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*Syntax First, Words After: a possible consequence of doing Alignment Syntax without a lexicon**

0 Introduction

Since its introduction in syntactic theory (Chomsky 1965), there has been much discussion about how to characterise the lexicon: does it contain only unpredictable information or are there generalisations stated in it?; is it static or dynamic?; how far can the syntactic information it contains be reduced to semantic information?, etc. Some of these points of view lead to an extended view of the lexicon in which certain syntactic processes are said to be carried out within it (as for example in Hale and Keyser 2002). Others have led to a reduction, or even the rejection of the lexicon, at least as it is commonly conceived of (most notably in Distributed Morphology, Halle and Marantz 1993, Marantz 1997).

In the present paper I want to explore the consequences of adopting the latter position within the framework of Alignment Syntax (Newson 2004, Newson and Maunula 2006). One feature of this framework is that it operates without any notion of constituent structure: the units that the syntax manipulates compete with each other for positions defined with reference to other units in terms of linear order and adjacency[1]. The lack of constituent structure, in conjunction with the assumed lack of a lexicon, allows us to take the radical step of assuming that the syntax itself does not operate with any notion of word. Nothing in the syntax forms units from the elements which

* I would like to thank Szécsényi Krisztina and Bartos Huba for helpful comments on various drafts of this paper. Their suggestions have undoubtedly improved the paper and the analyses it contains immensely and I am pleased to acknowledge their contributions. Whilst I have tried to address those comments pointing out weaknesses, it goes without saying that those which remain are entirely my own responsibility.

[1] A rejection of the assumption of constituent structure whilst certainly far from standard is not at all unique to the present work. The position can be found in other frameworks such as Dick Hudson's 'Word Grammar' (1984, 2010), Dependency Grammar (Debusmann, 2006) and a number of others (see Gáspár 2005, for a review). Within Alignment Syntax the position has been defended against the most obvious objections, such as 'empirical evidence' provided by tests for constituent structure in Newson (2004). The interested reader is directed towards this work for some discussion of the issue.

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words are traditionally assumed to be bundles of, these are just arranged in a linear order. It is only after this linear order is established and is ready to be spelled out that any notion of word comes into play. Assuming something like what Distributed Morphology calls the vocabulary, i.e. a list of associations between phonological forms and the syntactically manipulated elements that they spell out, it is the act of spelling out the syntactic output in terms of vocabulary items selected for the purpose that bundles the elements into what we recognise as words. Thus a redundancy is removed from the system: there is no need for bundling to happen both in the syntax and in the vocabulary.

The consequences of this main idea are far reaching into many aspects of the conceptualisation of language and language variation. This paper explores a tiny part of these in order to test for viability. The results are moderately positive enough to be encouraging, though it may be that any negative aspects reflect my own limitations rather than those of the general framework. There is obviously much more to be done.

We start from a critique of some generally accepted ideas concerning the notions of syntactic category and distribution which leads us to question the standard lexical based approach. In section 3 we lay the foundations of a theory, based on Alignment Syntax principles, which proceeds without assuming a lexicon and all the notions that such a construct involves, such as syntactic categories and the pre-bundling of the basic elements which eventually constitute words. We distinguish between the syntactic processes which impose order on the basic elements and the processes which determine which vocabulary elements to use to spell out the syntactic string.

In section 4 we test the proposed system on a very small fragment of English, concentrating on certain aspects of the expression of the meaning of the 'verbal' system. In particular we investigate the elements involved in expressing argument structure and temporally related meanings. Concerning argument structure, we concentrate mainly on different kinds of causative constructions, showing how different orderings of the basic elements affect which vocabulary items are chosen to express them. We propose that the causative light verb, *make*, is the result of placing the causative element at a distance from the elements which get spelled out by the root verb. The relationship between this phenomena and the expression of tense and aspect in the language is shown to be complex. Auxiliaries are claimed to be similar in many respects to light verbs, in as much as they are the spelling out of elements removed from the verbal root. Moreover, the ordering of temporal elements is shown to be interconnected to the arrangement of the elements of argument structure.

Although the results are far too preliminary to be able to conclude on with any certainty, they are non-the-less interesting, if only because of the new light

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they shine on old problems and the new problems that they themselves give rise to. Much work remains, but the indications are that it may be worth the attempt.

1 Category and Distribution

In the larger part of the generative tradition, syntactic categories play a major role in determining the distribution of elements in a structure. Lexical items are assigned their category in the lexicon and head positions in a structure are defined in terms of categories, allowing the insertion of only lexical items of the corresponding category.

The earliest theories had these categorial positions directly determined by the syntactic rules themselves, but there has been a move away from this direct approach and under standard X-bar theory it is assumed that the syntactic rules define only category neutral positions. Nevertheless, category is still important for determining distribution in that although general positions are determined on a category neutral basis, the categories of actual position within any given structure are determined mostly by the selectional properties of the heads that the positions are related to. These selectional properties may make reference to the category of the elements which occupy the positions, a restriction called *c-selection*.

Other selectional restrictions based on semantic factors, *s-selection*, have also been claimed to play a role in determining the distribution of elements in a particular structure and it has even been debated whether c-selection might not reduce to s-selection (Chomsky 1986). However, this does not seem tenable in some cases, for example concerning the selectional properties of functional heads, and indeed in the Minimalist Programme the pendulum seems to have swung the other way and c-selection is deemed to set the relevant restrictive conditions for the insertion of elements related to functional and thematic heads alike.

Obviously these current theories are based on much older ideas. The notion of category goes back to antiquity, though the classical grammatical approach tended to base categorisation on semantic and morphological criteria. It was the Structuralists who emphasised the relationship between category and distribution: defining categories in terms of distribution and describing distribution in terms of arrangements of the elements with given categories. It is clear however, that current approaches differ from the traditional one in that it is now recognised that distribution cannot be solely described in terms of combinations of categories. Other considerations play a role in determining the syntactic positioning of elements. Selectional restrictions are one such consideration: not every element that one might want

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to categorise as a verb, for instance, can fit into exactly the same position in all structures as any other verb. For the Structuralists, this was not particularly a problem as, lacking any restrictive theory of category, differences in the distribution of elements could always be accounted for in terms of the recognition of new categories or subcategories (Harris 1954). However, there are distributional facts recognised under current assumptions that cannot be accounted for with the invention of new categories. For example the following complementary distribution patterns are contradictory if taken as determined by similarity of category:

(1) a I asked if he is here
b I asked is he here
c * I asked if is he here

(2) a I asked who he met
b I asked if he met Mary
c * I asked who if he met

(3) who is he meeting

The data in (1) show that complementisers and inverted auxiliaries are in complementary distribution while those in (2) show that complementisers and fronted wh-elements are also in complementary distribution. If distribution were determined solely on categorial grounds, we would therefore have to conclude that complementisers, inverted auxiliaries and fronted wh-elements all have categorial similarities. But this would predict that fronted wh-elements and inverted auxiliaries should also be in complementary distribution, which (3) demonstrates is not so. The standard account of this apparent paradox is to assume that while the complementary distribution between complementisers and inverted auxiliaries has a categorial explanation, in that both are assumed to occupy the same structural complementiser position, the complementary distribution between wh-elements and complementisers has an entirely different explanation: Chomsky and Lasnik's (1977) multiply filled COMP filter, or whatever grammatical principle accounts for this.

Under current standard assumptions then, although category has a role to play in determining the distribution of elements in a structure, there are other restrictions to be considered in addition. The majority of these can be seen as co-occurrence restrictions, such as selectional restrictions or agreement conditions. This is necessarily complex and clearly the simpler theory in which distribution is determined entirely by category cannot work. Yet the

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question is begged whether there is another simpler theory that might work. Can distribution be accounted for in terms of co-occurrence restrictions without recourse to the notion of category? By and large, this question remains unexplored, though there are some approaches have attempted to do without the notion of syntactic category, most notably Distributed Morphology (Halle and Marantz 1993, Harley and Noyer 1999). If it is possible to jettison the notion of category and still account for distribution without the introduction of notions not already required, clearly this is to be preferred.

2 The Theory of Categories

A restrictive theory of categories, in fact the only one that I am aware of, coming out of early work by Chomsky (Chomsky 1965, 1970) and developed elsewhere (e.g. Jackendoff 1977, Abney 1987), assumes that syntactic categories are defined as a combination of a limited set of syntactic features, such as [±N], [±V], etc. The restrictiveness of this approach not only concerns the possible number of categories that it predicts, but also the predicted relationships that hold between the defined categories. Thus adding another binary feature [±*f*] not only doubles the number of possible categories, but it also states that all [+*f*] categories will share some property in common, related to this feature, and that all [-*f*] categories will be united (at least) by not demonstrating this property.

Recent ideas in generative grammar, however, have made this theory untenable as they require the addition of a great number of categories, all of which have very little to do with each other. Heads such as Neg, Foc, Top, etc. seem to belong to categories of their own (or at least to categories with a very small number of members) which, apart from their functional nature, are unrelated to other heads[2].

Because of this, attempts to work within a restrictive theory of category are currently few and far between. Newson et al. (2006) presents such an attempt in which various functional heads are analysed as belonging to a limited number of categories, such as light verb, light inflection, etc., defined in terms of categorial features. However under these assumptions elements of

[2] Bartos Huba (p.c.) points out that this is not a strong criticism if it is the case that such functional heads are not taken to be actual lexical elements themselves, but positions filled by head movement or freely inserted features. However, this is not the position taken by everyone and indeed one of the common motivations for the assumption of such head positions is to point out the existence of some language or other which lexicalises them with some independent morphological element (see Behelli and Stowell 1996 for an example of such a justification). Moreover, as Bartos himself admits, not all functional heads can be treated as non-lexical, negation being an obvious example. Even if these are relatively few in number, they pose problems for a restrictive theory of category.

