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Dummy Auxiliaries and Late Vocabulary Insertion *

0 Introduction

In this paper we forward a particular view of non-modal auxiliary verbs which treats them as dummies, in exactly the same sense that *do* is usually said to be a dummy. There are a number of difficulties facing this view however, as under the usual conception of a dummy, as being a meaningless element which serves only grammatical purposes, all dummies should be semantically identical. If they are identical, how can there be more than one of them, and how can their uses be restricted to specific contexts?

We argue that these problems can be overcome if one assumes that dummies are not themselves meaningless, but instead are the meaningless uses of elements which do in fact have meaning. Indeed, to use an element as a dummy is simply to ignore its semantic content and it is the ignored content which enables us to differentiate between those elements which can be dummies and those which cannot. We will also argue that not every aspect of a dummy's content is ignored and it is on the basis of the remaining content that we can distinguish between different dummies and their conditions of usage.

The structure of the paper is fairly simple. We provide the background to the current ideas in the first section and outline the framework we adopt in the second. The third section provides a detailed analysis of the content of those elements which are used as dummies and section four presents our analysis.

1 Background issues

1.1 Auxiliaries as dummies

Of the three English non-modal auxiliaries, *do* is usually considered special for its dummy status. Clearly in examples such as (1), *do* adds nothing to the semantic content of the sentence and serves as a pleonastic element whose function it is to bear the inflections which would otherwise be left stranded:

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(1) a they did not leave
b did they leave

This contrast between *do* on the one hand, and *have* and *be* on the other, demonstrates the popular view that the latter two auxiliaries have meaningful content. Dowty (1979), for example, refers to 'progressive *be*', claiming this to be a sentential operator.

The issue however is far from straightforward. The two aspectual auxiliaries are always accompanied by morphemes. The auxiliary and its accompanying morpheme are arranged on either side of a verbal element, which may itself be an auxiliary verb:

(2) **Aux** V -**morph**

On the view that the auxiliary is the meaningful element it is presumably assumed that the morpheme is pleonastic – a grammatical reflex of the presence of the auxiliary[1]. In contrast, the tense morpheme is clearly not meaningless and yet takes part in the same system as the aspectual and passive morphemes, a point established very early on in generative syntax with Chomsky's (1957) 'affix hopping' analysis. Thus an unexplained dichotomy in English verbal morphology is established.

The alternative is to claim that all the verbal morphemes are meaningful and that it is the auxiliaries which are pleonastic. Ouhalla (1991) argued this to be the case for *be*, though he explicitly denied the same for *have* on the grounds that *have* shows selectional properties, capable only of being followed by the participle. *Be*, on the other hand, may be followed by elements of virtually any category. This again introduces a strange dichotomy in verb morphology as, according to this, the progressive and tense morphemes are meaningful but the perfect is not. Moreover, if Ouhalla were right, we should expect *do* to show much the same complement taking flexibility as *be* when in fact it turns out to be as restricted as *have*. Thus, restrictedness is no reason to reject the dummy status of an auxiliary.

Newson et al. (2006) point out that in Small Clause contexts the progressive, passive and perfect morphemes appear without the auxiliary:

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[1] It might be possible to take the auxiliary and the morpheme to somehow share out the aspectual meanings, either treating them as a single element, as in Chomsky's (1957) analysis, or as independent elements each expressing a part of the semantic value of the whole construction. Both of these ideas are clearly problematic. If they constitute a single element which expresses a single meaning it is not clear how this element comes to be realised as independent syntactic elements. It is also far from clear that the auxiliary and the morpheme are associated with different semantic values, let alone how aspectual meanings can be fragmented.

(3)	a	I heard [the bottle breaking]	(the bottle was breaking)
	b	I saw [the play performed (by the actors)]	(the play was performed)
	c	him done his homework!	(he had done his homework)

The fact that the relevant meanings are present in these examples indicates that it is not the responsibility of the auxiliary to provide them and hence that the auxiliaries are dummies in much the same way as *do* is. If this view is correct, the English verb morphology system is very regular: the morphemes are all meaningful and the auxiliaries are dummies whose purpose is to support bound morphemes which cannot be bound by the verb itself.

If this conclusion can be maintained, then the complete analysis of dummy auxiliaries must contain an account of their respective distributions: the conditions under which they must or must not be used. Clearly this is not random, but the traditional notion of a dummy, as a meaningless word with only grammatical properties, does not offer much hope of distinguishing between them, as grammatically they are also very similar. If we are to provide a full analysis of auxiliary verbs, a better understanding of the nature of dummies is required.

1.2 Grimshaw on *do*-support

Grimshaw (1997) provides and interesting account of the dummy status of *do*, which rejects the idea that it is a meaningless element stored as such in the lexicon. This account hinges on the assumption that dummy *do* is one and the same thing as the meaningful verb *do*: the dummy is merely the use of meaningful *do* with its semantic content ignored.

Grimshaw's account addresses the issue of why there is a meaningful homonym of the dummy auxiliary. Indeed, she points out that dummy elements in general tend to have meaningful homonyms. For example, the English dummy subjects *it* and *there* are meaningful pronouns in other contexts, and the dummy 'Case assigning' preposition *of* does have meaningful uses[2]. Moreover, this is a pattern we can observe in other languages too. For example, Hungarian uses the wh-element *mit*, meaning 'what' as a dummy to mark the scope of other wh-elements:

[2] It can be argued that the preposition *by* used in passives is also a dummy. As many verbs have non-agentive subjects, the *by*-phrase is not restricted to expressing an agent. The interpretation of the demoted subject of the passive is clearly still determined by whatever determines the subject's interpretation in the active and hence the preposition *by* makes no semantic contribution and seems therefore to be used as a dummy.

(4) Mit akartál hogy kivel beszéljen
what wanted-2s.ind. that who-with talk-subj.3s.
"with whom did you want him to talk"

In addition, Grimshaw (2012) points out that in many unrelated languages, a word which translates as *do* is used as a dummy in situations similar, though not identical, to its use in English. If the analysis of auxiliaries in the previous section extends to other languages, as we believe it does, then it would seem that *have* and especially *be* are also commonly used as dummies as these are very typical auxiliary verbs.

It is an important aspect of Grimshaw's (1997) work that dummies are predicted not to be random, as they would be if they were listed as meaningless elements in the lexicon. For Grimshaw, dummies are always semantically simple and this is what determines their choice as dummies as opposed to other lexical items. In her system, ignoring a lexical element's semantic content comes at a cost: the violation of the Full Interpretation constraint. Couched in Optimality Theoretic terms, constraint violations are possible, but only to an extent that is motivated by the satisfaction of higher ranked constraints. Thus, if it is necessary to insert a lexical element and ignore its semantic content, it is better to use one which has a small amount of content to be ignored. It is intuitively obvious that *do* has a smaller semantic load than verbs such as *remunerate* or *kick* and hence *do* will be selected in preference to these in contexts where dummy insertion is necessary.

This account gives us a foothold into the question of why *be* and *have* are common auxiliaries. Under the assumption that these are dummies, we can observe that like *do* they are also elements with light semantic content. However, we still face the problems of accounting for why there are three dummies, not just one, and why each one is used in the specific context that it is. An account which simply assumes that in dummy contexts the element with the smallest content will be used would predict that there should be just one dummy.

Note, however, that it is not guaranteed that *do* will be the one selected, once we consider *be* and *have* as contenders. Thus something more is needed if we are to maintain Grimshaw's account as it stands. We will argue that this 'something extra' allows us to extend the choice of dummies to *be* and *have*, as well as *do* and gives us a sound basis for accounting for their distributions.

1.3 Late vocabulary insertion

Grimshaw's approach to dummy *do* has been criticised by Bresnan (2000) who claimed that there were internal inconsistencies in Grimshaw's system. For Grimshaw, the meaninglessness of the dummy arises from its insertion

into a candidate structure by GEN without it having been included in the input. Bresnan's point is that, given that semantic interpretation feeds off the final selected candidate, it makes no difference to interpretation whether an element enters a structure from the input or from insertion by GEN as to whether its content is interpreted or not. Thus it is not predicted by the system, and must be stipulated, that certain elements have their content ignored.

In the present paper, although we will adopt the spirit of Grimshaw's treatment of dummies, we will realise the idea in a completely different manner which avoids Bresnan's criticism. Our approach is crucially based on the idea of 'late vocabulary insertion'[3], in which the syntax manipulates abstract pre-vocabulary elements and these are spelled out by their phonological exponents only after their syntactic arrangements have been decided.

The idea of late insertion stems from work in the Generative Semantics framework (McCawley 1968), but more recently it has re-emerged in various frameworks, notably Distributed Morphology (Halle & Marantz 1993), Nanosyntax (Starke 2009) and Syntax First Alignment Syntax (Newson 2008, Newson 2010).

These recent theories propose that phonological exponents are selected from the vocabulary to spell out underlying abstract semantic/grammatical elements on a 'best fit' basis[4]. The details vary between the approaches, but the underlying idea is similar: the syntax organises abstract basic semantic/syntactic units taken from a universal set and combinations of these are spelled out by the relevant exponent. The exponents are listed in the vocabulary as a set of associations between phonological realisations and bundles of units. Vocabulary insertion is a matter of selecting the exponent whose associated units match those in the expression to be spelled out. The important point, however, is that it is not guaranteed that there will always be an exponent for every grammatical bundle of units. In cases where there is no exact match, the best matching vocabulary item will be selected. It is at this point that the various approaches differ from each other and we will return to

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[3] The term 'vocabulary' is used in Distributed Morphology to highlight the fact that the storehouse where phonological exponents are listed is unlike the traditional lexicon. Firstly the lexicon stores far more information than the vocabulary, the latter simply being a list of associations between exponents and the underlying units that they spell out. Secondly, the vocabulary is static and no processes act on it. Thus, it is not 'generative' in the sense of Pustejovsky (1998). Though not everyone makes this terminological distinction, it is a useful reminder of these differences and allows the two concepts to be contrasted. For these reasons, we will adopt the term in what follows.

