX}) \alpha \alpha^*$

A further rule of sentence-level phonology reorders the AUX so that it appears in 2P position.

- (48) $[\text{AUX } [\alpha] [\alpha]^* \rightarrow [\alpha + \text{AUX}] [\alpha]^*$

Such an approach shows that phonology must already be invoked to get the word order right for languages like Warlpiri, and using both syntax and phonology for word order will necessitate a more complicated grammar than the one I am proposing.

Notice also what would be involved in letting the syntax generate these sentences:

- (49) $S \rightarrow \text{XP AUX } [\alpha]^*$
 (50) $S \rightarrow \text{V AUX } [\alpha]^*$
 (51) $S \rightarrow \text{AUX } [\alpha]^*$

We need (51) because in connected speech, monosyllabic AUX can occur sentence initially because the last word of the previous sentence provides a phonological host for the clitic. Such a phenomenon is not unexpected under my approach and can be easily accommodated by allowing connected speech to do away with the *phonological* boundaries that normally surround a sentence.

This basic word order of (43-46) can be handled by treating AUX like the indicative verb in English by using a **Non-Edge** constraint. We also will need to add an **EdgeMost** constraint too. (52) gives us the constraints and ranking.

(52) **Non-Initial(AUX) » EdgeMost(Aux,L)**

Auxiliaries in Warlpiri are subject to both constraints because they are true second position phenomena. The AUX will only follow one constituent, and the constituent is determined by an integrity constraint. So AUX in Warlpiri will follow a domain governed by integrity. Crucially, Warlpiri is different from English in that it lacks the constraint **Integrity(V)**, or even the more parochial **Integrity(V_i/N)**.

The English verb lacks any **EdgeMost** constraint as Warlpiri has for its AUX. The reason is, as I mentioned earlier that English is a defective V2 language. Verbs in English are not true second position elements, they allow more than one domain to precede them, for example an adverbial plus a NP. Rather they are simply **Non-Edge** elements, so they only are subject to the **Non-Edge** constraint.

I can also give a phonological basis for discontinuous expressions. Hale cites as one example a case where a determiner is separated from the noun it modifies. The foremost reading of (53) is equivalent to (54).

- | | | | | | |
|------|-----------------------------|----------|---------------|---------------|-----------------|
| (53) | Wawirri | kapi-rna | panti-rni | yalumpu | |
| | kangaroo | AUX | spear NONPAST | that | |
| | I will spear that kangaroo' | | | | |
| (54) | Wawirri | yalumpu | kapi-rna | panti-rna | |
| | kangaroo | that | AUX | spear NONPAST | (Hale 1983 4-5) |

The sequence *wawirri yalumpu* qualifies as a phrase as we see that it can precede the AUX in (54). This tells us that Warlpiri is like English in having the constraint **Integrity(N)**. However, this situation is analogous to the case of those Serbocroatian dialects that allow 2P clitics to either follow the phrase or follow a single word of the phrase. What is needed then is to have the **Integrity(N)** constraint be unranked w r t **Non-Initial(AUX)** and **EdgeMost(AUX,L)**. When an utterance is made, one order will have to be chosen. Ranking the AUX constraints above **Integrity(N)** will allow the noun to be discontinuous from its determiner. However, case markers are never discontinuous from their nouns, so there needs to be a further constraint **Integrity(N/case)** to insure that those two morphemes are not separated. In general, discontinuity in phrases below the sentence level can be handled by not positing an **Integrity(XP)** constraint for that phrase or letting it be dominated by other constraints in the grammar.

I mentioned earlier that this a phonological account of word order. Some might question why I should treat these constraints as part of the phonology. Certainly there is no a priori objection to treating these local constraints as part of the syntax or part of the morphology. To do so, though, is to claim that there is a level in the grammar called syntax or morphology that has its own properties (other than these constraints) that need to be stated in these terms. But there are good reasons for considering this account to be phonological. First, the primitives of this account are concepts found in phonology. Concepts like left, right, edge-based phenomena, integrity are all part of phonology, particularly metrical phonology. Second, this implies that these constraints will be sensitive to phonological considerations. Exceptions to the constraints will be phonological in nature. This can be seen in cases like heavy NP shift in English³ or the Pashto data where word stress is relevant. These are good reasons for considering word order to be phonological in nature, and it raises the burden of proof for justifying the existence of morphology and syntax as separate modules or levels in the grammar.

Today, it is becoming increasingly clear that phonological considerations do bear on word order. In generative grammar, there has been a long tradition of phonology-free syntax. Pullum and Zwicky 1988 have defended the position that phonological information is not available to the syntax. On the one hand, this is probably the right move to make theoretically. If the syntax is susceptible to phonological information, it is difficult to state how this mingling of components in the grammar can be constrained. But Pullum and Zwicky also point out that the claim that there is no phonological information available to the syntax cannot be evaluated in a theoretical vacuum. In a certain sense the claim is trivial if you let the phonological component reorder syntactic structure as must be done to get the facts right. The clearest example of this would be special clitics whose placement in a string is subject to properties of stress and syllabicity. In particular, a phonology-free syntax can easily be maintained by positing phonological rules that reorder syntactic structure, as is often suggested for special clitics (Halpern 1995, *inter alia*). Halpern has a syntax which generates special clitics in a certain point in a tree and then a further phonological rule that moves the clitic after a single word if the clitic would otherwise appear first in the sentence. This keeps the syntax parsimonious but at the empirical level it is also an admission that phonology does influence word order. Whether this done by surface-level filters as argued by Ross 1967, Fiengo 1977, Pullum & Zwicky 1988, *inter alia*, or other means, there do not exist any principled accounts that constrain what is and isn't possible when phonology reorders syntax. In contrast, this analysis suggests that the grammatical mechanism for generating word order is both more simple and parsimonious than previously expected.

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³ This has been noted as far back as Fiengo 1974.

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