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similar categories are hierarchically ordered in ways which reflects their linear ordering, though nothing in the theory predicts this and indeed, as most functional elements share the same category, it would be impossible to account for the distributional facts in terms of syntactic category. Ultimately, then, the notion of syntactic category plays very little role in the syntax of these elements indicating that we might as well abandon it as far as they are concerned. But if such elements do not need syntactic categories, it becomes an even more attractive idea that we drop the notion entirely and have distribution of all elements determined on non-categorial grounds.

In the next section, we will lay the foundations of such a theory.

3 A Categoryless Theory of Distribution

There are a number of current theories which have also abandoned the notion of syntactic category. For example, Distributed Morphology (Halle and Marantz 1993) has argued against the standard idea of a lexicon, distributing the morphological processes commonly thought to operate in it to various other places in the syntactic system. Consequently, the idiosyncratic information said to be stored in the lexicon also has to be distributed elsewhere or abandoned altogether. For example, phonological forms traditionally associated with lexical elements are stored in a language specific vocabulary which links forms with bundles of features, the idea being that the syntactic system manipulates the features and the forms are inserted late in the process, after the grammatical feature arrangements have been determined. Idiosyncratic semantic information, on the other hand, is stored in the encyclopaedia, part of the semantic component. The categorial aspects of the lexicon, being neither phonological nor semantic, are not stored in the vocabulary or the encyclopaedia, and as there is nowhere else to put this information, the theory runs on the assumption that it is not necessary.

The approach I will outline here is similar in a number of ways, but differs in two important respects. First, the approach is linear rather than structural, based on the framework of Alignment Syntax in which elements compete for ideal positions defined in terms of linear order and adjacency to each other. The second difference is that whereas Distributed Morphology inserts vocabulary items into designated 'word' positions defined structurally, because of the lack of structure in an Alignment system, there are no pre-defined word positions prior to vocabulary insertion: it is the insertion of vocabulary items themselves which gives rise to the appearance that there are 'word positions'.

3.1 Background Assumptions

Alignment Syntax is an optimality theoretic approach to syntax in which constraints are limited to faithfulness, specifically parse, and alignment families. The alignment constraints align targets to hosts, taken from the input, in terms of ordering and adjacency. Thus for any target *t* and host *h* there can be three alignment conditions:

(4)

*t*P*h*	target precedes host
*t*F*h*	target follows host
*t*A*h*	target is adjacent to host

The ranking of the constraints for any target and host will determine the optimal positioning of the two relative to each other. Obviously, if *t*P*h* out ranks *t*F*h*, the target will optimally precede the host, though not necessarily adjacently. Adjacency is satisfied regardless of order and thus if this is highly ranked, the target will prefer to be as close to the host as possible, either preceding it or following it depending on the alignment conditions of other elements. If the dominant ordering constraint out ranks the adjacency constraint, competing elements will remain on their preferred side, but losers will be positioned at a greater distance from it.

This gives rise to two basic patterns of distribution: *elbowing*, in which a target prefers to remain on one side of the host no matter how many other elements intercede between them and *side swapping* in which a target will appear on whichever side of the host it can get nearest to it. Elbowing follows from a high ranking of the ordering constraints (*t*P*h* and *t*F*h*) and side swapping follows from the high ranking of the adjacency constraint.

An example of elbowing is the case of non-subject dependents on verbs in English, where dependents all want to follow the verb but some are elbowed to further positions by others:

(5)

a the letter was posted on Monday
b I posted the letter on Monday (*on Monday the letter)
c I posted the company the letter on Monday
(*the letter the company)

Prepositional modifiers follow the verbs they modify, but are elbowed by direct objects, which in turn are elbowed by indirect objects. All dependents however stay following the verb indicating that it is more important to maintain order than adjacency.

An example of side swapping can be seen in the behaviour of the Hungarian preverb which, as its name suggests, prefers a position in front of the verb. However it is in competition for this position with a number of elements including the negative marker and foci. When any of these appear, the preverb swaps sides and appears following the verb, preferably adjacent to it:

(6) a elment János
prev-go-past János
"János left"
b nem ment el János (*nem elment/el nem ment)
not go-past prev János
"János didn't leave"
c JÁNOS ment el (*JÁNOS elment/el JÁNOS ment)
"it was János who left"

These data suggest that it is more important for the preverb to obey the adjacency condition than the dominant ordering one.

Targets and hosts may be single input elements or sets of input elements, termed domains. Domains are defined over sets of input elements which share a given property. For example, all the input elements related to a root predicate may be a domain to which member and non-member elements are aligned. Ordering with respect to a domain means preceding and following every element of the domain (i.e. being first or last in the domain – see Gáspár (2005) for the origins of domains in Alignment Syntax). Adjacency to a domain generally requires a target to avoid being surrounded by the domain and hence it will appear at the edges of the domain (Newson and Maunula 2006).

The notion of domains was introduced to capture fronting phenomena which was difficult to account for in terms of individual alignments. While it is in principle possible to describe the fronting of an element through the assumption that its adjacency requirement to a given host is lower ranked than other elements competing for the position in front of the host, and hence it is elbowed to the front of all its competitors, certain phenomena resist this analysis and suggest that some elements have a strong requirement to be in front of a set of elements. A fronted wh-element, for example, does not conform to a weak requirement that it be adjacent to a predicate, but strongly requires to front its scope domain, i.e. the set of all elements related to the interrogative head.

Yet there are other phenomena which, although they do not seem to be the result of alignment to a particular host element, cannot be described as a

requirement that they front a set of elements either, for example, second position phenomena. Some second position phenomena may be the result of a requirement that the second position element immediately follow the element in first position. But this is only feasible if the first element is uniformly identified. This is not often the case. German V2 phenomena, for example, has the verb following the subject, the topic or the wh-element, whichever happens to be required to be first. It would miss the generalisation if we required the verb to follow the wh-element or the topic or the subject, in that order of preference, given that this order is already stated for the fronted elements in the ranking of separate constraints (i.e. the requirement that the wh-element be first outranks the requirement that the topic be first, which in turn outranks the requirement that the subject be first). It would be preferable to arrange things so that the verb is required to be second no matter what is required to be first.

We can envisage such second position phenomena as the result of two requirements: that the element precede the relevant domain, but that it not be the first element of that domain. This requires the introduction of an 'anti-alignment' constraint which is violated if an element is placed in a particular position relative to another element or domain. Consider the following constraints:

(7) xPD violated by every member of D which precedes x
x*PD violated if x precedes every member of D

Note that the anti-alignment constraint x*PD is not simply the opposite of xPD, requiring x to follow every member of D. This condition is already captured by the opposite ordering constraint xFD (x follows every member of domain D). Thus anti alignment constraints do not always redundantly impose the same requirements as other existent constraints[3]. Consider now the ranking

[3] Ordering constraints concerning individual elements may be different. x*Py seems to impose the same requirement as does xFy as both are violated if x precedes y. However, there is no other constraint with the same effect as an anit-adjacency constraint, x*Ay, requiring that x not be adjacent to y, and so it makes sense to extend the notion of anti-alignment constraints to this case. We therefore have the following classification of alignments:

of these two constraints with respect to each other. Suppose the domain consists of three members a, b and c, which are ordered abc by independent constraints:

(8)

		xPD	x*PD
☞	xabc		*
	axbc	*	
	abxc	**	
	abcx	***	

With the precedence constraint out ranking the anti precedence constraint, it is clearly better for the element x to precede the whole domain D and hence we have a fronting effect in this case. Now consider what happens if the rank order is reversed:

(9)

		x*PD	xPD
	xabc	*	
☞	axbc		*
	abxc		**
	abcx		***

The previous winning candidate is now ruled out and so x does not come first. However the lower ranked precedence constraint still has relevance and it prefers x to be as near to the front of the domain as possible. Thus, ranking the anti-precedence constraint above the precedence constraint gives us the required second position phenomenon we are seeking[4].

alignments	anti-alignments
xPy: x precedes y	(redundant)
xFy: x follows y	(redundant)
xAy: x is adjacent to y	x*Ay: x is not adjacent to y
xPD: x precedes domain D	x*PD: x does not precede domain D
xFD: x follows domain D	x*FD: x does not follow domain D
xAD: x is adjacent to domain D	x*AD: x is not adjacent to domain D

[4] The relevant ranking of the subsequence constraint and the anti-subsequence constraint will give rise to 'second to last' phenomena. We will see later that such phenomena may exist, though the details are more obscure.

3.2 Input

In general Optimality Theory it is usually assumed that linguistic variation is accounted for solely in terms of constraint ranking and that the same set of candidate structures compete for optimality in every language (the richness of the base hypothesis, Prince and Smolensky 1993). This is not easy to reconcile with standard views of the lexicon and the idea that input elements are selected from the lexicon. If the lexicon contains idiosyncratic information and such idiosyncratic elements form the input for each competition, competitions will vary to the extent that lexicons vary.

The assumption that there is no lexicon provides another view of the input which enables a more straightforward take on the richness of the base hypothesis. The input rather than being made up of lexical items is instead constructed from more abstract elements: the 'conceptual units' (CUs) which are combined by the grammatical system and then spelled out by vocabulary items. At this more abstract level, all languages can be viewed as equivalent as it seems reasonable to assume that the set of abstract CUs is universal[5].

Languages will differ in terms of the syntactic organisation of CUs, though of course they will also differ with respect to their vocabulary items. This difference, coming at the end of the syntactic process, is not so invasive as a supposed lexical difference which imposes conditions on the input itself and therefore on the subsequent syntactic processes and eventual selection of the optimal syntactic arrangement. Indeed, from this perspective the syntax has a certain amount of influence on the existent vocabulary, as CUs which are never placed in proximation in a language will not be spelled out as a single vocabulary item and hence there will be no such item in that language. Given another syntactic arrangement where the CUs are more proximate, there may well exist a vocabulary item to spell out this combination. For example, if a possessive feature is placed in the vicinity of a tense element, this may be spelled out as a single 'verb' and the language will have a possessive verb. If the possessive feature is not placed local to the tense, the two cannot be spelled out together as a single item and the language will fail to have a possessive verb, but will express possession somehow else. For example, in

[5] Bartos Huba asks about colour term variation in languages. However the absence of a one to one relationship between vocabulary items and CUs is no indication that the CUs are not universal. I seriously doubt the notion that a speaker of a language which has fewer basic colour terms lacks the conceptual elements of a speaker of a language with more of them. If this were true, I, as a native speaker of English would presumably have difficulty in comprehending the difference between Hungarian *piros* and *vörös* (corresponding to English *red*). I do not. Obviously languages differ in terms of the set of vocabulary items they have for spelling out CUs. This variation does not however demonstrate variation at the conceptual level.

