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Deforestation in syntax*

1 Introduction

One of the key ideas of modern theoretical syntax is that the syntactic expressions of human languages are structured. What is meant by this comes in two parts, one obvious and the other, though explicit in all theories of structure, more easily overlooked. The first claim for structure is that sentences are constructed by putting words together to form successively larger sub-parts of a sentence. The second part is that the constituents formed by the process of putting words together have a grammatical reality. What I mean by this is that constituents consisting of two or more words are assumed to have grammatical properties and are manipulated by grammatical rules. For example, a grammatical rule may tell us we can put a determiner, like *the*, together with a noun, like *man*, to produce a constituent *the man* and that in doing so we form a "noun phrase" (or a determiner phrase, if the theory is that way inclined). Then, another rule tells us what noun phrases can combine with.

One might think that the combination of elements into units and the definition of those units as grammatical entities are just two sides of the same coin. After all, one standard mechanism used to describe the process, the phrase structure (rewrite) rule does the two things simultaneously:

(1) NP $\rightarrow$ Det N

This rule *defines* a constituent labelled "NP" by placing the determiner in front of the noun. However, in the present paper, I want to explore ideas which have the consequence that these two claims about structure are completely separated. One of them, that elements group together, is held to be true, though not in exactly the same way as is usually conceived of, while the other, that these groups have grammatical reality, is explicitly denied. In short, the grouping of elements in any given linguistic expression is seen as epiphenomena of the grammar to which the grammar itself is completely blind.

2 Some background assumptions

Before starting, I want to make explicit some assumptions I will be keeping in the background but which are essential to the analysis. First I will assume standard optimality theoretic views on constraint interaction (Prince & Smolensky 1993). These take UG to be a set of *conflicting* constraints and individual languages to be rankings imposed on the constraints of UG. This ranking determines which

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constraint to adhere to in cases of conflict. I will also accept standard Optimality Theory assumptions about how grammaticality is determined: a set of candidate expressions is generated for every input and is presented for evaluation against the set of ranked constraints; the optimal, and therefore grammatical candidate is the one that best satisfies these constraints, violating a constraint only if necessary to satisfy higher ranked constraints.

I will accept the standard view of inputs as being a set of lexical elements plus a number of assignments to these of features marking thematic (Grimshaw 1997), scope (Legendre et al. 1998) and information relations (Grimshaw & Samek-Lodovici 1998). However, I will assume that precisely because these inputs carry all information needed for the interpretation of expressions, it is the input which feeds into the interpretative component and not, as is standardly assumed, the output expression or some abstract representation derived from this.

These assumptions are summarised in the following diagram:

(2) $$\begin{array}{l} \text{input} \rightarrow \left\{\begin{array}{c}\text{candidate}\\ \text{set}\end{array}\right\} \rightarrow \text{constraints} \rightarrow \text{optimal output} \\ \quad\downarrow \\ \text{semantic interpretation} \end{array}$$

3 Alignment constraints

In Optimality Theory much has been made of alignment constraints. These are typically constraints which favour the positioning of an element with respect to the edges of a given domain (McCarthy & Prince 1993). Choi (2001), on the other hand, utilises alignment constraints that align elements to other elements. It is this second view of alignments which will be made use of in the present paper. Importantly, I will take these to be gradient constraints, capable of violation to more and less degrees.

There are some syntactic phenomena that directly indicate that alignment conditions are gradient. For example, although a direct object is normally aligned to the right of the verb, it is displaced from this position by an indirect object. However, instead of totally giving up its position and going to find some other place, the direct object accepts "second place" attempting to be as near to the verb as it can get:

(3) a. John sent a letter yesterday
b. *John sent yesterday a letter
c. John sent Bill a letter yesterday
d. *John sent a letter Bill yesterday
e. *John sent Bill yesterday a letter

It is an intriguing thought that perhaps the majority of syntax might be organised along these lines: i.e., that every element in an expression is positioned with respect to some other element, though due to conflicting requirements sometimes elements can only achieve a position near to where they would be ideally placed. The overall arrangement of elements would then be a matter of conflict and compromise.