[4] In this respect the recent theories differ from the original Generative Semantics proposals which did not constrain the process of lexical insertion. Lexical insertion in this framework was done by transformations replacing underlying structures made up of basic semantic components with the relevant lexical items. It was this degree of freedom that was heavily criticised in the early 1970s and ultimately led to the collapse of the theory.

this shortly.

It is quite obvious how late vocabulary insertion relates to Grimshaw's conception of a dummy: a dummy is simply a vocabulary item inserted into an expression to spell out purely grammatical elements and its associated meaningful components are taken as extraneous. Moreover, the notion of 'best fit' ensures that the vocabulary item chosen will be the one with the fewest extraneous units, hence capturing Grimshaw's idea that dummies have small semantic content. Although it would be possible to have dummy items listed in the vocabulary, the notion of 'best fit' makes this unnecessary and hence making full use of the notion actually predicts a conception of dummies very similar to Grimshaw's.

Clearly, the notion of best fit will be central to the business of selecting vocabulary items to be used as dummies and, as mentioned above, there are differences of opinion as to how this is to be conceived of. One of the central principles to the notion of best fit adopted by Distributed Morphology is the Subset Principle (Halle 1997). This claims that if two vocabulary items are possible candidates for insertion in a given environment and one is associated with a subset of components associated with the other, then the one that matches the largest subset of components to be spelled out will be selected. A simple example of this from Sauerland (1996) concerns English regular tense morphology. In the past, there is just one realisation of tense no matter what the subject, but in the present, the third person singular form is specified and all others are null. Sauerland proposes the following vocabulary entries for these morphemes:

(5) /s/ ↔ [-1, -2, -pl, -past]
/ed/ ↔ [+past]
/∅/ ↔ [--]

The third person singular morpheme is fully specified for person, number and tense, while the past tense morpheme is specified for past but not person and number. The null morpheme is completely underspecified. In a context where non-first, non-second, non-plural and non-past must be spelled out, /s/ will be selected as this is an exact match. If, however, one of these features differs, /s/ will automatically be excluded as it no longer represents a subset:

(6)	Features to be spelled out	Realisation
	[-1] [-2] [-pl] [-past]	/s/
	[+1] ...	*/s/

Thus one of the other morphemes will be chosen. Which this will be will depend entirely on the tense: if it is marked [+past], /ed/ is selected and if [-past], /∅/ will be selected:

(7)	Features to be spelled out	Realisation
	[+1] [-2] [-pl] [+past]	/ed/
	[+1] [-2] [-pl] [-past]	/∅/

Note that in neither case here is there an exact match, as both morphemes are underspecified. Indeed, the complete underspecification of the null morpheme makes it also compatible with the past tense specification. However, in this case the past tense morpheme is associated with the larger subset and hence it will be selected over the null morpheme. In the case of the present tense, /ed/ will be rejected, as it is associated with an incompatible feature, and hence the null morpheme will be selected, being the only compatible one left.

Exactly the same result could have been achieved making the opposite assumptions. If instead of working with the Subset Principle, we operate with the Superset Principle, as argued for in Nanosyntax (Starke, 2009), by which a vocabulary item is preferred if it is associated with the smallest superset of the features to be spelled out, then we might propose the following specifications for the English tense morphemes:

(8) /s/ ↔ [-1, -2, -pl, -past]
/ed/ ↔ [±1, ±2, ±pl, +past]
/∅/ ↔ [±1, ±2, ±pl, ±past]

As previously, if the features to be spelled out are third person, singular present, then /s/ will be selected as it is an exact match. If not, then again it will depend on the specification of the tense feature: if past, then while both /∅/ and /ed/ are compatible, the latter will be selected as it is associated with the smaller superset of features, if present then /∅/ will be selected as it is the only remaining compatible candidate.

(9)	Features to be spelled out	Realisation
	[-1] [-2] [-pl] [-past]	/s/
	[+1] [-2] [-pl] [+past]	/ed/
	[+1] [-2] [-pl] [-past]	/∅/

In this particular case, there seems to be very little empirical evidence which could be brought to bear on the issue of which one of these approaches we should adopt. However, if we consider dummy forms from this perspective it seems that there is a clear choice: a dummy is always overspecified, as it is associated with semantic content which it does not spell out. From this point of view we see that it is the Superset Principle which captures Grimshaw's proposals.

The only way we could capture dummy behaviour from the point of view of the Subset Principle would be to claim that dummies are associated

with no semantic content at all in the vocabulary. They would therefore be the only compatible elements to spell out bundles of functional features excluding meaningful roots. Their 'meaningful' use would then have to arise because of a fortuitous gap in the vocabulary, meaning that there is no vocabulary element associated with certain roots. In this case, the dummy would be the best fitting item. However, there is no way, under these assumptions, to account for why the missing vocabulary item happens to be associated with the smallest root content: why is it DO that has no associated vocabulary item and not SMILE, for example? As it is accidental what vocabulary items a language has, there is no way to predict what will be present and what absent and certainly this cannot be made to follow from the Subset Principle which is concerned with selecting vocabulary items for spell out purposes and not determining which vocabulary items there will be.

It seems then that a late vocabulary insertion approach which adopts the Superset Principle is the most promising one to provide an account of dummies. While this is able to capture Grimshaw's intuition that dummies are selected because they have light content, it also gives us a very natural account for dummy phenomena in general. Of course, this does not solve all the problems and we still need to provide an account of why *be*, *have* and *do* are used as dummies rather than other vocabulary items. We return to this issue in section 3 after introducing the framework in which our account will be based.

2 The Syntax First system

As mentioned above, the Syntax First Alignment (SFA) system assumes late vocabulary insertion and in this respect it is similar to Distributed Morphology and Nanosyntax. However, it differs from both of these in that it does not assume that the syntax bundles the pre-vocabulary units into constituents of any kind. What the syntax delivers is a linear ordering of these units and it is only at the point of vocabulary insertion that they become 'bundled' through this very process.

The structuring nature of other approaches adds a redundancy which is absent in SFA: vocabulary items themselves constitute the bundling of the features that they spell out and if bundling also takes place in the syntax then it is done twice over. It is impossible to avoid this redundancy if a theory is committed to structuring its basic units prior to vocabulary insertion as vocabulary items must be associated with bundles of units in order for them to be inserted into an expression. There are only two options, therefore, to eliminate the redundancy: reject late vocabulary insertion and revert to a lexicalist position or reject constituent structure as the output of the syntactic system.

2.1 The Rudiments of SFA

The SFA system is based on Alignment Syntax (Newson 2000; Newson 2004), which is a restricted Optimality Theoretic grammar utilising only alignment and faithfulness constraints. The alignment constraints govern linear relations and adjacency between target elements and hosts, which may be a single element or sets of elements, called domains. These elements and dependency relations which hold between them are given in the input and GEN imposes linear orderings on the complete set of proper subsets of the input elements. These orderings constitute the candidate set which is evaluated by the alignment and faithfulness constraints. To illustrate, suppose there are three input elements, x, y and z, then the candidate set will be:

(10)
$$\left\{\begin{array}{c}\langle x\ y\ z\rangle\\ \langle x\ z\ y\rangle\\ \langle y\ x\ z\rangle\\ \langle y\ z\ x\rangle\\ \langle z\ x\ y\rangle\\ \langle z\ y\ x\rangle\\ \langle x\ y\rangle\\ \langle y\ x\rangle\\ \langle x\ z\rangle\\ \langle z\ x\rangle\\ \langle y\ z\rangle\\ \langle z\ y\rangle\\ \langle x\rangle\\ \langle y\rangle\\ \langle z\rangle\\ \langle\emptyset\rangle\end{array}\right\}$$

The candidate set will always be finite due to the restricted nature of GEN, which is not allowed to add non-input elements to a candidate. Insertion phenomena, such as the use of dummies, is taken care of during vocabulary insertion in the way described above and so is not constrained syntactically, but by restrictions on vocabulary insertion such as the Superset Principle.

Input elements are taken from a universal stock of basic units, which we refer to as Conceptual Units (CUs). These come in two types: a large but syntactically homogenous set of roots (RCUs) and a smaller heterogeneous set of functional units (FCUs), such as tense and aspect. Dependency relationships are also stated in the input, for example relating a particular tense to a particular root. As the input feeds directly into the syntax and the semantic

faculty[5], any mismatch of dependency relations between CUs, for example associating definiteness and tense with a single root, will be deemed as semantically anomalous and although there may be an optimal ordering of the input CUs (and even a best fit vocabulary insertion) it will be deemed defective. Such defective outputs have no interesting properties and we will not discuss them further here.

Alignment constraints evaluate candidate expressions in terms of the linear order and adjacency relations holding between specific input CUs. There are three basic relationships: precedence, subsequence and adjacency:

(11)	xPy	x precedes y	violated by y ... x order
	xFy	x follows y	violated by x ... y order
	xAy	x is adjacent to y	violated by every CU which intercedes between x and y

Note that the ordering constraints do not take adjacency into account and are satisfied if *x* is on the right side of *y*, and also the adjacency constraint is insensitive to order and is satisfied if *x* and *y* are adjacent in any order.

The host, *y* in (11), can be a single element or a set of input elements: a domain, denoted $\mathbb{D}_x$ where *x* identifies the property which defines the domain[6]. Precedence and subsequence constraints evaluated with respect to a domain are straightforward as the constraint is violated by every member of the domain which is on the wrong side of the target. Thus, precedence with respect to a domain favours placing the target first and subsequence favours placing it last in the domain. Adjacency to a domain is satisfied if the target appears at the edges of the domain rather than being surrounded by it. Like adjacency to a single element, order is not important and so a target can appear at either domain edge and satisfy the constraint[7].