Hungarian the possessive construction involves a dummy verb expressing the tense and a possessive marker on the possessed item:

(10) van egy kocsim
is a car-1s.
"I have a car"

In English the arrangement seems to be |tense|+|possessive|+|possessed| and the possessive verb spells out the first two features. In Hungarian the arrangement is |tense|+|possessed|+|possessive| and the verb is the spell out of the first feature only, the possessive being expressed as part of the possessed.

If we envisage the input as taken from the universal set of CUs a question is raised concerning what the syntactic constraints actually refer to. Obviously there would be far too many constraints if they are in a one-to-one correspondence with individual CUs. But with no lexicon and subsequently no syntactic categories, the question is: what of a more general nature can constraints refer to?

Following Distributed Morphology, we can recognise two basic types of CU: those which represent descriptive semantic content, or *roots*, and those which carry more functional content (Harley and Noyer 1999). The first group is a large but syntactically fairly homogenous set. I will assume that this set is extendable via combination of a basic set of CUs and, indeed, that most root CUs are made up of such combinations. Thus roots may be more or less complex depending on how many basic CUs are involved. In this paper I will not be concerned with these combinations and will treat roots as single elements. However, the idea that some roots are simpler than others will play a role in the process of vocabulary insertion, especially in cases where a 'dummy' is required.

Depending on where they are positioned in an expression, root CUs make up what are traditionally called nouns, verbs and adjectives. The amount of overlap between these categories shows that the same root can be positioned in a number of places (how it gets realised in terms of a vocabulary item is obviously influenced by its relative position to other elements). We can therefore envisage a range of constraints that align roots to certain functional elements to define their basic positions. A root aligned to a determiner will be realised as a 'noun' and one aligned to tense will be realised as a 'verb', though these category labels play no role in the syntactic system and are purely epiphenomenal[6].

[6] There may be some roots that do not combine with certain functional elements, for example it is hard to think of what the combination of tense and the root *disc* would

The second set of CUs is smaller in number and much more syntactically heterogeneous. These relate to what in Distributed Morphology are termed *f-morphemes* (Harley and Noyer 1998) or functional elements in other frameworks. As Borer (1984) pointed out, it is these elements which syntactically define linguistic systems in that they are the locus of syntactic differences between languages. Moreover, in terms of distribution, functional CUs appear to be more restricted than roots, often having very fixed positions relative to the roots whose nature they determine. It is reasonable therefore to assume that there are constraints governing the distribution of each of these CUs, or in some cases for small groups of them, those relating to tense or number for example[7]. This would account for why these elements are difficult to categorise syntactically as in reality they are treated individually by the syntactic system.

In general we can envisage an input made up of CUs, both root and functional, plus a specification of the semantic relationships between them: which roots are associated with which functional CUs, etc. These features are then manipulated by the general syntactic processor, which merely imposes orderings on them (and, if we consider deletion an option, on all possible subsets of input CUs), and the resulting set of candidate expressions is evaluated by the alignment and faithfulness constraints. The winning candidate is the optimal ordering of the optimal subset of CUs taken from the input.

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produce. But this is a matter for semantic interpretation not for the syntactic system: in so far as it is conceivable to *disc* something, perhaps meaning to turn it into a disc, the combination of this root with a tense is possible and there may be a language which spells it out as a verb. Other languages with no such vocabulary item will spell the combination out in other ways, *to make/turn something into a disc*, for example.

7 Cinque (1999) argues that functional elements are also ordered with respect to each other in a universally fixed hierarchy. He considers two alternative accounts for this: one that the fixed ordering has a purely structural basis with functional phrases hierarchically organised to produce the given ordering and the other that there are abstract ordering principles of a non-structural nature acting in conjunction with the structural conditions. He argues that the first alternative is to be preferred on simplicity grounds. Of course, the third alternative where the ordering is produced by non-structural principles operating without structural conditions was not considered and such a position is just as parsimonious as the one Cinque argues for. Indeed, as Bobaljik (1999) points out, Cinque's strict structural argument gives rise to paradoxical conclusions which lead to unwarranted complexities necessitating a retreat to the less simple alternative unless a more radical position is taken on the nature of structure. It is difficult at present to argue whether a totally structure based approach or a totally non-structure based approach is simpler as complexities arising with the later are yet to be discovered. However, it is clear that Bobajlik's paradox is avoided if we take a non-structural position.

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It is after this optimal ordering has been determined that vocabulary inserting takes place. We will discuss this process in more detail in section 3.4.

3.3 Argument Structure

Without a lexicon, there can be no storage place for differences between predicates in terms of argument structure and hence there are no theta grids or the like. What argument interpretations are compatible with any given root, I take to be a semantic issue which plays no role in the syntax. The issue concerns the status of the oddity of expressions such as *he put*. My claim is that this is not a case of ungrammaticality but of semantic ill formedness (see Huang, Li and Li 2009 for a similar suggestion).

Still, it has to be recognised that there are syntactic phenomena which are based on argument-predicate relationships and these cannot be entirely swept out of the system. In many languages arguments are ordered with respect to the predicate and each other. Moreover, the same predicate may be able to appear with certain arguments in one environment that it cannot in another. As Marantz (1997), drawing from Chomsky (1970), points out, some nominals do not have the same argument structure as their verbal counterparts:

(11) a the enemy destroyed the city
b the city's destruction
c the enemy's destruction of the city

(12) a John grows tomatoes
b the tomatoes' growth
c * John's growth of tomatoes

(13) a John broke the glass
b * the glass' break
c * John's break of the glass

Matantz contends that these facts concern the contexts in which certain syntactic constructions can occur: the objects of roots such as *destroy* can appear in either nominal or verbal contexts, whereas those of roots such as *grow* can only appear in a verbal context. Roots like *break* demonstrate a third category in which neither subject nor object arguments can appear in the nominal context.

Marantz's characterisation of the data, however, is a little odd as it seems that it is not the object of roots like *grow* that is prevented from appearing in nominal contexts but the external argument. While we can have constructions

such as (14a) in which the theme appears in object position, the interpretation of (14b) shows that the allowable argument must be interpreted as the theme and not the causer:

(14) a the growth of the tomatoes
b John's growth

It appears then that it is that which licenses the causer that is banned from nominal contexts.

If the only things there are to syntactically manipulate are the CUs provided in the input, then what is being manipulated in the phenomena discussed above must be CUs. I will assume that there are thematic type functional CUs which license the related arguments, by providing something for arguments to be aligned to and which themselves are aligned with respect to the root[8]. As they are not realised independently in most cases, I assume that they are normally positioned close to the root and therefore get spelled out by the root itself.

There are cases where such elements get separated from the root, however, and hence are spelled out independently. This will provide an account of certain 'light verbs'. For example, the periphrastic causative involving *make* can be seen in these terms:

(15) a … |cause| √BREAK |theme| …
John broke the glass

b … |cause| … |theme| √BREAK
John made the glass break

In (15a), the causative thematic CU licensing the external argument is adjacent to the root and is presumably spelled out by the root vocabulary item (this item being associated with this feature in its vocabulary entry). However, the causative CU in (15b) is separated from the root by the theme and hence it cannot be spelled out along with the root. For this reason, then, it is spelled out

[8] Given the difficulties linguists have faced in discovering a universally accepted list of thematic roles, it is unlikely that the thematic CUs I make use of here are correctly labelled. It may be that a more accurate system can be devised making use of more event based notions, such as proposed by Ramchand (2008). I put the issue aside for now, pending further investigation.

separately and is realised by the vocabulary item *make*. We will discuss the choice of vocabulary item in the next section.

3.4 Vocabulary Insertion

If the output of the syntactic system is a linear string of input CUs lacking any structure, neither syntactic nor morphological, it is obviously a crucial question how vocabulary items are chosen to spell this string out. There are a number of principles involved in this and we will spend some time discussing these here.

In most approaches which assume a late vocabulary spell out of an underlying abstract syntactic representation, an important principle is that vocabulary items are chosen on a 'best fit' basis. What this means is that if there are syntactic features xyz to be spelled out, a vocabulary item associated with the features xyz will be selected, but in the case that there is no such item another will be chosen which is considered to be the closest available. There are a number of possibilities, however, for determining what counts as the closest available vocabulary item in cases where an exact match is not possible.

In Distributed Morphology a vocabulary item can be selected only if the specified features of the vocabulary item is a subset of the bundle to be spelled out and hence the one that is considered the best fit is the one that is associated with the largest subset of features needing to be spelled out. Thus vocabulary items tend to be underspecified for features. However another view is taken by Caha (2007) working within the Nanosyntax framework. Arguing from empirical observations concerning Czech Case paradigms, Caha claims that it is better to assume that vocabulary items can be selected only if they are specified for a superset of features of those to be spelled out, the notion of best fit then being equated with the vocabulary item associated with the smallest superset of features needing to be spelled out. In order to achieve the same results in Distributed Morphology, working with underspecified vocabulary items, additional mechanisms such as Fusion and Fission are required. In Nanosyntax such complexities are not required as the assumption is that vocabulary items can be inserted under non-terminal nodes of a structure and thus cover a more dispersed range of specified terminal features.

In Alignment Syntax, given that there is no organisation of output expressions into structures, it is a natural consequence that vocabulary items will be inserted to cover a range of CUs and there is no need for any extra processes to collect these into one position. Indeed, as there is no constituent structure there can be no such positions properly defined. It is the very process of vocabulary insertion that groups the features into bundles rather than there

being syntactic processes which do this, redundantly, prior to vocabulary insertion. In this sense, the system is more like Nanosyntax than Distributed Morphology, though of course the former is also committed to constituent structure defining possible insertion points for vocabulary items, even if these positions are not necessarily terminal. Therefore, it seems that the conditions are more suitable in the present framework for operating with over-specified vocabulary items.