Under these assumptions it becomes possible to position every element in an expression relative to some other element without reference to the grouping of elements formed under such alignments. For example, consider the following highly simplified constraints:

(4) a. $\text{align}_{\text{det}}$ = align determiner to right of its noun
b. $\text{align}_{\text{adj}}$ = align adjective to right of its noun

Assuming $\text{align}_{\text{adj}}$ to be higher ranked than $\text{align}_{\text{det}}$, the result will be a "Det Adj N" linear ordering. Importantly, under these assumptions it is unnecessary to refer to the group of elements organised by these alignments as having any grammatical status: we get the correct arrangements of these elements without reference to a "Noun Phrase".

4 Do we need phrases?

If it can be demonstrated that gradient alignments can do everything that we use the notion of a phrase to accomplish, then we can eliminate such abstract elements from the grammar, a desirable step on simplicity grounds alone, though clearly a radical one. In this part of the paper I will demonstrate that many of the arguments that are commonly cited in favour of the necessity of phrases are undermined by consideration of gradient alignments.[1]

4.1 Semantic compositionality

It is probably true that semantics is compositional with the meaning of a proposition being determined by its component parts and their mode of combination. Does this not itself demonstrate that sentences are structured? I think the answer is clearly no. It is a hypothesis that there is isomorphism between semantic and syntactic structure, one which is, I believe, highly dubious. There is wide variation in how languages organise elements in a syntactic expression, but to my knowledge there is little evidence that different languages have widely varying semantic structures. To take an extreme example, there are some languages which demonstrate virtually no evidence of syntactic constituent structure: there is virtual free word order with little or no semantic repercussions of selecting one order over another. Yet it is perfectly possible to translate from and into such languages using configurational languages such as English, demonstrating that the semantic structures that both types of language express must be very similar, if not identical.

[1] I have cut a section on coordination from this part of the paper. For an account of how coordination phenomena can be handled in an alignment based system, see Newson & Gáspár (2001) and Newson (2002).

The organisation of the language faculty that I assume, as summarised in (2), entails that semantic interpretation and syntactic organisation are indirectly related, mediated through the input. Indeed, syntactic organisation only needs to reflect semantic facts to the extent that the semantic relationships stated in the input are faithfully encoded in the syntactic expression. Given that faithfulness constraints may be violated, it follows that the syntactic expression does not have to directly reflect semantic relationships at all.

The point is, of course, that syntactic expressions do not have to directly mirror semantic facts nor their method of representation and therefore under these assumptions one cannot use semantic compositionality to argue for the structured nature of syntactic expressions.[2]

4.2 Distribution

One of the strongest syntactic arguments for phrases concerns distribution. The argument goes that, like words, phrases have recognisable positions within sentences and therefore the grammar must recognise their existence in order for rules to govern distributions. I think it is fairly obvious however that gradient alignments can produce the same distributional patterns without reference to phrases at all.

Before demonstrating this, a certain fact about inputs needs to be highlighted. Clearly inputs should not be organised in the same way as syntactic expressions, as this the function of the grammar. Inputs are therefore "unorganised" entities. However, they clearly contain information which may (or may not) serve as the basis for syntactic organisation. One consequence of these assumptions is that in the input it is lexical items which are related to each other and not units built from lexical items. A typical input might therefore look like:

(5) $\{\text{saw}_{\langle x,y\rangle}, x\text{=man}, y\text{=woman}, \text{det}_x\text{=this}, \text{det}_y\text{=that}\}$[3]

Note that it is the nouns *man* and *woman* which are related to the argument roles assigned by the verb, not the "Noun Phrases", *this man* and *that woman.* On the basis of this we can establish *man* as the subject of the verb and *woman* as the object. Suppose there are alignment constraints which place the subject to the left of the verb and the object to the right. Suppose also the $\text{align}_{\text{det}}$ constraint discussed above. If the determiner alignment is more highly ranking

[2] Huba Bartos comments that the majority of languages are configurational and wonders why this would be the case under the assumptions made here. The reason is that nonconfigurationality is due to faithfulness violations in which the features relevant for alignments are underparsed rendering the alignment constraints vacuously satisfied. Radical nonconfigurationality requires massive unfaithfulness, which, while possible, can only be achieved in a small number of viable grammars in which all alignment constraints are inoperative.