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[5] The general organisation of the grammar assumed is as follows:

input → GEN → Candidate set → EVAL → Optimal candidate → Vocabulary insertion

↓

Semantic interpretation

[6] Domains are not constituents. Nothing manipulates a domain as a phrase may be manipulated in a phrase structure grammar. Moreover, domains do not have to hold together as a continuous string in an expression and can be interspersed by members of other domains. They are not randomly defined however and must be made up of elements which share some property determined by the input. For example, all the CUs related to a particular root predicate might constitute a domain (the predicate domain).

[7] László Varga has raised the issue of how an element can precede or follow a domain. Conceptually there seems little difference between preceding a single element and preceding a set of elements: a target precedes a set of elements if it precedes every member of that set. The problem arises if the target is a member of the set as then a precedence

In addition to the above, there are also 'anti-alignment' constraints. Anti-ordering constraints evaluated with respect to a single host are redundant as they produce exactly the same effect as their opposite: an anti-precedent constraint is equivalent to a subsequence constraint and vice versa. However, when evaluated with respect to a domain, anti-ordering constraints do not produce an effect which is already catered for. For example, a domain anti-precedence constraint is violated if the target precedes every member of the domain, but is satisfied if it precedes some of these CUs. The combination of an anti-precedence and a precedence constraint can give rise to second position phenomena, as the target should appear as close towards the front of the domain as it can, without being first:

(12)

		x*P$\mathbb{D}_{\{x, y, z\}}$	xP$\mathbb{D}_{\{x, y, z\}}$
	x y z	*!	
☞	y x z		*
	y z x		**!

In this table, the first constraint represents an anti-precedence (*P) condition on an element x with respect to a domain consisting of x, y and z. This is violated if x is the first element of this domain. The second constraint is a precedence condition on x with respect to the same domain and is violated by every member of the domain which precedes x. Hence if x is second in the domain the second constraint is violated once, but if x is third it is violated twice. The result is that x will adopt the second position in the domain.

Anti-adjacency with respect to a domain also requires some discussion. Recall that adjacency to a domain requires that the target not be within the domain, but be at one of its edges. The anti-adjacency requirement therefore is satisfied if the target is inside the domain, with members to the left and right of the target. We will see an instance of this kind of constraint in our analysis of auxiliaries.

Vocabulary insertion will take place only after the optimal ordering of CUs is determined. As one condition on vocabulary insertion, we will adopt the Superset Principle to determine which is the best fitting vocabulary item in cases where there is no exact match. In this case, according to the principle, the best fitting vocabulary item will be the one associated with the smallest

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requirement would appear to demand that it precede itself. However, from an optimality perspective this is not a problem. There is nothing wrong with setting conditions which cannot be fully met, as long as they are met to a better or worse extent by different candidates. Also consideration of the violation conditions of a constraint is an important aspect of the logic of optimality constraints. A domain precedence constraint is violated by every member of the domain which precedes the target. Given that the target cannot precede itself, the constraint will be fully satisfied if the target precedes every other member of the domain. From this perspective there is no conceptual problem at all.

superset of CUs to be spelled out[8].

As CUs do not come pre-bundled to the vocabulary insertion process, it is necessary to decide which CUs will be spelled out by which vocabulary element. Obviously it is a basic condition that only contiguous CUs can be spelled out by a single vocabulary item, otherwise there would be little point in imposing a linear order on them. We also assume that vocabulary insertion is 'root centric', which means that the process starts with RCUs, spelling these out with those contiguous FCUs that the vocabulary entry allows for. Remaining FCUs are then spelled out separately.

Another principle of vocabulary insertion is Minimal Vocabulary Access, which favours the spelling out of as many CUs with one vocabulary item as possible[9]. Thus, the process of vocabulary insertion will proceed by spelling out RCUs with as many contiguous FCUs as there is provision for in the vocabulary. Any FCUs that remain will have to be spelled out independently of the root, either individually or, if possible, in as big a contiguous group as possible.

This process provides a straightforward approach to regular and irregular morphology. In the case of regular morphology, the RCU is spelled out by itself as no form is listed for the root and an accompanying FCU together. The FCU must therefore also be spelled out independently by a separate vocabulary item which will be uniform across all instances of its use and hence regular. With irregular morphology however, a form is listed as a combination of the RCU and the FCU and may differ from one case to another. By the principle of Minimal Vocabulary Access, the irregular form covering both CUs will be chosen over the simple root plus the regular morpheme, which requires accessing the vocabulary twice.

An important issue for the present paper concerns the distinction between bound and free morphemes in the SFA system. This distinction

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[8] If there is no subset relationship between competing vocabulary items, obviously the Superset Principle will be inapplicable. In this case there are a number of possible strategies we could use to select the best fitting vocabulary item. The simplest way would be to list vocabulary items in an order of preference, as suggested by Halle & Marantz (1993). Another option is suggested in Newson (2008), in which the competition between vocabulary items proceeds along OT lines, with ranked matching conditions. In this way, the matching of certain CUs could be prioritised to favour one vocabulary item over another.

[9] This is similar to the 'biggest wins' theorem in Nanosyntax (Starke 2009) which ensures that the winning vocabulary item is the one that 'eats up' the biggest amount of structure. Starke claims this to be a theorem of the system as it follows from the notion of cyclic override, by which at each step in the derivation there is an attempt to spell out the structure under construction and each subsequent spell out can overwrite the results of previous ones. Hence the final spell out will always be the biggest one. However, nothing in the system predicts cyclic override and as this is the direct cause of 'biggest wins' it is as much an assumed axiom of the theory as Minimal Vocabulary Access.

cannot be made in terms of the traditional view that bound morphemes are incorporated into a single unit with the root, as this assumes an output structured into constituents. Instead we will assume that the difference lies in the conditions of vocabulary insertion. Bound morphemes are restricted to insertion into a specified immediately root adjacent context. Thus, for example, the past tense morpheme *ed* can only be realised as such if the tense CU immediately follows the root. To achieve this we take the vocabulary entry for the regular past tense to be as follows:

(13) [+past] ↔ ed /√ --[10]

The contextual restriction in this vocabulary entry not only means that this morpheme can only appear immediately following a root, as its 'bound' nature demands, but that if tense is positioned elsewhere, it cannot be realised by this vocabulary item and hence will have to be realised by something else. This, we will see, is exactly the situation in which dummy auxiliaries are used.

2.2 The basic ordering of roots and related FCUs in the SFA system

In Newson (2010) the basic organisation of the tense-aspect-root sub-part of the English sentence is described as a two stage process. First the relevant FCUs are ordered with respect to each other and then the root is positioned with respect to this domain.

The ordering of the FCUs in English is strict and straightforward, following the pattern described in (14):

(14) tense – perfect – progressive - passive

This ordering is easily captured if we assume these elements to form a domain, let us call it the inflection domain ($\mathbb{D}_I$), and a set of domain precedence constraints relevant for each domain member[11]:

(15) a [tense]P$\mathbb{D}_I$ tense precedes inflection domain
b [perf]P$\mathbb{D}_I$ perfect precedes inflection domain
c [prog]P$\mathbb{D}_I$ progressive precedes inflection domain

[10] For convenience, here and elsewhere, we use the square root symbol √ to represent the root.

[11] Although the passive obviously takes part in this system, it also involves other aspects of syntax, such as the licensing of arguments, which are only tangential to our present concerns and would only serve to further complicate what is already a rather complex system. To keep this paper within reasonable bounds, therefore, we will not deal with the passive.

These constraints are listed in their rank order, highest first, and so tense, when present, will always be first with the others, when present, following in the given order.

Morphologically speaking, English allows only one of these elements to be realised as a morpheme bound to the root. This can be achieved under the assumption that the root is placed before the last member of the domain: i.e. in second to last position. We demonstrated above how a combination of domain anti-precedence and precedence constraints can achieve second position phenomena. Second to last phenomena can be achieved in exactly the same way with anti-domain subsequence and domain subsequence constraints. Let us suppose the following:

(16) a $\sqrt{}$*F$\mathbb{D}_I$ root does not follow inflection domain
b $\sqrt{}$F$\mathbb{D}_I$ root follows inflection domain

Assuming the ranking of these constraints to be that indicated by their listing in (16), the desired result is achieved, as demonstrated below:

(17)

	$\sqrt{}$*F$\mathbb{D}_I$	$\sqrt{}$F$\mathbb{D}_I$
$\sqrt{}$ [tense] [perf] [prog]		***!
[tense] $\sqrt{}$ [perf] [prog]		**!
☞ [tense] [perf] $\sqrt{}$ [prog]		*
[tense] [perf] [prog] $\sqrt{}$	*!	

(18)

	$\sqrt{}$*F$\mathbb{D}_I$	$\sqrt{}$F$\mathbb{D}_I$
☞ $\sqrt{}$ [tense]		*
[tense] $\sqrt{}$	*!	

As we can see, the position of the root with respect to the inflectional FCUs is straightforwardly captured under these assumptions. When there is only one member of the domain present, as in (18), the root will precede it due to the effect of the anti-subsequence constraint. However, when there are more members present, as in (17), the root will precede only the last one.

An issue arises at this point concerning the category of the root. Because there is no lexicon, roots enter the syntax without category. A standard response to this from a late vocabulary insertion perspective is to claim that categories are epiphenomena and that the context in which a root is inserted is responsible for its categorial appearance (Marantz 1997). However, at first sight it looks as though the category of the root, as verb or adjective, determines its position with respect to the inflectional FCUs: verbs, as discussed, appear in the second to last position of the inflection domain, but adjectives appear in the final position:

(19) a he is sleeping ... [tense] √ [prog]
b he is asleep ... [tense] √
c he is being foolish ... [tense] [prog] √

The solution to this problem is surprisingly simple and shows how regular these distribution patterns are. The important point is that roots realised as adjectives are not always the last element in the set of inflections; they can be followed by adjectival inflections concerning degree[12]:

(20) a he is taller ... √ [comp]
b he is (the) tallest ... √ [sup]

In a case such as (19b) we can assume a following positive inflectional FCU, ([pos]) which is realised along with the root and so has no overt realisation of its own[13]:

(21) ... $\underbrace{\sqrt{}\ [pos]}_{\text{root}}$

It follows from this that appropriate English roots must be associated with the [pos] FCU in the vocabulary. When such roots appear with a comparative or superlative degree, their association with the positive degree must be disregarded and will not be part of what is spelled out. This accords perfectly with the Superset Principle:

(22) a ... $\underbrace{\sqrt{}}_{\text{root}}$ $\underbrace{\text{[pos]}}_{\text{er}}$[14]
b ... $\underbrace{\sqrt{}}_{\text{root}}$ $\underbrace{\text{[pos]}}_{\text{est}}$

The assumption of these degree FCUs provides the contextual elements

[12] In the present paper the differences between inflectional and periphrastic comparison are disregarded for expositiory reasons.