Indeed, other assumptions within Alignment Syntax also argue in favour of this position. It is assumed that faithfulness violations are restricted to the 'Parse' variety, in which input elements are not visible in the output. Thus there is no syntactic 'insertion' process, including elements in the output which were not present in the input. Yet there are many syntactic phenomena which give the appearance of insertion, the use of pleonastic elements being the most obvious. We can handle pleonastics without assuming Fill violations if we account for the phenomenon at the point of vocabulary insertion[9]. The idea is based on Grimshaw's (1997) analysis of *do*-insertion. In this, the inserted word *do* is not considered to be a dummy auxiliary: a lexically specified semantically empty verb. Instead the fully meaningful verb is selected for insertion, and its semantic content is simply ignored. This accounts for the fact that pleonastic elements are always identical to meaningful words in a language. If there really were semantically empty lexical items one would have to wonder why they do not have completely different forms to other lexical items.

Adopting these ideas, we can achieve the effect of insertion through the selection of vocabulary items which are specified for a greater number of features than they are used to spell out. Of course, the principle of 'best fit' governing the selection of vocabulary items will always mitigate in favour of 'least insertion', i.e. the selection of the vocabulary item which has the fewest number of extraneous specified features. Thus, this will limit 'insertion' to those cases where there exists no vocabulary item to spell out the exact set of CUs required to be. For example, if certain functional CUs need to be spelled out independently of a root as they are not contiguous with it, but the only vocabulary items associated with those CUs are also associated with roots, then one of the root vocabulary items must be selected and its root content be treated as over-specified. This provides some account of which vocabulary items tend to be used for pleonastic purposes, along similar lines to

[9] In OT, faithfulness constraints sanction differences between inputs and outputs. These differences can come in two types: input elements are missing from the output and output elements are not present in the input. The first violates a constraint known as Parse, which is therefore like a constraint against deletion. The second violates the Fill constraint, a constraint against insertion.

The Even Yearbook 9 (2010), Department of English Linguistics, Eötvös Loránd University, Budapest
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Grimshaw's original account. According to Grimshaw, it is no accident that the dummy auxiliary is *do* as this is one of the most conceptually simple verbs – in our terms, made up of the fewest number of basic root CUs – and hence it is the best fitting item to spell out pure functional CUs such as tense. We will develop these ideas in section 4 when we discuss the treatment of other auxiliary verbs.

Another reasonable principle governing vocabulary insertion to assume is that vocabulary items are selected to cover the maximum number of CUs in the output expression as possible. Thus if it is possible to spell out features *xyz* as a single vocabulary item it will be spelled out by this item, rather than selecting one to spell out *xy* and another for *z*. In other words, there is an economy condition on vocabulary selection: don't use two vocabulary items when one will do! Again this argues for a superset approach to vocabulary insertion. If it were possible to ignore the features constituting the output expression, as the subset approach advocates, the most economic spell out would be to say nothing! However, if it is the features of the vocabulary items which can be ignored and not those of the output expression, economy urges the use of the fewest vocabulary items to spell out *all* of the syntactic features[10].

Clearly morphological fusion, in which a vocabulary item is associated with a number of CUs, is more economical in these terms and hence should be preferred over isolation, where vocabulary items are more in a one-to-one relationship with CUs. We might wonder therefore why there are isolating languages at all and indeed why all languages are not maximally agglutinating. The answer is that there is a play off between economy and efficiency. The more fusion there is, the more vocabulary items there must be, as each root will need to be associated with a number of phonological forms depending on which functional CUs it is fused with. More vocabulary items clearly make the process of choosing the best fit in any one case more complex and the system will be less efficient. Thus economy and efficiency pull in opposite directions and individual languages find their own equilibriums in this tug of war. Some tend towards economy at the expense of efficiency while others opt for efficiency over economy. There seems to be no single most satisfactory solution and hence languages vary on they one they settle on. I do not think

[10] Bartos Huba raises the question of whether the vocabulary insertion process may not be seen in OT terms, given that it involves a competition between candidate vocabulary items and a process determining the best one. This is possible and indeed I have pursued the idea for the choice of vocabulary insertion in the context of English modals (Newson 2008). The assumptions I made in that paper however differ slightly from the ones I am making here and it remains to be seen whether the two sets of assumptions can be satisfactorily unified.

The Even Yearbook 9 (2010), Department of English Linguistics, Eötvös Loránd University, Budapest
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that there is any account for why one language opts for one solution, any more than there is an account of why different languages make different choices about the associations made in their vocabularies[11].

A final thing to consider concerning vocabulary insertion is that if the output expression is simply a linearly ordered set of CUs prior to vocabulary insertion, where does vocabulary insertion start? How do we choose which groups of features to spell out with which vocabulary items? One fairly obvious principle in operation here, without which there would be little point in linear ordering and hence no possible account of syntactic phenomena, is that only contiguous CUs can be spelled out as a single vocabulary item. If it were possible to spell out non-contiguous CUs as a single vocabulary item, they might just as well be placed in any order prior to vocabulary insertion. We would then need extra mechanisms to place the vocabulary items in the grammatical order and hence we would undermine the very idea of late lexical insertion.

Even with this assumption, though, it still remains to be made more precise how we select which CUs to be spelled out by which vocabulary item. Supposing we have a string of features *abcd*. Do we start at the front and look to find vocabulary items to spell out *a* or *ab* or *abc*? Or do we start at the end to search for vocabulary items to spell out *d* or *cd* or *bcd*? Obviously different strategies will produce different results. If one looks at the issue from a purely phonetic point of view, it might be natural to assume that vocabulary insertion should follow a left to right pattern, reflecting the order of the phonetic exponents[12]. However, syntax is as connected to semantics as it is to phonetics, traditionally being conceived of as a bridge between the two. From a semantic point of view it perhaps makes more sense for vocabulary insertion to be root based, highlighting the semantic centrality of roots. Such a strategy would start with the roots and look to find the largest number of contiguous features around them to be spelled out by a vocabulary item. Any remaining functional CUs will then have to be spelled out separately by other vocabulary items. The evidence presented below appears to support the assumption of the root based strategy, the reason for which is, I think, not difficult to comprehend. Syntactic alignments affect those elements which are related in the input and input relationships reflect semantic relationships. Thus the tendency is to cluster semantically related elements together in the linear output. A purely linear strategy of vocabulary items would add a degree of chance to whether semantically and syntactically related elements get spelled out on different and otherwise unrelated vocabulary items. We will see that

[11] Thanks to Szécsényi Krisztina for pointing out the need for this discussion.
[12] Thanks to Bartos Huba for bringing this point of view to my attention.

semantically and syntactically related elements do indeed get spelled out on different vocabulary items on occasions, but it is rare that an element that is semantically related to one root, and therefore positioned in terms of an alignment to that root, gets spelled out with a separate root which just happens to be near by. Far more common is the situation in which related elements get spelled out by a single lexical item or if that is not possible, one of them is spelled out by an independent vocabulary item of its own, reflecting the linear placement of that element with respect to its related elements. Semantic encoding is therefore more straightforwardly represented, an obvious advantage.

Now that we have set all of the parts of the theory in place, it is time to demonstrate how it works on a few example analyses. My intention is not to be comprehensive here, dealing with a broad range of issues and showing how ideas already captured in other frameworks can be rendered in this one. Instead I will content myself with a more random approach, following leads which appear interesting or which challenge the system. The approach is therefore exploratory rather than expository.

4 Some Example Analyses

I will start this section by looking at the organisation of the thematic CUs, using English as a test case. After this we will turn to an account of tense and aspect and its interaction with the thematic CUs.

4.1 The event domain

Most of the time, thematic CUs are spelled out, along with others, by the root vocabulary item. Thus their positioning cannot be directly observed. However, under the assumption that the arguments they licence are aligned with respect to them, the positioning of the arguments gives indirect information about how the CUs are ordered[13].

One of the basic observations concerning the arrangement of arguments in English is that, in normal circumstances, the root precedes all but one of them. The 'external argument' precedes the root. But, although it is possible to predict which argument will be external, given a set of them, the mapping between arguments and grammatical function is not a simple one-to-one type.

[13] The question of learnability is raised at this point, given that what must be acquired is only indirectly represented in the data available to the learner. To address this issue properly however, more work would need to be done concerning the amount of language variation in this area. It may be that there are certain universal aspects to the system that can therefore be assumed not to be acquired. Any variation, however, must be assumed to open options up in the system and these are loci for learning.

For example, the theme is a typical post root argument, but when it is the only argument it will appear in the pre root position.

There are two aspects to this distribution pattern. One concerns the arguments' order with respect to each other, something which is often discussed in terms of a thematic hierarchy, but from our point of view will be represented as a linear ordering imposed on the thematic CUs. The other concerns the root's position with respect to the set of arguments.

Abstracting away from the details of the arguments for the time being, we can represent the position of the root in the following way:

(16) a arg √
b arg √ arg
c arg √ arg arg

Clearly in the domain made up of thematic CUs related to a particular root, let us call it the event domain (D_e), the root is in second position. We have seen how second position phenomena is achieved by ranking the anti-precedence constraint above the precedence constraint (which itself dominates the subsequence constraint, so that the main ordering principle is precedence, but not of the whole domain).

Thus we can propose the following constraints:

(17) √*PD_e: violated if the root precedes every member of the event domain
√PD_e: violated by every member of the event domain that precedes the root

The following simple tables show how the root is positioned with respect to its arguments in the cases in (16):

(18)

		√*PD_e	√PD_e
	√ arg	*!	
☞	arg √		*

(19)

		√*PD_e	√PD_e
	√ arg arg	*!	
☞	arg √ arg		*
	arg arg √		**!