[3] Huba Bartos has suggested that the inclusion of indices in inputs "resurrects" the phrase structure that I deny. Certainly indexes, which merely represent semantic relatedness, are the bases for the alignments of the pairs of coindexed elements. But this notion falls a good deal short of claiming that the combined group of elements which enter into a complex of alignment relationships has grammatical reality. Simply put, there is no rule or combination of rules in the envisaged grammar which defines or makes reference to units bigger than words.

than the argument alignments, the result will be that the determiner will precede its relevant noun and the noun will come as near as it can to the left or the right of the verb, depending on its function, considering the alignment of the determiner:

(6) this man saw that woman

Simply put, the distribution of the "Noun Phrase" is merely the distribution of the noun. The fact that other elements may orbit round the noun is an independent fact to do with the alignment properties of these elements. The result is that the determiner + noun sequence will have a distribution without the grammar actually defining this as a constituent with grammatical reality.

More or less the same applies for related arguments for constituent structure such as displacement facts. The standard position is that the fact that structural units may be "displaced" from their "base" positions is again evidence that the grammar is able to manipulate such objects and therefore they must have grammatical reality. But again, this does not necessarily follow once we think in terms of gradient alignments. Whatever the grammatical mechanism responsible for apparent displacement phenomena, and I will not go into this issue here, it is clear that it can be expressed as a requirement that such and such a lexical item occupy a certain position different from its base position. So, for example, the fact that a topic is a left peripheral element in English may be due to a topic alignment constraint. Note once again that in the input the element that is identified with the topic role is a lexical item because in the input that is all there is:

(7) $\{\text{saw}_{\langle x,y\rangle}, x\text{=man}, y\text{=top=woman}, \text{det}_x\text{=this}, \text{det}_y\text{=that}\}$

Suppose the determiner constraint outranks the topic constraint which outranks the argument constraints, the result is that the topic will appear at the left periphery and the determiner will appear to its left:

(8) that woman, this man saw

We achieve the appearance that the sequence determiner + noun "moves" as a unit without any reference to structural units any bigger than words.

In summary, distribution facts do not necessarily lead to the conclusion that the grammar manipulates units bigger than words as it is possible to produce exactly the same facts with a grammar which consists of alignment conditions placed on words alone. Note that it is crucial that these alignment requirements must be gradient—violable to different degrees—as it would be impossible to define the relative placements of individual lexical elements in a more rigid system.

4.3 Pronominalisation

Pronominalisation is another common "test for constituent structure". The argument goes as follows. Only certain stings of words in a sentence my be replaced by a proform. These strings are constituents and given that different strings are replaced by different proforms, we can conclude that constituents have different grammatical properties:

(9)	a.	*the police*	covered	*the rusty hand grenade*	with	*this bucket*
	b.	they	covered	it	with	this

Currently the semantic similarity between such sentences is accounted for by the assumed referential properties of proforms: *they* is capable of having the same referent as does *the police* and in the right context will do so. We have already argued that such semantic facts do not necessarily lead us to the conclusion that there must be syntactic constituency and therefore this aspect of pronominalisation can be discounted as an argument in favour of the existence of phrases.

The other aspect of pronominalisation is a syntactic one: certain strings are replaced by single words; words are constituents, so the strings should be constituents. Thus what we are looking at is the fact that certain words can crop up in the same positions as certain strings in different sentences. In other words, this is a distribution argument again and once more it does not lead to the conclusion that syntactic constituent structure exists. For example, the distribution of the string *the police* is governed by the alignment requirements of *police* (to the verb) and of *the* (to the noun). In the expression with the pronoun, the pronoun *they* will have the same alignment requirements as *police* and will therefore sit in the same position. The grammar does not have to treat *the police* as a grammatical unit for the facts to be captured.