[13] Though in most of the languages of the world positive degree is unmarked, in certain languages, e.g. Chinese, it has been argued that the comparative is the basic form and the positive is morphologically complex. The data are complex however, and a definitive conclusion is hard to reach as there are numerous constructions in which a positive meaning is expressed by the morphologically simple adjective, which in other situations would have to be interpreted as a comparative.

[14] Here and elsewhere we use the strike out notation to indicate vocabulary content which is overspecified.

by which we can distinguish between verbal and adjectival roots – a root is adjectival if followed by a degree FCU:

(23) a ... SLEEP
sleep
b ... SLEEP [pos]
asleep

Assuming that the degree FCUs form part of the inflection domain, our system predicts precisely the positioning of the 'adjectival' root along the same lines as that of 'verbal' roots: the root is in second to last position within the inflection domain. There is only one additional constraint needed, which places the degree FCUs at the end of the inflection domain (24a). This is identical to the constraints for tense and aspectual inflections, requiring the degree elements to be at the front of the domain. Ranking this constraint lower than all the others will ensure that it follows every other element in the domain (24b):

(24) a [deg]P$\mathbb{D}_I$ degree precedes inflection domain
b [tense]P$\mathbb{D}_I$ > [perf]P$\mathbb{D}_I$ > [prog]P$\mathbb{D}_I$ > [deg]P$\mathbb{D}_I$

As a result of these ordering conditions, there will be only one morpheme which will possibly be able to be realised by its regular 'bound' vocabulary item, as all the others precede the root and hence do not meet the contextual restriction stated in their vocabulary entries:

(25) a [+past] ↔ ed / √ --
b [perf] ↔ n / √ --
c [prog] ↔ ing / √ --
d [comp] ↔ er / √ --
e [sup] ↔ est / √ --

To demonstrate how this works, let us take the winning candidates of (17) and (18) and show how vocabulary insertion will proceed:

(26) a √ [+past]
root ed
b [+past] [perf] √ [prog]
*ed *n root ing

In (26a), [+past] fulfils the contextual requirements of its vocabulary entry and, assuming that there is no irregular form of the root listed that could spell out the root and the tense together, the FCU will be spelled out by the vocabulary item in (25a). In (26b), however, neither the tense nor the perfect can be spelled out by their regular vocabulary items (25a/b) as neither meet the contextual requirements. This is not so for the progressive and hence this is spelled out by its regular morpheme (25c).

The important question that arises here is: if the tense and perfect CUs cannot be spelled out by their listed vocabulary items, how can they be spelled out at all? It should be obvious that our answer to this is that this is exactly the situation that calls for a dummy auxiliary. The vocabulary items listed for *be*, *have* and *do* are free morphemes and hence are not subject to contextual restrictions. Their relevant forms, being largely irregular, are associated with the tense and aspectual CUs, along with their root content. They are inserted, then, to spell out the FCUs and in this situation their root content is taken to be overspecification.

With this last piece in place, we are now in a position to tackle the question of why the different auxiliaries are selected to spell out the FCUs in different circumstances. In order to understand this, it is essential to first build a theory of 'lexical' semantic representation on which we can predict not only that *be*, *have*, and *do* have the smallest amount of semantic content, and hence are the best candidates for dummy usage, but also that differences in their content will ensure that they are the best dummies for the particular conditions of their insertion.

3 Semantic decomposition and the meaning of *be*, *have* and *do*

To be able to understand the dummy uses of the English auxiliary verbs it is essential to understand their meaning when used as 'full' verbs. In this section we will forward a concrete proposal of these meanings, bringing together a number of existent proposals concerning the nature of predicate semantics. Our approach will essentially be a decompositional one.

We first assume that predicate meanings are split into two parts (following Grimshaw (2005)): one which differentiates predicates in terms of their 'root content', and one which differentiates predicates in terms of the types of events they denote, their 'event structure' (these terms are from Levin & Rappaport Hovav (2005)). The value of this division is that it allows us to conceptualise predicate meaning as virtually unlimited in terms of root content, but, at the same time, as highly restricted in terms of event structure. The distinction will also play a major role in the analysis of the meaning of *be*, *have* and *do*, which we will claim are identical in terms of their root content, but differ in terms of their event structure.

This paper will not add much to the theory of root content. We will

simply assume that this is given as part of the human conceptual system in units which, as is standard, we will represent as capitalised (English) words. However, to distinguish these root conceptual units from those units which constitute event structure we will make use of the following representation for roots: $\sqrt{SEE}$, $\sqrt{RUN}$, $\sqrt{CALCULATE}$, etc. As we are not assuming a lexicon in which 'pre-bundling' of syntactic, semantic and phonological features takes place, RCUs and their related event FCUs enter the syntactic system independent of each other. They are freely related in the input but with semantic restrictions, as discussed above.

The next part of our analysis is based on Dowty's (1979) proposals concerning the decomposition of different aspectual properties of verbs. The kind of decomposition conceived of goes back to work done in the Generative Semantics framework, particularly Lakoff (1965) and McCawley (1968), though it has had a long history of development since, leading to the present day (see, amongst others, Jackendoff (1976), Van Valin (1990), Rappaport Hovav & Levin (1998), Hale & Keyser (2002), Ramchand (2008)).

Early work in this vein conceptualised 'semantic primitives' such as DO, BECOME, CAUSE, etc., which formed the basis of a semantic analysis of certain lexical items but did not add much to our understanding of how this is related to syntax. More recent work, however, has tended to cast these components as syntactic heads in an extended 'VP shell' analysis (Larson 1988) and thus there is now seen to be a direct link between these components and the syntactic structures they form. Moreover, there has also been a move away from the view of such elements as semantic operators, as Dowty (1979) had conceived of them, and the 'head' conceptualisation has suggested more of a 'predicate' view, with elements of event structure introducing arguments in their specifier positions. Thus it has been claimed that there is a direct connection between the elements of event structure and the argument structure associated with lexical predicates.

Starting from Vendler's (1967) four-way categorisation of verbs into states, activities, achievements and accomplishments, Dowty (1979) proposes that all verbs are based on a simple basic stative predicate and that the different aspectual types are created by the addition of one or more of a small number of "sentential operators or connectives". For example, an achievement as exemplified by *the soup cooled* can be produced by adding the operator BECOME to an underlying sentence *the soup is cool*, producing the following representations:

(27) a Cool(soup)
b BECOME(Cool(soup))

Here the basic stative predicate is realised by the adjective and the addition of the inchoative operator turns this into an achievement verb. As we will not be adopting all of Dowty's assumptions, we will not go into the details of the syntactic process involved here, which Dowty himself only deals with superficially. What is important for us is the basing of the achievement on the stative predicate. A similar analysis is given for accomplishments with the help of the operator CAUSE, which connects two sentences:

(28) [ϕ CAUSE ψ]

The connected sentences may be of different aspectual types themselves, but commonly they involve an activity or achievement and an achievement. For example, consider Dowty's analysis of *John killed Bill*:

(29) [[John did something] CAUSE [BECOME¬[Bill is alive]]

Note again how the basis of this is a stative predicate: *alive*[15].

The most difficult aspect of Dowty's proposal is his claim that activities are also based on stative predicates, as there seem to be very few activity verbs which are obviously related to a stative predicate that can be expressed independently. However, he does point out that verbs of perception seem to have an activity alternate which is often cognate with this verb, though not always[16]:

(30)	a	John saw Bill	John looked at Bill
	b	He heard the music	He listened to the music
	c	John could smell the flowers even after they had gone	John smelled each flower, one after the other

For Dowty the difference between these is the addition of the operator DO to the second, thus capturing the activity status of these verbs. Another example of an activity based on a stative predicate is shown in (31):

(31) a he is foolish
b he is being foolish

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[15] Obviously Dowty bases this example on McCawley's (1968) highly debated analysis. As Dowty wonders about the seriousness of the original analysis, it is also difficult to say how serious Dowty's own analysis should be taken to be. Whether or not *kill* should be analysed as 'cause to become not alive', the example demonstrates the general approach to accomplishments.

[16] That different verbs which share an underlying stative predicate are pronounced differently is not a problem under the assumption of late insertion which Dowty, borrowing from McCawley (1968), assumed.

For such cases as (31b), Dowty suggests that the extra DO operator is realised by the auxiliary *be*, a point we will contend a little later, though we agree with the general analysis that these represent states turned into activities by the addition of some element of event structure.

These proposals mesh well with the idea that predicate meanings are composed of root content and event structure parts. In particular, we can equate Dowty's stative predicate with the root part of predicate meaning and the event structure components to be what is added to this to produce the different event types. However, we will need to develop these ideas a little more to be able to make use of them for analysing the dummy uses of *be*, *have* and *do*.