ISSN 2061–490X, http://seas3.elte.hu/delg/publications/even,

(20)

		√*PD$_e$	√PD$_e$
	√ arg arg arg	*!	
☞	arg √ arg arg		*
	arg arg √ arg		**!
	arg arg arg √		***!

The tables speak for themselves and do not need further comment.

The ordering of the thematic CUs themselves can be handled by a ranking of precedence constraints. I will assume that the basic order of arguments is essentially that proposed by Grimshaw (1990) (agent > goal > theme) and rank the following constraints accordingly:

(21) |agent|PD$_e$: violated by every member of the event domain which precedes the agent

|goal|PD$_e$: violated by every member of the event domain which precedes the goal

|theme|PD$_e$: violated by every member of the event domain which precedes the theme

As the thematic CUs generally group round the root, I will also assume a set of root adjacency constraints which will not be discussed here, but will be relevant to the analysis of the interaction of the tense and aspect CUs with respect to the event domain.

The table demonstrating this system in full is rather long, and becomes even longer the more input CUs are involved. But if we concentrate on those possible orderings in which the root is in second position, which we have already demonstrated, we can cut this down substantially:

(22)

		√*PD$_e$	√PD$_e$	|agent|PD$_e$	|goal|PD$_e$	|theme|PD$_e$
☞	|ag| √ |go| |thm|		*		*	**
	|ag| √ |thm| |go|		*		**!	*
	|go| √ |ag| |thm|		*	*!		**
	|go| √ |thm| |ag|		*	**!		*
	|thm| √ |ag| |go|		*	*!	**	
	|thm| √ |go| |ag|		*	**!	*	

In (22) all the possible orders of the arguments are given with the root's position held stable. Any other position for the root would result in one of the two higher ranked constraints being violated to a greater extent than any of the

ones presented here and hence these could not be optimal. As all the given orders perform exactly the same on the two higher constraints, their differentiation depends on the lower ranked thematic precedence constraints. This is straightforward: it is more important for the agent to precede than it is for the goal and it is more important for the goal to precede than it is for the theme. Therefore we achieve the correct order: agent – goal – theme. Note that if the theme is the only argument it will obviously be first in the domain as there will be nothing to precede it. But it will also precede the root as the root is always in second position:

(23)

		√*PD_e	√PD_e	|agent|PD_e	|goal|PD_e	|theme|PD_e
☞	|thm| √		*			
	√ |thm|	*!				

This is essentially the same situation as was demonstrated in (18).

4.2 Word order, grammatical functions and the power of the system

At this point it is necessary to diverge a little to discuss some issues which arise from the proposals above. The first is that this approach attributes no proper role to the notion of grammatical function. Thus from this perspective there is little sense in talking of word order variation in terms of subject, verb and object combinations. Indeed, the approach proposes a completely different view of word order arrangements in natural languages.

Essentially there are two dimensions along which languages may differ from each other in terms of word order, abstracting away from complicating issues such as the positioning of topics, foci, operators, etc. Along one dimension there are at least four possibilities: root first, root second, root last and root second from last. These are produced by the following rankings of the alignments:

(24)

rankings	order
precedence > subsequence and precedence > anti-precedence	√ arg arg …
precedence > subsequence and anti-precedence > precedenct	arg √ arg …
subsequence > precedence and subsequence > anti-subsequence	… arg arg √
subsequence > precedence and anti-subsequence > subsequence	… arg √ arg

If the notion of subject has any reflection in this system it is in those languages in which one argument differs from the others in that it is on the other side of the root, i.e. in root second and root second from last languages. In root first and root last languages there is no positional way of distinguishing between subjects and other arguments. Of course, arguments may differ in terms of their thematic interpretation or their Case forms. But these must be independent considerations and not determined by grammatical function. The same is in fact true of root second and second from last languages and hence the *appearance* of a 'subject' in these languages must be taken to be epiphenomenal.

Despite the epiphenomenal nature of grammatical functions attributed by this approach, it is clear that the predicted word orders correspond to attested languages traditionally described in terms of the order of grammatical functions:

(25)

language type	traditional description
√ arg arg …	VSO or VOS
arg √ arg …	SVO
… arg arg √	SOV or OSV
… arg √ arg	OVS

The second dimension of word order concerns the ordering of the arguments in terms of the thematic alignments. Here things are more complex as it is not entirely clear whether Grimshaw's thematic hierarchy should be taken to be universal. If it is universal, then the OT account given here does not predict this without stipulation that the constraints involved have a fixed ranking. However, although the data are far from clear and there is much more work required to determine the facts let alone their explanation, there are a number of considerations which would argue for assuming that the thematic hierarchy is not universally fixed and hence that the constraints given in (21) are subject to re-ranking.

The first of these concerns the nature of root first and last languages. As discussed, there is no proper way in terms of position to distinguish between grammatical functions in such languages. Yet traditionally a distinction is made between VSO and VOS and between SOV and OSV orders. What is the basis of these distinctions? The issue is complex because details vary from language to language. In Malagasy, for example, a well know case of a VOS language, what is taken as the subject seems to be more topic-like (Pearson 2007), whereas other VOS languages define the subject in terms of its Case form (nominative/absolutive). In as much as there are VOS languages which

define the subject in thematic terms, similarly to English, then the order of thematic elements is not universal. In some languages the agent precedes the theme and in others it follows. The same would be true for root final languages with differing fixed argument orders.

A second, theory internal, consideration concerns languages which demonstrate no preferred argument order. In such languages, while order may be imposed on other grounds, there seems to be no requirement that an argument be ordered with respect to any other because of its thematic interpretation. Hungarian is an obvious example. Note that in these languages, it is not that the argument alignment constraints have a weak effect, demonstrating a relatively low ranking: they have no effect whatsoever. Thus unless we want to entertain the idea that constraints themselves, as well as their ranking, are subject to the learning process, there must be a way that constraints can be nullified without removing them from the system. In Alignment Syntax, this is achieved via violation of the faithfulness constraints. Targets of constraints, being input elements, may be absent from outputs, thus rendering the relevant constraints inapplicable. Obviously, however, there must be a reason why faithfulness violations are tolerated, and in standard OT terms this reason is that it enables the satisfaction of higher ranked constraints. Given the assumptions of Alignment Syntax, the only other constraints we can consider are alignment constraints, and therefore it must be the satisfaction of alignment constraints that sanctions the violation of the faithfulness constraints. The final piece of the puzzle comes from the assumption that alignment constraints come in opposite pairs: precedence and subsequence. Obviously, these impose opposite requirements on the positioning of targets and hence cannot be satisfied simultaneously. Their ranking with respect to each other will therefore determine the surface order of targets and hosts. But if both alignment constraints out rank the faithfulness constraint, the optimal solution will be to omit the target and thereby allow the vacuous satisfaction of both alignments. Given that there are languages with no thematically determined word orders, it follows that in these languages the thematic CUs are underparsed in the optimal string[14]. We conclude that there must exist both precedence and subsequence thematic alignment constraints, e.g. |agent|PD_x AND |agent|FD_x. It follows therefore that the thematic hierarchy in which the agent is first cannot be universal as there exists a constraint which favours a last position for this argument.

Admittedly, this discussion only scratches the surface of relevant matters and more questions are raised than can be hope to be answered in the present

[14] Note that underparsing input elements does not affect the semantic interpretation of the resulting string as this is read off the input not the output.

paper. What I hope to have addressed here however is the question of the viability of the theory in as much as it makes predictions about possible linguistic variation for which there is some support in attested cases.

4.3 Causative

With a number of roots in English there are two causative constructions involving a causative thematic CU. In one of these, this CU is aligned to the root and is spelled out with it and in the other the cause CU is distanced from the root and is spelled out by the light use of *make*:

(26) a he closed the door
b he made the door close

There are a number of interesting syntactic and semantic observations concerning the relationship between pairs such as these. The arrangement of the thematic CUs is of primary concern for us here. When the causative is spelled out with the root, the theme argument, and thus the theme CU, follows the root. But when the causative is spelled out independently of the root, the theme precedes. The preceding theme is unexpected in this case as it seems that this places the root in third, rather than in second position with respect to the event domain.

A reasonable account of these observations can be given if we first consider some of the semantic differences between the examples in (26). While the meanings of these examples are obviously related, they are not identical. (26b) for example, would hardly be an accurate description of a situation in which someone walked up to a door, exerted a little pressure on it's handle so that the door moved towards the closed position. Such a situation is what (26a) describes. The periphrastic causative, on the other hand, would be more appropriate to a situation in which someone carries out an action not involving the door at all, say for example opening the window, but that the result of this action is that the door comes to be closed. Thus it seems that there are two levels of causation here: one which directly involves the argument that undergoes the result and one which does not.

Suppose these involve distinct CUs, a direct causative ($|\text{cause}_d|$) and an indirect causative ($|\text{cause}_i|$). The fact that these would be independently positioned by their own alignment conditions does not help us very much at this point as it is the root's alignment with respect to the event domain that is the problem. However, the identification of these distinct CUs does allow us to hone the definition of the event domain more precisely. Suppose we define the event domain to be the set of thematic CUs directly related to the event

described by the root, and as such it will exclude the indirect causative. We can then define an 'extended event domain' to include the indirectly related thematic CUs as well.

With these notions in place, we can see that the root is positioned in the second position in the event domain, but not the extended event domain. When there is an indirect causative, assuming this to be ordered in front of the other elements of the extended event domain, the root will effectively ignore this CU and appear behind the first direct thematic CU. In the following tables, the distinction between indirect and direct CUs is indicated by subscripts and the members of the event domain are in bold:

(27)

		$\surd$*PD_e	$\surd PD_e$
	$\surd$ **arg_d arg_d**	*!	
☞	**arg_d** $\surd$ **arg_d**		*
	arg_d arg_d $\surd$		**!