4.4 Conclusion

This section raised the question of whether we need phrases. The kinds of phenomena we have discussed here are very often taken as unquestionable evidence that the answer to this question should be positive. Each attempts to show that constituents have grammatical properties, having fixed positions and being able to pronominalise, for example. Yet each is undermined once we consider gradient alignments as the grammatical mechanism for organising syntactic expressions: in all the cases we have reviewed the grammar can be seen to be manipulating nothing larger than lexical elements and the fact that certain groups of lexical elements seem to behave as well defined groups is epiphenomena, a by-product of the grammar rather than one of its central concerns.

5 Some example analyses

In this section, I will develop further a system which is based on alignment constraints and show that it is possible to handle fairly complex and intricate data under such restrictions.

5.1 Wh-“movement”

One way to characterise the fact that in certain languages a wh-element sits at the left periphery of an interrogative clause is through the notion of “type marking”:

the wh-element, by sitting at the front of a clause simply marks the clause as interrogative. Looked at in this way, wh-“movement” can be seen as the way an expression satisfies a type marking requirement.

From the present perspective, however, some alterations must be made to this point of view. If we are assuming that there are no constituents, then we also abandon the notion of a clause as a grammatical entity (the notion survives in semantics as a “proposition”, but this has no direct bearing on syntactic organisation). It seems a reasonable assumption to make that alignment conditions will be, to a large extent, head driven in that most information in an input relates elements in one way or another to a head. For simplicity’s sake, I will assume that the head element in a “clause” (understood now only in an epiphenomenal way) is the verb. Hence if anything needs to be type marked it is the verb. Let us assume the following constraint:

(10) Type Marking: align the type marker to the left of the verb

This turns out to be a fairly general constraint responsible for positioning such elements as complementisers, marking subordinate status, and relative pronouns.

Of course, the wh-element rarely appears directly at the left edge of the verb that it type marks, but often gets pushed out to the periphery by elements such as subjects, auxiliary verbs and adverbial modifiers. This indicates a lower ranking for the Type Marking constraint than those responsible for placing the other elements. In general it will be the case that the nearer to the target any element is aligned, the higher ranked the constraint responsible for the alignment will be.

Consideration of the interaction of the type marking constraint and others highlights a problem which will require development of the system to solve. To demonstrate this, consider the following constraints:

(11) Argument: align the argument to the right of the predicate

(12) Subject: align the subject to the left of the verb

In English arguments generally follow the verb, except for the subject. This is due to the subject constraint outranking the argument constraint. The type marking constraint is lower ranked than the subject constraint as type markers generally precede the subject. However this constraint outranks the argument constraint as type marking arguments (e.g., wh-element) precede the verb. Consider the results under these rankings:

(13)

		Sub	TM	Arg
☞	… asked who laughed			∗
	… asked laughed who	∗!	∗	

(14)

		Sub	TM	Arg
	… asked who Bill saw		*	**!
	… asked Bill who saw	*!		**
	… asked who saw Bill	*!		*
☞	… asked Bill saw who		*	*
	… asked saw Bill who	*!	*	*

When the wh-element is the subject, there is no problem as the subject and type marking constraints are not in conflict. However, when the wh-element is a non-subject, as the subject and type marking constraints are in conflict, the general argument constraint forces the wh-element into a post verbal position: not the desired result.