Let us start by considering the distinction between adjectival and prepositional roots. An adjectival root, such as $\sqrt{COOL}$ fits nicely with Dowty's concept of a basic stative predicate on which verbal predicates can be formed, clearly referring to a state. But prepositional roots, such as $\sqrt{UNDER}$ do not fit so well: no inchoative verb can be formed from such a root and it seems to refer more to a relation than a state. Let us suppose therefore that roots come in two types, those that denote states (represented as $\sqrt[S]{X}$) and those that represent relations ($\sqrt[R]{X}$). In the simplest cases these predicates are directly related to their arguments:

(32) a $\sqrt[S]{TALL}$(John) John is tall
b $\sqrt[R]{UNDER}$(box, table) the box is under the table

Now consider a stative verb, such as $\sqrt[S]{EXIST}$. If we assumed a similar semantics to the adjective in (32a) it would be difficult to distinguish between them, though there is a distinction to be made between *sleep* and *asleep*, for example. Dowty argued that the difference between the underlying stative adjective $\sqrt[S]{COOL}$ and the inchoative verb *cool* is the addition of a piece of event structure. We will claim that this is also the difference between a basic stative predicate, as realised by an adjective, and a stative verb: the latter are associated with a piece of event structure that the former lacks.

One of the clearest demonstrations of the difference between adjectives and event denoting predicates can be seen in phenomena demonstrated in (31). As Dowty points out, the simple adjective denotes a timeless permanent property of an individual: if someone is foolish, it is part of their nature over which they have little control and so it cannot be deliberately brought to an end. We can think of this as being the direct result of the adjective failing to denote an event. Events are things bounded in time. Thus they have beginnings and ends as central aspects of their meaning. Although it is possible to add such aspectual notions to a simple state, a state itself, as

expressed by an adjective, does not have these as part of its basic meaning. Adding elements of event structure to a basic state, as in (31b), fixes the state in time and hence the states referred to here are temporary and able to be brought to an end.

It is generally thought that what fixes an event in time is its event variable (Davidson 2001). Therefore we might claim that one of the basic differences between a stative verb and an adjective is the presence of the event variable with the former. On these assumptions, how are we to represent the meaning of a stative verb? Simply including the event variable as an argument of the predicate, as in (33) fails to capture the idea that the meaning of an eventive predicate consists of its root content and its event structure, simply because it attributes no event structure to such predicates:

(33) $\sqrt[S]{EXIST}$(e, x)

Instead we will propose that a stative verb denotes a relationship holding between an individual and an event, but that unlike a relation denoting element, such as a preposition, the nature of the relationship is left undefined (denoted $\sqrt[R]{\emptyset}$). The stative predicate then functions to provide the content of the undefined relationship. We will represent this as follows:

(34) $\sqrt[S]{EXIST} \rightarrow \sqrt[R]{\emptyset}$(arg, e)

What (34) says is that the stative predicate *exist* is defined as that relationship between an argument and an event whose content is given by the stative root EXIST. Therefore the components of such a verb, which enter the input as CUs are: a stative root ($\sqrt[S]{X}$), an undefined relation root ($\sqrt[R]{\emptyset}$) and an event variable ([e]). We will see that the notion of an undefined predicate whose content is provided by something else plays a central role in our account of dummies.

Turning now to activities, again we will agree with Dowty's general idea that these are built on, and therefore are more complex than a basic stative predicate. Specifically, activities involve the addition of a component, ACT, which specifies the event to be of a particular kind. The event structure will still be stated as an undefined relationship between an activity event and an argument. As with stative verbs, a stative root will provide the content of this undefined relation:

(35) $\sqrt[S]{RUN} \rightarrow \sqrt[R]{\emptyset}$(arg, ACT(e))

The relevant CUs for forming an activity predicate are therefore: $\sqrt[S]{X}$, $\sqrt[R]{\emptyset}$, [act] and [e]. Note that this set properly contains the set of CUs needed to form a stative verb.

We will not continue to develop this view of semantic representation to cover achievement and accomplishment verbs as they have no direct implications for the meaning of *be*, *have* and *do*, though it should be clear how this might be done.

With these things in place, let us now turn to the analysis of the meanings of *be*, *have* and *do*. Although the semantic content of *be* turns out to be the simplest, we will start our discussion with *have* and *do* as the properties of these verbs which make them potential dummies are more obvious and hence easier to explain. Once we have seen how *have* and *do* work, however, our proposals for the meaning of *be* will be quite straightforward.

The verb *have* is used in a number of seemingly unconnected contexts, as exemplified by the following:

(36) a John has a new car
b John had an idea
c John had a cigarette
d John has a daughter
e Mary had a baby
f John had his dinner
g Mary had John (round for lunch)/(on the floor)
h John had to find his own way home
i John had Bill clean his room

It seems unlikely that we would be able to distil from examples such as these a 'core' root content of *have* which is applicable in all cases. Indeed, the most likely result of such a distillation is the null set, which is exactly what we claim the root content of *have* to be. That is, the root content of *have* is $\sqrt[S]{\emptyset}$: the undefined stative root. This is the stative equivalent to the undefined relation discussed above and it shares the property of having its content specified by something else. Clearly though, *have* is not meaningless. If we replace *have* in the examples in (36) with *be* or *do*, we get something which is either ungrammatical or completely different in meaning[17]. Although the

[17] The one possible exception to this is the use of *have* and *do* in a sexual context, in as much as *Mary had John* and *Mary did John* can refer to the same event. It is difficult to know what the distinction between the two is. From our current point of view it will turn out that the difference should be that the *have* case indicates an unspecified relationship between Mary and John and the *do* case indicates that Mary performs some unspecified action on John – the content of the relationship and action being provided by the context. We leave it to the reader to decide if this accords with their intuitions.

content of *have* is undefined, we claim that it is provided by the context of its use. For example, (36c) does not describe an event similar to (36f) as what happens to the cigarette and to the dinner is not the same thing: the cigarette is smoked and the dinner is eaten. This seems to be because the typical thing that happens to cigarettes is that they get smoked rather than eaten or any other conceivable thing that could happen to them. Similarly, dinners are eaten and not set on fire[18]. Our claim is that this happens with *have* precisely because its root content is unspecified. Note that the same is not the case for verbs with specified content: if John *ate* a cigarette, we can only interpret this as odd behaviour by John and not as a default relationship that holds between a person and a cigarette, which is exactly the case with *have*.

In this particular respect, *do* is very similar to *have*. Whatever other difference between the two verbs there might be, the content of both is vague and allows for different interpretations in different contexts. For example, consider the following:

(37) John did the work

The exact details of what John *did* here is entirely dependent on the nature of the work. We therefore claim that the root content of both *have* and *do* is identical, i.e. $\sqrt[S]{\emptyset}$. Both are based on an undefined state whose unspecified nature allows context to play a role in determining the details of the event described.

Turning now to *be*, our claim is that this too has undefined root content. In considering the meaning of *be* it should be pointed out that many so-called 'main verb' uses of *be* are indistinguishable from its auxiliary use. Not only does it behave syntactically like an auxiliary, displaying the NICE properties (Huddleston 1976)[19], but it is also omitted in Small Clause contexts:

(38) a I consider him foolish
b We judged him the winner

This indicates that in these circumstances *be* is used as a dummy and so can give no real indication of its root content.

It is often claimed that *be* carries an existential meaning and indeed in existential sentences it is harder to show that *be* is used as a dummy. For example, it is not omissible in existential *there* constructions:

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[18] And when they are, it is not an event we refer to as '*having dinner*'!

[19] N = negation: he isn't tall
I = inversion: is he tall?
C = code: he's tall, but she isn't
E = emphasis: he IS tall

(39) a ? I believed him in the garden at the time (he was in the garden)
b * I believed there a man in the garden (there was a man in the garden)

The data show that, although not totally ungrammatical, *be* is difficult to omit in simple locative constructions and its omission is completely impossible in existential constructions[20]. Furthermore, there are languages in which copula *be* is not present at all under certain agreement conditions, but it is obligatorily present with these agreement features in existential constructions. For example, for third person present contexts, Hungarian does not use the copula, though this is obligatory in all other contexts:

(40) a (Ő) magas/orvos (*van)
He/she tall /doctor be-pres-3-sing
"he/she is tall/a doctor"
b (Ők) magasak/orvosok (*vannak)
They tall-pl /doctor-pl be-pres-3-pl
"they are tall/doctors"
c (Ő) magas/orvos *(volt)
He/she tall /doctor be-past-3-sing
d (Én) magas/orvos *(vagyok)
I tall /doctor be-pres-1-sing
etc.

A third person singular present copula is obligatory however in existential contexts:

(41) a *(van) élet a Mars-on
be-pres-3-sing life the Mars-on
"there is life on Mars"
b *(vannak) emberek a kert-ben
Be-pres-3-pl people the garden-in
"there are people in the garden"

[20] The data are in fact more complex than is usually admitted. For example, the following are all actual uses of Small Clause existential *there* constructions found on the internet (one from a published scientific journal):

i) I consider there a difference between booty call and fwb
ii) We consider there a symmetric bounded A-regular operator ...
iii) Does the military consider there a difference between …

Certainly we detect a difference in grammaticality between these examples and (39b), which is far worse. It seems that existential there constructions with a locative require the presence of *be* more strongly than those without. We have no account for these observations.

We might take this as an indication that *be* is a dummy in copula, but not in existential contexts and hence that the root content of this vocabulary item is $\sqrt{EXIST}$.

However, this conclusion is hard to maintain when we consider that there is a difference between the verb *to be* and the verb *to exist*. Certainly the following do not mean the same thing:

(42) a there is a man in the garden
b ? a man exists in the garden

It would be very difficult to account for the existence of the verb *to exist* if indeed it did have the same meaning as the verb *to be*: why would there be two roots with the same meaning? But if *exist* does not mean $\sqrt{EXIST}$, what meaning could it possibly have? Conversely, if *exist* does mean $\sqrt{EXIST}$ it follows that *be* cannot be taken to have this root content.