(28)

		$\surd$*PD_e	$\surd PD_e$
	$\surd$ arg_i **arg_d**	*!	
	arg_i $\surd$ **arg_d**	*!	
☞	arg_i **arg_d** $\surd$		*

(27) may represent a case of a direct causative as in (26a). The actual arguments appear surrounding this string, being aligned to their licensing CUs and hence the root can spell out the whole string as represented in (15a). (28), on the other hand, represents a case of the indirect causative, with the theme CU positioned in front of the root. The theme argument itself is positioned in front of its licensing CU, interceding between the causative CU and the root. Thus the causative CU cannot be spelled out as part of the root as the two are not contiguous. In this case, apparently the root *make* is the best fit vocabulary item.

The selection of *make* as the vocabulary replacement of the causative CU is a complex issue. We can gain some understanding of the process if we consider some possible alternatives to *make*. First, as what needs to be spelled out in this case is not a full root meaning, consider the possibility of using very 'light' verbs such as *be* or *do*. These are out, however, by the fact that they are too light and their root content does not include any aspect of causation. Given that the best fitting vocabulary item is over-specified rather than underspecified, this means that minimal content roots will not be used to express causation. Therefore we are looking for roots which have causation as part of their content. *Make* certainly has this, assuming its meaning in 'to

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make something' is the one that it is associated with in the vocabulary. But there are many other vocabulary items which are also associated with causation. Most of these however, such as *create*, *kill* and as we have seen *close*, are too over-specified. Both *kill* and *close* are causatives that are specified for a particular and fairly complex result (to become dead and to become closed, respectively) whereas *make* is a causative where the result is simply the existence of something. *Create* is similar to *make* in this respect, but is also associated with other meanings to do with aesthetics and the like. Of course, there are other causative roots which are used to express causation in much the same way as *make* is, such as *have* and *let*. But these are used to spell out specific meanings, differing in terms of the amount of force needed to bring about the caused resultant state. Presumably then, these aspects of meaning are associated with these vocabulary items to allow a specific choice in a specific context.

Stating the conditions for the correct vocabulary insertion in these cases is clearly a complex task and I will not attempt to go further into the issue here. I trust that a better understanding of the conceptual make up of roots will enable us to say more in the future.

4.4 Tense and Aspect

Outside of the event domain and often more remote from the root we have elements expressing verb related meanings such as tense, aspect and modality. In English there is a varied system with elements of tense and aspect either being expressed as a morpheme attached to the root, or as a vocabulary item separate from the root, traditionally termed an auxiliary.

The English system of tense and aspect is very regular and thus easy to describe, though it is deceptively difficult to explain. We can get some idea of this complexity by considering the first generative account of the phenomena: 'affix hopping' (Chomsky 1957). In this it is assumed that the elements of aspect are inserted into a structure as an auxiliary accompanied by a suffix. Tense is inserted only as a suffix. These elements are inserted into the structure in the following order:

(29) -tense (have+-en) (be+-ing) V

After the elements have been inserted a transformation moves each affix backwards onto the following verb/auxiliary and thus we end up with:

(30) have-tense be-en V-ing (e.g. had been drinking)

This very neatly captures the regular surface order of the elements involved, but the difficulty is in understanding the two parts of the aspectual elements. In Chomsky's original system, these were inserted as a single element, but then are treated as independent elements by the transformation. After the introduction of the lexicon into the grammatical system, this became particularly problematic as it is unclear whether we are supposed to take the associated auxiliary and suffix to be one or two items. If it is one item, then how is it possible that the transformation can split it and if it is two items, why do they seem to express a single meaning and how do they get inserted together?

A reasonable response to these questions is to assume that one of the two elements is the central meaningful item while the other is a pleonastic element inserted for grammatical purposes. At first sight it might seem obvious that if this is so, then it is the auxiliary which is meaningful and the morpheme is merely a grammatical reflex. However, Newson et al. (2006) present arguments to suggest exactly the opposite. The grammatical motivation for the auxiliaries are similar to those that force the use of the 'dummy' auxiliary *do*. It is commonly held that this auxiliary is inserted to bear a bound morpheme which, for one reason or another, cannot attach to the main verb, for example in the presence of negation:

(31)	a	-ed smile	→	smile-ed	
	b	-ed not smile	↛	* not smile-ed	
			→	do-ed not smile	(did not smile)

Pretty much the same analysis can be given for the other auxiliaries, though in these cases the stray morpheme is the result of English being unable to attach more than one such morpheme to the root:

(32)	a	-ed –en smile	→	have-ed smile-en	(had smiled)
	b	-ed –ing smile	→	be-ed smile-ing	(was smiling)

One argument in favour of this analysis is the fact that when there is no stray tense morpheme to bind, the auxiliary is not inserted, even though the aspectual morpheme is present expressing the relevant meaning:

(33)	a	I saw [him smiling]	= is smiling
	b	[him mown the lawn], you must be joking!	= has mown

For the present analysis, I will adopt the assumption that all auxiliaries are 'dummy' elements in exactly the same way as *do* is standardly treated.

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ISSN 2061–490X, http://seas3.elte.hu/delg/publications/even,

For a concrete proposal, let us assume the following CUs as relevant for the analysis: |tense|, |perfect| and |progressive|.

4.4.1 Vocabulary Insertion and Bound Morphemes

Obviously, where a tense and aspect CU are spelled out determines how they are spelled out. When following the root they are all spelled out as a bound morpheme, though irregular root forms often block the regular morpheme:

(34) a smile –ed *run –ed ran

√ |past| √ |past| √ |past|

b see –en *read –en read

√ |perfect| √ |perfect| √ |perfect|

Accounting for the irregular forms is straightforward. Given that vocabulary insertion is economical, if there is a vocabulary item listed that covers the root and a contiguous tense or aspect CU this will be preferred to spelling out the root and the functional CUs separately. Thus irregular listed forms block regular morphology on economic grounds. To give a brief example, suppose the following vocabulary entries:

(35) |past| ↔ /d/
√FILL ↔ /fil/
√RUN ↔ /run/
√RUN |past| ↔ /ran/

If the output of the syntax provides us with a root √FILL followed by |past|, given that every output CU must be spelled out, both will need to be replaced by some vocabulary realisation. As there is no vocabulary item to spell both out together, they will be spelled out separately and /fil/+/d/ will be the result. If the output provides us with √RUN followed by |past|, however, these two can be realised by one element, /ran/, and as this is more economical than spelling out the two CUs separately the irregular form will be chosen.

This does not address the status of the tense and aspectual CUs as bound morphemes, however, and the vocabulary entry in (35) treats the tense morpheme as no different from the roots. I will suggest here that bound morphemes are marked in the vocabulary with an abstract CU symbol, forming part of their realisation. Thus, the very insertion of these vocabulary items produces further CUs that need spelling out and so a second round of

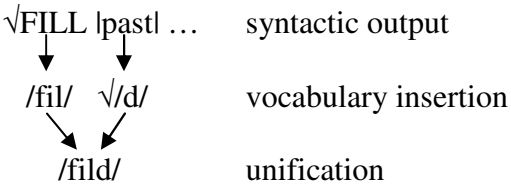
spell out is initiated. However, if there already exists an element which could possibly spell out the extra symbol, no further insertion is necessary as this will unify with the abstract symbol[15].

For example, the past tense morpheme is stipulated to attach to a root. Thus its vocabulary entry is as follows, with an abstract root symbol as part of its realisation:

(36) |past| ↔ √/d/

Suppose the output consists of a root for which there is no irregular past tense form followed by the past tense CU. Both CUs will be spelled out independently, but the abstract root symbol on the past tense will trigger a process of unification with the preceding root and they will become one phonological unit:

(37)



We will need this unification process to account for the dummy auxiliary insertion in the next section.

4.4.2 Vocabulary Insertion and Dummy Auxiliaries

So far we have accounted for the spell out of the tense and aspect CUs in the post root position. In the pre-root position things are different as in these cases auxiliary verbs are also inserted. However, it would be inaccurate to say that the pre-root spell out of these morphemes is completely unconnected to the post root spell out, as in a number of cases the regular post root morpheme appears alongside the inserted auxiliary:

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[15] Bartos Huba objects that this complicates the vocabulary, making it something more than just a semantic-phonetic pairing. This is true, but clearly the distinction between bound and free morphemes must be made somewhere. This is easily done in a system involving structure, but if this is the only advantage of a structural system over a linear one, this is not a forceful argument against the present proposal. The other way to avoid this complication within the present system would be to list bound morphemes along with their roots in the vocabulary. But this would result in massive redundancy and the inability to account for the difference between regular and irregular morphology.

(38) |perfect| √ |progressive| → /bee**n/** √/ing/
|progressive| √ |passive| → /be**ing/** √/n/

For this reason, I claim that exactly the same vocabulary item is inserted into the pre-root position as into the post root position, thus avoiding the redundancy noted in footnote 15. However, the consequences of this insertion are very different depending on the context. When the vocabulary item is inserted into the post root position, the root is able to unify with the abstract root symbol which is part of the vocabulary entry for the functional CU. When the root follows, this unification is not possible and it is the need to spell this abstract symbol out which triggers the insertion of the dummy auxiliaries:

(39)

… |progressive| √FILL |passive|…	output
↓ ↘ ↓	
√/ing/ /fild/	vocabulary insertion
↓ ↓	
/being/ /fild/	dummy insertion

The central claim is that *have*, *be* and *do* are all vocabulary items selected to spell out the abstract root symbol of the tense and aspect vocabulary items, with their own root content treated as over-specification. All of these vocabulary items have minimal root content and so it is no surprise that they are used in this way. Of course, it is an important question why a particular vocabulary item is selected in one case and another in another. The choice is clearly not random. Following Newson et al. (2006), I will assume that the choice of vocabulary item is contextually determined and that each item used in this way is associated with information concerning the wider contexts it can be inserted in, extending beyond the particular CUs they actually replace. When they are used to express full root meanings, these contextual stipulations are treated as over specifications, just as their stipulated root content is over specified when they are used as auxiliaries. In other words, these vocabulary items are never used in situations which match perfectly with their vocabulary specifications. However, they are the best fitting choices for a number of spell out requirements and so they are used in these cases.