I think it is clear what we want to say however. The Type Marking constraint wants the wh-element to the left of the verb and thus moving it to the other side of the verb counts as a more serious violation of this constraint than keeping it on the left side. To handle this, I will differentiate between EDGE VIOLATIONS and SIDE VIOLATIONS of an alignment constraint. Edge violations are counted by how many elements lie between an element and its target on the relevant side as determined by the constraint. Side violations are incurred by an element appearing on the wrong side of the target according to the constraint. Side violations are clearly worse than any amount of edge violation and hence an element will always choose to be pushed further away from its target on the relevant side than to switch sides. I introduce a new symbol on the table to indicate side violations:

(15)

		Sub	TM	Arg
☞	… asked who Bill saw		*	☆☆
	… asked Bill who saw	*!		☆☆
	… asked who saw Bill	☆!		☆
	… asked Bill saw who		☆!	☆
	… asked saw Bill who	☆!	☆	*

More complicated cases of wh-movement show an interesting effect. Consider the following:

(16) … asked who Bill said saw Mary

In this example the subject of the subordinate verb has been used as a type marker for the superordinate verb, suggesting that type marking for the superordinate verb is more important than providing a subject for the subordinate one. Yet the superordinate verb's subject is closer to it than its type marker, suggesting that the subject of the superordinate verb is more important than its type marking. Thus the following pattern emerges, where "≫" indicates that the element to the left is "more important" than the element to the right:

(17) subject of superordinate verb ≫ type marking of superordinate verb ≫ subject of subordinate verb ≫ type marking of subordinate verb

It seems more than just coincidental that the same relative ranking of the constraints is relevant for both superordinate and subordinate verbs, so it would be unwise to try to capture this phenomena by introducing domain specific constraints, one lot for superordinate contexts and another lot for subordinate contexts. Besides such a notion hardly makes any sense given that some domains are both superordinate and subordinate. Instead, what I propose is to introduce a method of calculating optimality which is reminiscent of the notion of strict cyclicity of earlier transformational grammars (it also has connections with the notion of a "phase" in the Minimalist Programme, Chomsky 2000). The idea is that the candidate set are evaluated by the ranked constraints on a number of passes. Each pass attends to the situation of successively more subordinated predicates (thus this idea is rather like an inverted cyclicity). All surviving candidates of each pass of the constraints form the candidate set for the next pass, and as is standard, once a candidate has been eliminated it cannot be resurrected. To see how this works, consider the following example:[4]

(18) $\{\ldots\ \text{said}_{\langle\text{ag, th}\rangle},\ \text{ag} = \text{Bill},\ \text{th} = \text{saw}_{\langle\text{exp, th}\rangle},\ \text{exp} = \text{Mary},\ \text{th} = \text{who},\ \ldots\ \}$

(19)

	Pass for *said*	Sub	TM	Arg
	asked said Bill saw Mary who	☆!	☆	
	asked Bill said saw Mary who		☆!	☆
	asked who said Bill saw Mary	☆!		
☟	asked who Bill said saw Mary		∗	☆
	asked Bill who said saw Mary	∗!		☆
	asked said Bill Mary saw who	☆!	☆	
	asked Bill said Mary saw who		☆!	☆
	asked who said Bill Mary saw	☆!		
☟	asked who Bill said Mary saw		∗	☆
	asked Bill who said Mary saw	∗!		☆

What we see here is that on this pass the optimal solution for the relevant verb (*said*) is worked out, i.e., with the subject and the type marker to the left. The surviving candidates are differentiated only in terms of different remaining possibilities for the subordinate verb: whether or not this has a subject. This decision will be made on the next pass:

(20)

	Pass for *saw*	Sub	TM	Arg
	asked who Bill said saw Mary	☆!		
☞	asked who Bill said Mary saw			☆

[4] In this example I have systematically ignored the Arg violations caused by the distance between *say* and its argument *saw*. We will see in the next section how and why this is legitimate.

5.2 That-trace effects

The that-trace effect observes that a normally optional complementiser is obligatorily absent when the following subject is absent due to type marking requirements of a superordinate predicate:

(21) a. . . . asked who Bill said (that) Mary saw
b. . . . asked who Bill said (*that) saw Mary

In order to account for this phenomenon we must first address the normal optionality of the complementiser. Recall that the complementiser is a type marker, marking the subordinate status of the predicate. It cannot be that when the complementiser is absent that the verb fails to be type marked as this candidate would always lose to the one where there was a complementiser:

(22)

		Sub	TM	Arg
☞	. . . said that Mary . . .			
	. . . said Mary . . .		∗!	