Intuitively, 'existing' seems to have more conceptual content than 'being' and *be* is less specific and more vague. We will propose that this is because *be*, like *have* and *do*, actually has no defined root content: its root content is $\sqrt[S]{\emptyset}$. Our claim is that the reason why *be* is often associated with existence is that this is one of the more basic states and will be one of the more common inferences we can make given the lack of information in existential sentences such as (42). With more information, we can make more specific inferences:

(43) a There is a man in the garden asleep
b There is a man in the garden dead!
c There is life developing on Mars

Having established what *be*, *have* and *do* have in common, we now turn to examine how they differ. If the root content of these verbs is identical, it follows that any differences between them must be located in their event structures. With regard to the event structure of *be*, one important thing to consider is that although *be* is 'verbal' in terms of its morphological properties, it is to some extent less of a verb than most others. For example, while many verbs with simple content can be used as a 'light verb' (to adopt Jespersen's (1942) usage), *be* never is:

(44) a He had a bath
b He did a dance
c He took a walk
d He gave it a quick glance
e * he is a bath/a dance/a walk/a quick glance

Such light verb usage generally adds aspectual or other event related meanings to an expression. The fact that *be* is never used in this way suggests that it is simply not associated with such aspects of meaning.

Of all the auxiliary verbs, *be* is the one that is used in the widest contexts, appearing with progressive, passive and copula situations:

(45) a He is running
b He was seen
c He is tall

These observations are consistent with the claim that *be* has null root content and no event structure. If this is true, it is the minimal possible verb which therefore should be used as a dummy in situations in which little or no verbal content is to be spelled out.

We conclude that the meaning of *be* is provided entirely by its root content, which itself is unspecified:

(46) $\|be\| = \sqrt[S]{\emptyset}$

This amounts to the claim that *be* denotes an undefined basic state. The only CU needed therefore is the root.

Have, like *be*, is stative, but it differs from *be* in a number of ways. One clear difference is that it can be used as a light verb:

(47) a John had a bath
b John had a quick look at the paper

If the inability of being used as a light verb is indicative of the absence of event structure, then we conclude that *have* must be associated with some event structure. Thus *have* is associated with more verbal properties than *be*. Indeed, the idea that *have* is something more than *be* has been proposed in a number of places. As pointed out by Szécsényi (2011), accounts of *be* and *have* coming from very different backgrounds seem to share the assumption that *have* is actually *be* together with an extra meaning component. What this extra meaning component is assumed to be varies to a great extent. It is argued to be a result component in McFadden & Alexiadou (2010), a kind of a prepositional meaning for den Dikken (2006) connecting perfect with passive, claiming that perfect *have* is actually *be* incorporating the preposition *by* appearing in passive voice. Hoekstra (1995) also argued for *have* being made up of *be* plus a preposition but this time the preposition is one compatible with a dative meaning.

To try to discover exactly what aspect of event structure differentiates *have* from *be*, let us begin by considering the possessive use of *have*. It is well

known that the possessive relationship is semantically vague (Kempson 1977). It certainly covers a wider variety of relationships than does a more specific concept such as *own*:

(48) a John has a car
b John owns a car

Neither of the above sentences implies the other in any strict way: if John has a car, it does not mean that he owns it – it could be Bill's car that he has – or if he owns a car, it does not entail that he 'has' it in all the possible senses of having. Indeed, one can own something and never 'have' it: a painting on permanent loan to a museum, for example. Moreover, 'having' something does not even imply a local spatial relationship: one does not have to be with something in order to have it. For example, if a man goes to a horse race and chooses a horse that he thinks will win, there is a clear sense in which he 'has' a horse without either owning it or even being anywhere near it.

The relationship expressed by 'X has Y' can be interpreted as virtually any compatible relationship. We might therefore claim that *have* realises a general notion 'relation', which we have assumed to be represented by the undefined relation root $\sqrt[R]{\emptyset}$. As we have argued, this provides the basic aspects of event structure and normally takes its content from the stative predicate. But given that the root content of *have* is also undefined, the details of this relation have to come from elsewhere, i.e. inferred from the context.

Although *have* appears to be more of a verb than *be*, it is also noticeably less of a verb than most others. In particular, most verbs are associated with arguments and their arguments tend to be interpreted in a fairly specific way in relation to the verb. For example, there is nothing vague about how we interpret the arguments in cases like *John hit Bill*. However, as we have seen, the interpretation of *have* is vague and subsequently the interpretation of the elements it relates is vague too: in *John has a horse*, John could be interpreted as owner, rider, backer, etc. If we suppose that *have* is similar in some respects to prepositions, in that it denotes a relationship between individuals rather than between an argument and an event, we can capture this aspect of its meaning. Therefore we take the semantic content of *have* to consist of the undefined stative predicate and the undefined relation predicate:

(49) $\|have\| = \sqrt[S]{\emptyset} \rightarrow \sqrt[R]{\emptyset}(x, y)$

The CUs relevant for *have* are therefore: $\sqrt[S]{\emptyset}$ and $\sqrt[R]{\emptyset}$.

Finally we turn to *do* and its semantic content. Like *have*, *do* can be used as a light verb, but unlike *have* its light verb uses are very limited:

(50)	a	John did a dance	cf. John had a dance
	b	John did a sneeze	cf. John had a sneeze
	c	* John did a sleep	cf. John had a sleep
	d	* John did a thought	cf. John had a thought

Essentially the light verb usage of *do* is restricted to unergative contexts, whereas *have* seems not to be restricted along these lines. Given that *have* and *do* have the same root content, it must be differences in their event structure which accounts for this. Moreover, as their light verb uses are in a subset relation to each other, it follows that *do* has a more specified event structure than *have*. In other words, the relationship between *do* and *have* is the same as that between *have* and *be*: *do* is a more specified version of *have*.

There are two other ways in which *do* is more restricted than *have*. One is in the interpretation of the arguments which accompany these verbs. As we have seen, the relationship that *have* refers to is vague and the interpretation given to the related elements is consequently also vague. *Do* behaves like other verbs in this respect, as its subject is always interpreted as agent.

The second difference between *have* and *do* concerns the observation Dowty (1979) made concerning the difference between states and activities, which we interpreted as an inherent 'temporally fixed' property present in events but lacking in basic states. We attributed this property to the presence of the event variable. It is clear that while *have* is stative, *do* is not, as indicated by all the standard tests for stative predicates:

(51)	a	John is doing the work	* John is having a car
	b	I forced John to do the work	* I forced John to have a car
	c	Do the work!	* have a car!
	d	What he does is do the work	* What he does is have a car

All these observations add up to the conclusion that *do* is simply an activity verb, and hence has the event structure represented in (35). However, like the other verbs with dummy usage, the stative predicate is undefined and so unable to provide the undefined relation with content:

(52) $\|do\| = \sqrt[S]{\emptyset} \rightarrow \sqrt[R]{\emptyset}(\text{arg, ACT(e)})$

That is: *do* expresses a relationship between an unspecified activity and an argument. The CUs involved for *do* are therefore: $\sqrt[S]{\emptyset}$, $\sqrt[R]{\emptyset}$, [act] and [e].

While in this section we have been concerned mainly with the representation of the semantics of *be*, *have* and *do*, the main focus of this paper is on the syntax of these elements. Within the system we are working in, what connects syntax and semantic representations is the input and the CUs it contains. The components of event structure semantics identified in this

section relate to the FCUs $\sqrt[R]{\emptyset}$, [act] and [e], which are what the syntax organises, along with the roots that they are associated with. They are also elements which need to be spelled out at the point of vocabulary insertion. The heart of our analysis is that it is the distribution of these FCUs that accounts for the different uses of *be*, *have* and *do* as dummies.

4 Analysis

In this section we present our analysis of the various uses of *be*, *have* and *do*. We start with a simplified demonstration of the analysis, concentrating solely on *be*, as, lacking an event structure, this is used to spell out only FCUs such as tense and aspect. We demonstrate both the dummy usage of *be*, using English data, and main verb usage, using Hungarian data. We then move on to consider *have* and *do*, demonstrating how the distributions of the event structure components decides on which dummy will be chosen.

4.1 Be: a simplified demonstration of dummy usage

Based on our discussion of the semantics of *be* in the previous section, and also considering the process of vocabulary insertion to be governed by the Superset Principle, we propose the following vocabulary entries for the different irregular forms of *be*[21]:

(53) be ↔ $\sqrt[S]{\emptyset}$
is ↔ $\sqrt[S]{\emptyset}$ [-past] [-pl] [-1] [-2]
am ↔ $\sqrt[S]{\emptyset}$ [-past] [-pl] [+1] [-2]
are ↔ $\sqrt[S]{\emptyset}$ [-past] [±pl] [±1] [±2]
was ↔ $\sqrt[S]{\emptyset}$ [+past] [-pl] [±1] [-2]
were ↔ $\sqrt[S]{\emptyset}$ [+past] [±pl] [±1] [±2]
been ↔ $\sqrt[S]{\emptyset}$ [perf]
being ↔ $\sqrt[S]{\emptyset}$ [prog]

Note that we are listing the apparently regular form *being* here. This is essential to our approach as there needs to be a listed vocabulary element associated with [prog] to spell this feature out when it cannot be spelled out by its regular bound morpheme[22].

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[21] We include the agreement features in this table for completeness, but we will have very little to say about them. They are not members of the inflection domain as their presence has no effect on the distribution of the root. Moreover, they are clearly dependent on a finite tense and are spelled out by whatever vocabulary item spells this out. This suggests that there are independent constraints governing their distribution.