As to the contexts which determine auxiliary choice, we can see that *have* and *do* are restricted to a particular case while *be* has a more varied use. *Have* is always used with a following perfective, which can either be before or after the root:

(40) a he had seen me
|past| √ |perfect|
b he had been running
|past| |perfect| √ |progressive|

Thus we can propose the following vocabulary entry for *have*:

(41) /hav/ ↔ √HAVE / __ *x* |perfect|
/had/ ↔ √HAVE |past| / __ *x* |perfect|

Here, *x* stands for one or more non-relevant intervening elements, such as the root, which may or may not be present.

The context for the insertion of *do* cannot be taken to be determined by the root, as there are cases when a past tense CU followed by a root is spelled out with *be*:

(42) a he did not run
b he was not fun

Clearly under current assumptions we cannot account for the difference through reference to the category of the root. Thus there must be some other way to distinguish between these cases. I will assume that what distinguishes between these two roots is the presence of event CUs in the first case. Thus the argument is related to the root in (42a) via a thematic CU, but in the case of (42b) the relationship between the root and the subject is simply predication. The context for the insertion of *do* is therefore a following event CU:

(43) /do/ ↔ √DO /__ *x* |CU_e|
/did/ ↔ √DO /__ *x* |CU_e|

Finally, *be* is inserted in a number of contexts: when the following functional CU is |progressive| or |passive| or when there is a bare root with no accompanying event CU, as in (42b). We can treat this as the elsewhere case, inserted when the context does not fit one specified for *have* and *do*. The elsewhere condition applies as a last resort as the notion of best fit strives to meet the maximum amount of vocabulary specification. Therefore if a specified contextual restriction of a vocabulary item matches a syntactic environment, this vocabulary item will be considered better than one with no stipulated contextual restriction.

The last point, which needs some discussion, concerns irregular forms of the auxiliaries. We have seen how irregular forms listed in the vocabulary

block the insertion of the less economical regular forms as irregular forms invariably cover more output CUs than do their regular counterparts. The same conditions must also apply at the stage of dummy insertion. When a bound morpheme is inserted along with its abstract root symbol, this triggers a second round of vocabulary insertion. The choice is then set up whether to insert a dummy into the place of the abstract root symbol, or whether to replace the root symbol and the past morpheme with the irregular past form of the dummy. Economy will prefer the insertion that reduces the number of vocabulary items and so the irregular form will be selected.

4.4.3 Alignment Conditions for Tense and Aspect

Having dealt with vocabulary insertion, we now turn to the syntactic system which determines the ordering of the tense and aspect CUs. These are positioned in a strict order with respect to each other, i.e. |tense| |perfect| |progressive|. We can achieve this, as we did for the thematic CUs, by first defining a domain constituted by them, call it the temporal domain (D_t), and then proposing the following constraints concerning the elements of this domain:

(44)	|tense|PD_t:	violated by every member of the temporal domain that precedes the tense
	|perfect|PD_t:	violated by every member of the temporal domain that precedes the perfect
	|progressive|PD_t:	violated by every member of the temporal domain that precedes the progressive

The ranking of these constraints follows the order they are given in (44).

In the simplest case, the root follows all but the last element of the temporal domain and so at first it looks like a case of 'second to last' phenomena:

(45)	a	√ |tense|
	b	|tense| √ |perfect|
	c	|tense| |perfect| √ |progressive|

However the picture is complicated when we consider the distribution of the temporal elements with respect to light verbs:

(46)	a	he made the glass break	* he make the glass broke
	b	he had made the glass break	* he make the glass had broken

The elements of the temporal domain treat the light verb the same as they treat the root and thus it might be tempting to consider the possibility of treating the causative as a root rather than a light verb. There are reasons to believe that the causative light verb is not a root, however. The issue is related to the standard debate of whether these constructions should be given a mono- or bi-clausal analysis[16]. Under current assumptions, if the causative were to be taken as a separate root, there would be two separate temporal and event domains. But the fact that the elements of these domains are in complementary distribution over the whole construction strongly supports the assumption that there is only one set of domains here. In (46) we can see that the elements of the temporal domain align with respect to the causative light verb and not with the root. However, the passive aligns with the root, but not the light verb[17]:

(47) he made the glass be broken * the glass was made break

It would be difficult to account for this pattern of distribution if we assumed that there are two sets of domains. Assuming there to be just one root, it follows that there is just one event and one temporal domain within which the relevant CUs are distributed according to the alignment conditions.

If we assume that the causative is not a root, but a functional CU forming part of the extended event domain, it follows that the temporal elements are positioned with respect to the elements of the extended event domain, not the root[18]. Given that the root is positioned with respect to the event domain the

[16] There is of course a large body of literature debating this issue, with arguments supporting both positions. While I do not claim to have resolved the issue, the observations I make here clearly support the mono-clausal approach.

[17] There are a number of interesting issues arising from these data. One is the appearance of the auxiliary *be* with the passive root. It is not entirely clear what underlying CU is being spelled out by this vocabulary item. Whatever it is, it is not independently spelled out in the active counterpart. The second point of interest concerns the fact that the passive can be aligned to the causative if the root is marked as infinitive. This is puzzling, but the fact that the root can only be infinitive when the causative is passive indicates that whatever is going on here, it fits the same complementary distribution patterns shown in (46) and (47) and hence it supports the assumption of a single root.

[18] The idea essentially mirrors that of the structural approach in which sentences can be broken up into areas for designated elements of a given meaning. For example, the CP and its associated projections is constructed from elements that play a role in the interpretation of the force of the sentence, while the IP and its associated projections play a role in the temporal interpretation of the sentence. Each area is structurally related to the one below by the notion of inclusion. The idea that the temporal domain is aligned with respect to the event domain is therefore similar to the idea that the vP is included within the IP. Domains, however, are not identical to structures and therefore, although the ideas are

ordering of the root with respect to the temporal domain is therefore indirectly achieved.

To see how this might work, consider some possible basic orders of event and temporal elements:

(48) a temp temp arg arg
b temp arg arg temp
c temp arg temp arg

In (48a) every member of the temporal domain precedes every member of the event domain. Except under special circumstances, such as the in presence of negation, which we will discuss later, this pattern is not grammatical. As one of the temporal elements typically must follow the root, and given that the root will typically follow the first element of the event domain, (48a) cannot be possible under normal circumstances. (48b), on the other hand, might be what we get in cases without the periphrastic causative. Assuming the root to be positioned between the two members of the event domain, the last member of the temporal domain follows this position, as it should:

(49) … had throw –n …
|past| |agent| √ |theme| |perf|

Therefore this is a permissible ordering of the temporal domain with respect to the event domain.

(48c) is what we get with the indirect causative. Here the last member of the temporal domain follows the first member of the extended event domain. The root follows the second member of this domain (i.e. the first member of the event domain proper) and therefore follows the temporal elements entirely:

(50) … had made it break
|past| |cause| |perf| … |theme| √

This is also a permissible ordering, given these particular conditions.

What the two permissible orders have in common and which separates them from the ungrammatical (48a) is that in both at least one member of the

similar, their consequences are not identical and we will see that because domains may overlap and interlock, the order of their elements can be non-continuous without additional processes such as movement.

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extended event domain is surrounded by the members of the temporal domain. Thus it is not the case that every member of the temporal domain precedes every member of the extended event domain. It is also never the case that every member of the extended event domain precedes every member of the temporal domain. This is exactly the conditions imposed by an anti adjacency condition placed on the two domains:

(51) D_{ee}*AD_t: violated if every member of the extended event domain precedes or every member of this domain follows every member of the temporal domain

There are many ways in which the constraint in (51) can be satisfied. Consider the following possibilities:

(52) a temp temp arg arg temp
b temp arg arg temp temp

In (52a), while the event domain is surrounded by the temporal domain, the tendency is for the former to follow the latter, so that only one element of the temporal domain follows and the rest precede. In (52b) the tendency is for the argument domain to precede. Clearly (52a) is the accurate description of the ordering of these elements for English. Hence we can also propose a constraint which favours the general precedence of the temporal domain:

(53) D_tPD_{ee}: violated by every ordered pair <e, t>, where $e \in D_{ee}$ and $t \in D_t$

If this constraint is out ranked by the anti adjacency constraint in (51), we achieve the required ordering:

(54)

		D_{ee}*AD_t	D_tPD_{ee}
	temp temp temp arg arg	*!	
☞	temp temp arg arg temp		**
	temp arg arg temp temp		****!
	arg arg temp temp temp	*!	

In this table, the first and last candidates have the event domain aligned to the temporal domain and hence these are out by the higher ranked constraint. Of the other two candidates, the precedence constraint is violated more every time a member of the temporal domain follows members of the extended event

ISSN 2061–490X, http://seas3.elte.hu/delg/publications/even

domain and hence the number of following temporal elements is kept to a minimum

Note, however, that the constraints actually prefer a situation in which only one member of the event domain is followed by one member of the temporal domain:

(55)

		D_{ee}*AD_t	D_tPD_{ee}
	temp temp arg arg temp		**!
☞	temp temp arg temp arg		*

The winning candidate here is the one associated with the periphrastic causative and so we conclude that there is something else which plays a role in the analysis of expressions which do not involve the indirect causative. We know that the indirect causative CU is itself more separable from the root whereas the other thematic CUs cluster around the root and are never spelled out separately from it. Thus it is possible that it is the requirement that the thematic CUs be adjacent to the root that forces the temporal CU further back, at the expense of further violation of the temporal domain precedence constraint. Presumably there are a number of these adjacency constraints: one each for the relevant thematic CUs. However, to avoid the difficult task of trying to determine their ranking with respect to each other, which appears to have no visible effect on any of the data we are considering here, let the following stand for this set of adjacency constraints and their correct ranking, whatever that may be:

(56) $CU_{d\theta}A\surd$: violated by every element which intercedes between a direct thematic CU and its root

Note that the set of constraints that this stands for does not contain one making reference to the indirect causative CU and so this is unaffected by (56).