Suppose therefore that there is another way to mark the subordinate predicate as subordinate, which is simply by placing it in complement position of the predicate of which it is an argument. In other words, a predicate itself can act as the subordination type marker for its verbal complement. This would account for why the complementiser is obligatory when the clause is in a non-complement position, such as subject and extraposed position:

(23) a. *(that) Bill saw Mary is unthinkable
b. I couldn't believe it *(that) Bill saw Mary

The idea is that, as with many grammatical phenomena, there are two ways of doing the same thing: a morphological way and a syntactic way. So, for example, object status can either be marked morphologically by a Case or positionally by occupying object position (or both). The complementiser is therefore the equivalent of a morphological way of satisfying the type marking requirement.

Now, the subordinate verbs we are considering here also happen to be arguments of a superordinate predicate and therefore have to satisfy the Argument alignment constraint. Yet there is a conflict here between the needs of the subordinate verb to be type marked and have a subject and for it to act as an argument of the superordinate predicate: both the type marker and the subject should be to the left of the subordinate verb while the subordinate verb itself should be to the immediate right of the superordinate predicate. Unless there is some way of overcoming the needs of the superordinate predicate, which are paramount as discussed above, the result should be that subordinate verbs should not have subjects nor be type marked with a complementiser. Clearly this is not the case. To overcome this then I will assume the following:

(24) the Argument alignment constraint is applicable only to syntactic arguments (ones carrying the argument feature assigned them in the input)

(25) features may be underparsed in the output (missing, at the cost of a faithfulness violation)

Now if the faithfulness constraints are ranked below the subject and type marking constraints, this will sanction the underparsing of the argument feature in order to satisfy these conditions. To see this, consider the following analysis:

(26)

	pass for *think*	Sub	TM	Faith	Arg
	I think that he left$_{th}$				✩∗∗!
	I think he left$_{th}$				✩∗!
	I think that left$_{th}$ he				✩∗
☞	I think left$_{th}$ he				✩
☞	I think that he left				✩
☞	I think he left				✩
☞	I think that left he				✩
☞	I think left he				✩

In this table, the ✩ is awarded due to the subject of *think* appearing on the left. The other violations are due to the verbal argument *left* being removed from its predicate to varying degrees. The main point to note here is that as the argument feature is located on the subordinate verb, its underparsing does not violate the faithfulness constraint for this pass which only concerns the superordinate verb.[5] When the feature is underparsed, the Argument alignment constraint is satisfied vacuously and therefore all cases of underparsing produce equally optimal results as far as the superordinate verb is concerned, as does the case involving no underparsing but with the subordinate verb to the immediate right of the superordinate. The survivors are then presented for the second pass:

(27)

	pass for *left*	Sub	TM	Faith	Arg
	I think left$_{th}$ he	✩!			
☞	I think that he left		∗	∗	✩
☞	I think he left		∗	∗	✩
	I think that left he	✩!		∗	
	I think left he	✩!		∗	

Here the underparsing is relevant, but as the only candidate which does not involve it is ruled out immediately by the subject constraint we need only consider those in which underparsing takes place. Of these, the two with a subject are equally op-

[5] I assume that we want to count any given constraint violation only once in an evaluation. But this raises the question of which cycle to count violations incurred by predicate arguments in: their own cycle or the cycle of the superordinate predicate? I will assume that given the choice of counting a violation in two cycles, the violation will always be counted in the later one.

timal as in both, type marking is satisfied to the same degree: the type marker, the complementiser and the superordinate predicate respectively, is one step removed from the subordinate verb by the subject.

Now, let us consider what happens when the subject of the subordinate verb is a wh-element, needed to type mark a superordinate verb.