[22] While this may seem *ad hoc*, it should be noted that the verb *be* is generally very irregular cross-linguistically. One might wonder why this should be. One possibility is that in those

To introduce the use of *be* as a dummy, first consider a case where no dummy is necessary. This is the case of a simple past or present construction, where tense will appear behind the root:

(54) ... √ [-past] [-1] [-2] [-pl]

The vocabulary entry for the tense morpheme is as follows:

(55) s ↔ [-past] [-1] [-2] [-pl] / √ --

As there is an exact match of the CUs specified in this vocabulary entry and those to be spelled out, and as the contextual restriction is met, the morpheme will be used (assuming the root has no listed irregular form):

(56) ... √ [-past] [-1] [-2] [-pl]
root s

However, when a further morpheme, such as progressive or passive is present, by the constraints discussed in section 2, the tense will appear before the root:

(57) ... [-past] [-pl] [-1] [-2] √ [prog]

In this case the bound morpheme will not be able to realise tense as its contextual restriction is no longer met. The progressive will be able to be spelled out by the relevant morpheme and the root will be spelled out by the relevant vocabulary item, leaving the tense and agreement CUs in need of spelling out by something else. Given that *be* has no contextual restrictions attached to its vocabulary entry and that its associated RCU and event FCUs are light, the relevant form of *be* will be the best fitting vocabulary element for the job. Any other verb will either have fuller root content or, in the case of *have* and *do*, be associated with a richer event structure. Hence by the Superset Principle, tense will be realised by the relevant form of *be* and its root content will be overspecification:

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languages in which it is used it is an extremely frequent verb, used in many kinds of constructions, thanks to its ability to be used as a dummy and its unspecified semantics. It may be that there is a processing advantage to listing the relevant forms of high frequency vocabulary items, making full use of the principle of Minimal Vocabulary Access. If this is so, then it is not surprising that all the forms of the word, even those that appear to be regular, should be listed in the vocabulary.

(58) ... [-past] [-pl] [-1] [-2] √ [prog]
is $\overline{\sqrt{\phi}}^{S}$ root ing

A slightly more complex example can be considered next. In this case both a progressive and a passive CU accompany the tense and, as discussed, the root is positioned before that last of these:

(59) ... [-past] [-pl] [-1] [-2] [prog] √ [pass]

Here only the passive CU will be able to be spelled out by its bound morpheme and both the tense and progressive CUs will require a dummy. Given that there are no vocabulary items which spell out both tense and progressive together, a separate dummy will be required for each. Again, the relevant form of *be* will be used in each case, these having the smallest superset of associated CUs specified in their vocabulary entries to those needing to be spelled out. This will proceed as follows:

(60) ... [-past] [-pl] [-1] [-2] [prog] √ [pass]
is $\overline{\sqrt{\phi}}^{S}$ being $\overline{\sqrt{\phi}}^{S}$ root en

There are some special considerations that arise in the analysis of adjectives. At first, one might think that the analysis of the adjectival case is simple as it is just a matter of realising tense with the copula and the adjective realises the root and the degree FCU:

(61) ... [-past] [-pl] [-1] [-2] √ [pos]
is root

Recall that we are assuming that adjectives are associated with [pos] in their vocabulary entries and hence this FCU is never spelled out as an independent morpheme. However, we also know that some adjectives, besides spelling out a basic stative predicate, can appear with an activity interpretation, as discussed in the previous section (see (31b)). As the construction denotes an activity, all of the event CUs associated with such an interpretation must be present:

(62) ... [-past] [-pl] [-1] [-2] [prog] $\sqrt{\phi}^{R}$ [act] [e] √ [pos]
is $\overline{\sqrt{\phi}}^{S}$ being $\overline{\sqrt{\phi}}^{S}$ adjective

Under the assumptions made so far, it is obvious that tense and agreement are spelled out by the relevant form of *be*, as is [prog]. The adjective will spell out the root and the degree FCU. But this leaves that event CUs not spelled out. It should be clear that it cannot be the progressive *be* that spells these elements out, as *be* is not associated with event CUs at all. If they were spelled out by the dummy which also spells out the progressive, we would expect the relevant form to be *doing*, as *do* is an activity verb and thus is associated with precisely these CUs[23]:

(63) ... $\underbrace{\text{[-past] [-pl] [-1] [-2]}}_{\text{is } \sqrt[S]{\emptyset}}$ $\underbrace{\text{[prog] } \sqrt[R]{\emptyset} \text{ [act] [e]}}_{\text{doing } \sqrt[S]{\emptyset}}$ $\underbrace{\sqrt{\text{ [pos]}}}_{\text{adjective}}$

If the event CUs are not spelled out with the preceding inflection, it must be the case that they are spelled out with the following adjective:

(64) ... $\underbrace{\text{[-past] [-pl] [-1] [-2]}}_{\text{is } \sqrt[S]{\emptyset}}$ $\underbrace{\text{[prog]}}_{\text{being } \sqrt[S]{\emptyset}}$ $\underbrace{\sqrt[R]{\emptyset} \text{ [act] [e] } \sqrt{\text{ [pos]}}}_{\text{adjective}}$

Thus, it follows that adjectives must be associated with event CUs in their vocabulary entries, despite the fact that they are semantically associated with non-eventive stative roots. While this may seem to be a problem, in fact it is not. Indeed, it is perfectly consistent with the assumption of the Superset Principle. According to this, a vocabulary item should be associated with all the features that it can possibly spell out, even if they are contradictory. The fact that adjectives *can* spell out event CUs therefore means that such CUs should be stated in their vocabulary entries and they will be taken as overspecifications in cases where the adjective spells out just the stative predicate. Recall that it is the underlying CUs which vocabulary items spell out that determine the meaning of an expression, not the vocabulary themselves. Thus there is no contradiction in the assumption that adjectives are underlying non-eventive stative roots, but their vocabulary items can be used to spell out certain event related CUs.

Next we move on to consider the use of *be* in Hungarian copula structures with adjectival or nominal predicates. We have seen in (40), repeated here as (65), that in a number of cases where English uses dummy *be* Hungarian can (actually has to) do without it. Since Hungarian has no

[23] Whatever else might determine that *he is doing silly* is ungrammatical, it is clear that *doing* cannot be the realisation of the relevant CUs as while this vocabulary item might be associated with these, it is not associated with them in this particular order. In cases where *do* is used grammatically, the event CUs will precede the inflection as the former precede the root and the latter follows it.

progressive or perfect expressed in the form of an inflectional ending on the verb, we can only consider the present and past paradigms. The nominal and adjectival patterns look the same.

(65) a (Ő) magas/orvos (*van)
He/she tall /doctor be-pres-3-sing
"he/she is tall/a doctor"
b (Ők) magasak/orvosok (*vannak)
They tall-pl /doctor-pl be-pres-3-pl
"they are tall/doctors"
c (Ő) magas/orvos *(volt)
He/she tall /doctor be-past-3-sing
"he/she was tall/a doctor"
d (Én) magas/orvos *(vagyok)
I tall /doctor be-pres-1-sing
"I am tall/a doctor"
etc.

What the Hungarian data show is that in third person singular present tense no dummy form is needed to express tense. Presumably the tense and agreement CUs in this case do not just disappear and therefore we must assume that they are spelled out by something, the adjective/noun being the obvious candidate. Dummy *be* appears only when a tense different from present and/or person agreement different form third person are expressed. Plural is expressed as an independent morpheme following both nouns and adjectives. The difference between English and Hungarian is in whether non-verbal vocabulary items are associated with tense, agreement and number CUs: English nouns and adjectives are associated with none of these, Hungarian nouns and adjectives may be associated with all of them:

(66) a Hungarian: magas $\leftrightarrow \sqrt[S]{TALL}$ [-past][-1][-2][-pl]
b English: tall $\leftrightarrow \sqrt[S]{TALL}$

The fact that the copula is obligatory in Hungarian in all other cases than present and third person indicates that, unlike verbs, Hungarian adjectives and nouns are specified for exactly these CUs and no others. Hence, in the presence of different CUs the relevant exponents will be used to spell out the root, and as many FCUs as possible, and the rest will be spelled out by other vocabulary items. For example in (67b), the adjective can spell out all but the plural FCUs and hence this must be spelled out by an independent morpheme. In (67c) the adjective can spell out none of the FCUs which therefore must be spelled out together, by the copula. The functional specifications on the

adjective/noun which are not used in these cases will be overspecification and as such ignored:

(67) a ... $\underbrace{\sqrt[S]{TALL}\text{ [-past][-1][-2][-pl]}}$
magas

b ... $\underbrace{\sqrt[S]{TALL}\text{ [-past][-1][-2]}}\underbrace{\text{[+pl]}}$
magas ~~[-pl]~~ ak

c ... $\underbrace{\sqrt[S]{TALL}}$ $\underbrace{\text{[+past][-1][-2][-pl]}}$
magas ~~[-past][-1][-2][-pl]~~ volt

All this, as we have already seen, does not mean that *be* in its third person singular present form can never be expressed overtly in Hungarian. In sentences containing a place adverbial (68a), or asserting existence (68b), a singular third person, present tense *be,* expressed as *van,* has to appear:

(68) a a könyv az asztal-on van
the book the table-on is
"The book is on the table"

b van élet a Mars-on
is life the Mars-on
"There **is** (emphatic) life on Mars"

The reason why the copula is absent in cases like (65a) and (b) but is present in (68) is that adjectives express basic states and so there is nothing more to spell out, on the assumption that the adjective also realises tense and agreement in these cases. Prepositions, on the other hand, express relations not states and therefore the unspecified stative predicate which accompanies this relation needs to be spelled out independently. The verb *be* is exactly the right element to do this as it is associated in the vocabulary with the unspecified stative predicate and hence is an exact match for the CUs that need to be spelled out[24]:

[24] Another context where we find third person singular present *be* used in Hungarian is in the possessive construction. Hungarian does not have a possessive verb, but uses a combination of *be* and possessive morphology on the possessed noun to mark possession:

i) (Péter-nek) van autó-ja
Peter-DAT be-3SG car-POSS.3SG
"Peter has a car"

This phenomena fits well with our analysis as it seems to show that the $\sqrt[S]{\emptyset}$ FCU of possessive constructions is in some languages positioned away from the tense and hence

(69) a ... $\underbrace{\sqrt[S]{TALL}\text{ [-past] [-1] [-2] [-pl]}}_{\text{magas}}$ ...

b ... $\underbrace{\sqrt[R]{ON}}_{\text{-on}}$ ... $\underbrace{\sqrt[S]{\emptyset}\text{ [-past] [-1] [-2] [-pl]}}_{\text{van}}$...

What we have here, then, is a non-dummy usage of *be* used to spell out its entire content.