In order to achieve the correct order, the constraints represented by (56) must at least out rank the temporal precedence constraint:

(57)

		D_{ee}*AD_t	$CU_{d\theta}A\surd$	D_tPD_{ee}
	temp temp temp arg_{direct} $\surd$ arg_{direct}	*!		
	temp temp arg_{direct} ($\surd$) temp ($\surd$) arg_{direct}		*!	*
☞	temp temp arg_{direct} $\surd$ arg_{direct} temp			**

As the thematic CUs in (57) are direct, the root appears after the first one. One temporal CU must follow at least one thematic CU to satisfy the highest

ranked constraint. However, unless the temporal element is placed after all of the thematic CUs, it will intercede between them and the root, and hence will violate the thematic adjacency constraint.

Next consider the case where the first thematic CU is the indirect causative, with the root following the second thematic CU. Again, one part of the temporal domain must follow some part of the extended event domain to avoid violating the highest constraint. But this time the thematic adjacency constraint is irrelevant for the indirect thematic CU and hence the temporal CU will not be forced further back:

(58)

	D_{ee}*AD_t	$CU_{d\theta}A\surd$	D_tPD_{ee}
temp temp temp $arg_{indirect}$ arg √	*!		
☞ temp temp $arg_{indirect}$ temp arg √			*
temp temp $arg_{indirect}$ arg √ temp			**!

4.4.4 Negation

It is important that we address the data which is more traditionally associated with the insertion of a dummy auxiliary, such as the insertion of *do* in the presence of negation. One of the main facts about this phenomena is that it is only relevant when there are no aspectual CUs present, i.e. when the tense is the only element of the temporal domain. In the presence of aspectual CUs, negation does not appear to have much of an effect:

(59) a had left
|past| √ |perfect|
b had not left
|past| |neg| √ |perfect|

This much is expected, especially if we do not consider the negative CU to be part of either the event or the temporal domains. In this case its presence will not affect the ordering requirements placed on the elements of these domains by the constraints we have considered so far[19]:

[19] The negative is also not a relevant element, similar to the root, for determining the context of insertion for the auxiliaries.

(60)

	|tense|PD_t	|perfect|PD_t	√*PD_e	√PD_e	|theme|PD_e	D_{ee}*AD_t	$CU_{d\theta}$A√	D_tPD_{ee}
|past| |theme| √ |perfect|		*		*				*
|past| |neg| |theme| √ |perfect|		*		*				*

As we can see, the presence of the negation makes no difference to the violation profile of the constraints and given that this is the optimal ordering when the negation is absent, it follows that it will be the optimal ordering when the negation is present. The reason why the presence of the negation has little or no effect on the violation of these constraints is that domain based constraints are calculated in terms of the members of the domains themselves, ignoring elements which are not domain members. Of course, these constraints therefore have little to say about the position of the negative CU. This is something which we must address separately.

Generally speaking, the negative element occupies a position somewhere between the tense and the root:

(61) a * she not had been being watched
b she had not been being watched
c she had been not being watched
d she had been being not watched
e * she had been being watched not

While there are semantic differences between the grammatical sentences with the negative in different positions, for the present purposes what is important is the observation that the negation does not precede the tense nor follow the root. These suggest the following negation specific constraints:

(62) |neg|F|tense|: violated if the negative precedes the tense[20]
|neg|P√: violated if the negative follows the root

[20] This constraint echoes a condition first proposed by Laka (1994) to the effect that negation appear in the scope of tense. In this work, as is standard in structure based approaches, scope is defined in terms of c-command and generally c-command entails precedence. Thus Laka's condition amounts to much the same thing as this constraint in the present system.

Nothing more is needed to provide us with a simple account of *do*-insertion. Recall that at least one element of the temporal domain has to follow the event domain. When the tense is not the only element of the temporal domain, it will never be the tense which follows, as this always precedes every other element in the temporal domain. Because of this, the negative CU will always have a position behind the tense but in front of the root and its alignment requirements can be fully satisfied. However, when the tense is the only element of the temporal domain, it must follow the event domain, and therefore it will follow the root. In this case, the negation cannot possibly be behind the tense and in front of the root and so its constraints will be violated. If the negation's alignment constraints are ranked higher than those which force the temporal element behind the root, the result will be that it will be better to violate the condition on the temporal element than those on the negation and hence the presence of the negation will stop the tense from appearing behind the root. This is shown in the following table:

(63)

	|neg|F|tense|	|neg|P√	D_{ee}*AD_t	$CU_{d\theta}A\surd$	D_tPD_{ee}
☞	|past| |neg| |theme| √			*		
	|neg| |theme| √ |past|	*!				*
	|theme| √ |past| |neg|		*!			*

Given the winning candidate, auxiliary insertion will be forced as the tense CU cannot be realised with the root. As we have seen, in the context of a following event domain element, the relevant choice of auxiliary will be *do* and hence this expression will be spelled out as follows:

(64)

|past| |neg| |theme| √	output
√/d/ /not/ arrive	vocabulary insertion
/did/ /not/ arrive	dummy insertion

4.4.5 Tense and Modality

There is an outstanding issue which at first sight seems to be problematic for the system built in the last sections. As we have said, the constraints require

that one member of the temporal domain follow the event domain to ensure that the two domains are not adjacent. The data shows us that this is true when the only element in the temporal domain is the tense:

(65) a he had flown
|past| |theme|√ |perfect|
b he flew
|theme|√ |past|

However, this is not what the system, as it stands, predicts. The problem is that in the case that the temporal domain contains just one member, the event domain has no choice but to be adjacent to it, either in front of it or behind. Thus the high ranking domain adjacency constraint will be ineffective. It will then fall to the lower ranked temporal precedence constraint to determine the order, and this will prefer the tense to precede the event domain, incorrectly according to fact.

(66)

		D_{ee}*AD_t	$CU_{d\theta}A\surd$	D_tPD_{ee}
☞	|past| |theme| √	*		
	|theme| √ |past|	*		*!

The fact that the lone tense CU follows the root does not fit the pattern of distribution for temporal elements as they clearly under other circumstances prefer to precede the event domain. Thus the observation is puzzling on any account.

There are a number of possible solutions that might be attempted. For example, we might try to fix things with different alignment constraints and different rankings from those proposed above. However, this would be a mistake as in fact the current proposal makes exactly the correct predictions about the order of elements in other cases in which it can be argued that there is just one element of the temporal domain. For example, when there is only modality specified, the modal auxiliary does indeed precede the root, not follow it:

(67) a he may leave
b * he leave may

Moreover, there are cases where the solitary tense does precede the root, such as those concerning emphasis:

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(68) a he DID leave
b * he lefT

The question is: what separates these cases from the one where the tense follows the root? An obvious answer that would require minimal change to the analysis already proposed would be to claim that when the tense follows the root, it is not the only element of the temporal domain present. In this way, the post root tense is analysed in exactly the same way as any other post root member of the temporal domain and hence nothing has to be altered in the analysis. This leaves us with two specific questions to answer: what is the temporal element that accompanies the post root tense and why don't we see it?

There are a number of possible answers to the question of why the suggested element, whatever it is, should be invisible. One would be to make use of a standard notion of an empty category: an element associated with a null pronunciation in the vocabulary. Under this assumption the ordering of the tense element is straightforward, given the current analysis:

(69)

		D_{ee}*AD_t	$CU_{d\theta}A\surd$	D_tPD_{ee}
	Ø |past| |theme| √	*!		
☞	Ø |theme| √ |past|			*

Another possibility would be to assume that the element is invisible because it is never spelled out independently of the root and hence its invisible nature is similar to that of the thematic CUs. This has the advantage over the assumption of an empty category that it makes use of mechanisms independently motivated rather than the somewhat ad hoc assumption of a phonologically null vocabulary item. However, it also involves the assumption that all roots are associated with this CU in the vocabulary so that they can be used to spell it out in all cases. This is perhaps a disadvantage of working with over specified vocabulary items.

As to the identity of the invisible item, perhaps something can be gained from comparing the cases where it is present and absent. The element is present in cases where the tense appears post root (70a) and is absent with the emphatic pre root tense (70b):

(70) a he left
b he DID leave

It is perhaps more standard to assume that the emphatic contains something extra to the non-emphatic, though given that the emphatic is more likely to be used in echoic contexts, contradicting or reaffirming a previously made statement, it would not be difficult to conceive of this as lacking something present in a 'stand alone' statement which is provided by the antecedent. For example, it may be that the non-emphatic contains a marker of assertion that is absent from the emphatic, but which the emphatic inherits from the context. This is supported by the fact that emphatic non-assertives are difficult at best:

(71) a ? WILL he leave?
b ? what an awful noise he DOES make!
c ? DO leave!

Although some of these sentences are not entirely ungrammatical, it is far from clear that they the non-assertive emphatic equivalents to the following:

(72) a he WILL leave
b he DOES make an awful noise
c he DID leave

Furthermore, assuming the relevant invisible element in a case such as (70a) to be a marker of assertion may account for why this is marked in the vocabulary entries for all roots, on the assumption that the assertive is the default form.

I will not speculate further on this issue and leave it as a topic requiring more research. I hope to have conveyed at least that this particular approach opens up some interesting avenues of investigation which are not obvious from other points of view.

5 Conclusion

Given the rather radical assumptions made in this paper, the results have been surprisingly positive within the very narrow area we have investigated. This is not to say that the extension of the approach will not meet with problems, nor that every aspect of the investigated areas have been completely and satisfactorily dealt with. Yet the kinds of constraints we have utilised seem to give rise to distributional phenomena of the right kind to account for some rather complex data.

If we are to proceed under the assumption that there is no lexicon, and this is still a matter in need of much debate, the issue of what the syntax manipulates and what it does with them is obviously central. Logically speaking it should be wrong to make the syntax build the kinds of objects that

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are abandoned with the lexicon, if these objects are then in correspondence with the vocabulary items that them spell out. Yet it appears to me that this cannot be avoided in a structure based approach and so there is built in redundancy in the entire programme. This might be an argument in favour of lexicalism. The current approach however offers a way to sidestep this redundancy and so needs to be considered carefully as a response to those who would criticise the suggestion that we can manage without the lexicon.

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