(28) pass for *said*

		Sub	TM	Faith	Arg
	... asked who Bill said that saw$_{th}$ Mary		∗		✩∗!
☝	... asked who Bill said saw$_{th}$ Mary		∗		✩
	... asked Bill said that who saw$_{th}$ Mary		✩!		✩∗∗
	... asked Bill said who saw$_{th}$ Mary		✩!		✩∗
☝	... asked who Bill said that saw Mary		∗		✩
☝	... asked who Bill said saw Mary		∗		✩
	... asked Bill said that who saw Mary		✩!		✩
	... asked Bill said who saw Mary		✩!		✩

As in the previous example, the underparsing is irrelevant for this pass as it involves a feature of the subordinate verb. Therefore cases involving underparsing or not compete evenly and the three survivors are not differentiated on this issue. One crucial difference is however that as the subject of the lower predicate is required to type mark the superordinate one, in all the optimal cases there is no subject to intervene between the superordinate predicate and its verbal argument. However the complementiser does intervene, meaning that in the case where no underparsing takes place the candidate with the complementiser is ruled out as it adds an unnecessary distance between the verb and its argument. Note that in both cases the type marking of the subordinate predicate is the same as both the superordinate verb and the complementiser are able to satisfy this function.

(29) pass for *saw*

		Sub	TM	Faith	Arg
☞	... asked who Bill said saw$_{th}$ Mary	∗			
	... asked who Bill said that saw Mary	∗		∗!	
	... asked who Bill said saw Mary	∗		∗!	

It is in this table that we see the main difference between this and the previous case, where the complementiser was optional. Previously the surviving case in which no underparsing had taken place had the subject on the wrong side and hence was immediately ruled out leaving the other survivors (with and without the complementiser) as equally optimal. In this case however, in all three of the survivors the subject has been utilised by the superordinate predicate and thus they are not distinguished on this constraint. However, they are distinguished in terms of underparsing and the winning candidate is the one in which there are no faithfulness violations.

In short what is going on is that the presence of the subject of the subordinate clause makes it impossible for the argument alignment constraint, valid for the verbal argument of the superordinate verb, to be satisfied. Therefore underparsing is forced and the subordinate verb can be any distance away from the superordinate verb, meaning that the insertion of the complementiser makes no difference. However, when the subordinate predicate's subject is press ganged by a superordinate predicate, there is no reason to underparse the subordinate verb's argument feature. Therefore the presence of the complementiser does make a difference, adding an unnecessary distance between the superordinate verb and its argument.

The essence of this analysis, that if something (i.e., the subject) must intervene between the superordinate predicate and its argument then it doesn't matter what else also intervenes (e.g., the complementiser), predicts that the same should be true of any intervening element, not just the subject. As has been pointed out in several places (e.g., Culicover 1993), this prediction seems to be correct. For example, if an adjunct intervenes between the two verbs, the *that*-trace effect is cancelled:

(30) a. who did Bill say (that), for all intents and purposes, was head of department
b. who do you think (that) only yesterday was standing on this very spot

This adds support for the analysis which provides a uniform account of these phenomena in which no special mechanisms have to be introduced to deal with one in the face of the other.

6 Conclusion

In this paper I hope to have demonstrated that the normal assumption of constituent structure is an unnecessary abstraction if the principles governing the organisation of elements in linguistic expressions are seen as gradient alignment constraints. This allows expressions to be organised in terms of individual lexical elements competing with each other for preferred positions defined with respect to other lexical elements. Some elements win and others come in second and the final expression is the optimal satisfaction of these alignment conditions. As far as "structure" is concerned then, elements group together in an attempt to satisfy their alignment conditions, but these groupings have no status in the grammar and the grammar itself does not manipulate them. What we end up with is a very linear view of sentence organisation rather than a hierarchical one and hence the tree, as a representation of sentence organisation is not appropriate under these assumptions.

There is another consequence of these ideas that I have hardly touched upon, which concerns the restrictions placed on the theory itself. Given that syntax is mainly about the positional organisation of elements in a sentence, it may be that all we need to account for syntactic phenomena is alignment constraints. Actually, we also need faithfulness constraints as well, but even so, if this is all that is needed, we end up with a radically restrictive theory which has all sorts of ramifications for the explanatory nature of the theory itself. These will need to be further explored to find out what real advantages they offer.

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