4.2 Have

Based on the discussion of the content of *have* and consideration of the Superset Principle, the vocabulary entries we assume for English *have* are as below:

(70) have ↔ $\sqrt[R]{\emptyset}\ \sqrt[S]{\emptyset}$ [-past] [±1] [±2] [±pl]
has ↔ $\sqrt[R]{\emptyset}\ \sqrt[S]{\emptyset}$ [-past] [-1] [-2] [-pl]
had ↔ $\sqrt[R]{\emptyset}\ \sqrt[S]{\emptyset}$ [+past][perf] [±1] [±2] [±pl]

When *have* is used as an auxiliary the sentence always expresses perfect aspect. We have argued that this is not because the verb *have* realises this meaning, but that it is a dummy realising tense in the presence of the perfect morpheme which is responsible for the meaning. The question that needs to be answered is: why is *have* used in this case and not *be*?

Considering the sentences in (71), both of the dummies seem to be supporting the tense morpheme. Why do we need different dummies then?

(71) a He is running
b He has run

We have the same verb in both of these sentences, so the difference in the dummies does not follow from an inherent difference in the makeup of the verb itself[25]. The CUs we need to describe the meaning of a verb such as *run* are the CUs proposed for activity verbs ($\sqrt[R]{\emptyset}$, [act] and [e]) together with the

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cannot be spelled out as a possessive verb, *have*, as it is in languages such as English. However, to develop this analysis would require more space than there is in the present paper and so we put it to one side and will return to it in a separate paper.

[25] It is well known that in some languages there is an interaction between the perfect and the verb type which determines whether *have* or *be* is used as an auxiliary. While we will not present an analysis of this phenomenon in this paper, such an analysis is possible using the same basic ingredients as we use here. Essentially the interacting elements are the perfect CU and those event structure CUs which distinguish between unaccusative and other types of verbs.

root content stative predicate $\sqrt[S]{RUN}$, defining the specific properties of a running event. In (72), the root spells out all the event related FCUs as well as the [+past] and agreement, given that the irregular past form is listed in the vocabulary:

(72) He ran $\underbrace{\sqrt[R]{\emptyset}\text{ [act] [e] }\sqrt[S]{RUN}\text{ [+past][-1][-2][-pl]}}_{\text{ran}}$

When we add, for example, the progressive to the picture, as we have demonstrated above, the tense is positioned in front of the root and is spelled out by *be*. It is clear that in this case all the event FCUs are still spelled out with the root as *be* is unable to spell out any of them:

(73) He is running $\underbrace{\text{[-past]}}_{\text{is }\sqrt[S]{\emptyset}}\ \underbrace{\sqrt[R]{\emptyset}\text{ [act] [e] }\sqrt[S]{RUN}}_{\text{run}}\ \underbrace{\text{[prog]}}_{\text{ing}}$

When the perfect is added, however, something is different and this difference triggers the use of *have* as opposed to *be*. The vocabulary entries we have proposed for *be* and *have*, based on the discussion of their semantics, claim that they differ in terms of the presence of the $\sqrt[R]{\emptyset}$ CU in the entry for *have*. This suggests that it is the distribution of this element which is affected by the presence of the perfect, in such a way that instead of being realised on the root, it has to be spelled out with tense. As *be* is not associated with this CU, it cannot be selected as the dummy spell out of tense, but *have* can.

(74) He has run $\underbrace{\sqrt[R]{\emptyset}\text{ [-past]}}_{\text{has }\sqrt[S]{\emptyset}}\ \underbrace{\text{[act] [e] }\sqrt[S]{RUN}\text{ [perf]}}_{\text{run}}$

What are the constraints involved which produce this particular distribution? In all cases in which *be* is used, $\sqrt[R]{\emptyset}$ is positioned close to the root, in front of it, along with the other event FCUs, so that it can be spelled out with it. This entails two basic alignment constraints, ensuring that the event CU both precedes and is close to the root:

(75) $\sqrt[R]{\emptyset}$P√ $\sqrt[R]{\emptyset}$ precedes the root
$\sqrt[R]{\emptyset}$A√ $\sqrt[R]{\emptyset}$ is adjacent to the root

Given that there is no indication that $\sqrt[R]{\emptyset}$ ever ends up behind the root, these constraints are ranked in the order presented in (75). The relative ranking of

the adjacency constraint to the adjacency constraints of the other event FCUs will determine their order in front of the root[26].

These constraints must be overridden when the perfect is present as the $\sqrt[R]{\emptyset}$ CU is positioned away from the root, where it will be spelled out together with tense. For this, $\sqrt[R]{\emptyset}$ has to be placed before tense, as shown in (74). Note, we cannot say that the overriding constraint is one which demands that $\sqrt[R]{\emptyset}$ precede tense, as there are many occasions where $\sqrt[R]{\emptyset}$ follows tense. It is only in the presence of the perfect that $\sqrt[R]{\emptyset}$ comes before tense. The fact that the distribution of $\sqrt[R]{\emptyset}$ involves two separate elements (the presence of [perf] and the position of tense) suggests that this distribution is determined with respect to a domain, not to just a single element. In particular, it seems that what $\sqrt[R]{\emptyset}$ cannot tolerate is being placed between tense and perfect:

(76) a $\underbrace{\sqrt[R]{\emptyset}\ [\text{tense}]}_{\text{have}}\ \underbrace{\sqrt{}}_{\text{root}}\ \underbrace{[\text{perf}]}_{\text{en}}$

b $*\ \underbrace{[\text{tense}]}_{\text{is}}\ \underbrace{\sqrt[R]{\emptyset}\ \sqrt{}}_{\text{root}}\ \underbrace{[\text{perf}]}_{\text{en}}$

What we need, therefore, is a domain adjacency constraint, ensuring that $\sqrt[R]{\emptyset}$ is never internal to this domain. This domain consists of just tense and [perf], as other FCUs do not play a role in the distribution of the relation CU. This combination of tense and perfect in a single domain is not surprising given that both play a role in temporal relations: perfect is related to past tense in obvious ways[27]. For this reason we will call the domain the temporal domain. The relevant constraint can be stated thus:

(77) $\sqrt[R]{\emptyset}\text{A}\mathbb{D}_{\text{temp}}$ $\sqrt[R]{\emptyset}$ is adjacent to temporal domain

When [perf] is positioned behind the root, this constraint is sufficient to account for the pre-tense position of $\sqrt[R]{\emptyset}$. Given that $\sqrt[R]{\emptyset}$ must precede the root, the only position in which it can be adjacent to the temporal domain and

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[26] It is difficult to know what this order is, given that when they are positioned in front of the root they are always spelled out with it. We can assume a universal default ordering in this case – which one doesn't appear to matter.

[27] It is common to find descriptions of the perfect as referring to a past event which has relevance for the present or past, depending on the tense, or to a past event which has an unspecified time reference. More formal accounts also have the perfect imposing some notion of temporal precedence. For example, Kiparsky (2002) treats the perfect as something which imposes a precedence relationship on Event time with respect to Reference time.

precede the root is in front of the tense:

(78)	a	$\sqrt[R]{\emptyset}$ [tense] √ [perf]	$\sqrt[R]{\emptyset}A\mathbb{D}_{temp}$	satisfied
			$\sqrt[R]{\emptyset}P\sqrt{}$	satisfied
	b	[tense] $\sqrt[R]{\emptyset}$ √ [perf]	$\sqrt[R]{\emptyset}A\mathbb{D}_{temp}$	violated
			$\sqrt[R]{\emptyset}P\sqrt{}$	satisfied
	c	[tense] √ [perf] $\sqrt[R]{\emptyset}$	$\sqrt[R]{\emptyset}A\mathbb{D}_{temp}$	satisfied
			$\sqrt[R]{\emptyset}P\sqrt{}$	violated

However, when the perfect precedes the root, even though it would be possible for $\sqrt[R]{\emptyset}$ to be adjacent to the temporal domain behind it whilst remaining in front of the root, is seems that this arrangement is still not possible. This suggests that another constraint is in play:

(79)	* [tense] [perf] $\sqrt[R]{\emptyset}$ √ [prog]	$\sqrt[R]{\emptyset}A\mathbb{D}_{temp}$	satisfied
		$\sqrt[R]{\emptyset}P\sqrt{}$	satisfied
		???	violated

We suggest that the relevant constraint is that $\sqrt[R]{\emptyset}$ must precede [perf]: in all grammatical cases where [perf] is present, $\sqrt[R]{\emptyset}$ is in front of it. In those cases where [perf] is absent this constraint will be vacuously satisfied and hence be without effect. Thus we propose the following additional constraint:

(80) $\sqrt[R]{\emptyset}P$[perf] $\sqrt[R]{\emptyset}$ precedes [perf]

As to the ranking of these constraints, the only effective conditions are that the domain adjacency, perfect precedence and root precedence constraints all outrank the root adjacency constraint:

(81) $\sqrt[R]{\emptyset}A\mathbb{D}_{temp}$, $\sqrt[R]{\emptyset}P$[perf], $\sqrt[R]{\emptyset}P\sqrt{}$ > $\sqrt[R]{\emptyset}A\sqrt{}$

With this we conclude our discussion of *have* as a dummy. In the next section we discuss dummy *do*.

4.3 Do

The verb *do*, we have argued, is an activity verb with unspecified root content, which means that it contains all the components of *be* and *have* plus something extra. On the assumption that activities, unlike the states and relations that *be* and *have* realise, are events, one extra element associated with *do* is the event variable which ultimately fixes the event in time. However, activities are specific types of events, so there is also an [act] CU associated with *do*.

For some reduced content uses of *do*, it seems that the [act] CU plays a role in the selection of this vocabulary item, as it is restricted to activity contexts. We have already seen this to be so in the light verb usage of *do*:

(82) a He did a dance/sneeze/salute/etc.
b * he did a think/look/rest/etc.

Other instances where *do* is restricted to activity contexts are mentioned by Dowty (1979), which can be seen by comparing the examples in (83) with those in (84):

(83) a What he did was play the triangle
b Playing a six string banjo with only five fingers is impossible to do
c Playing the bazooka in an orchestra just isn't done

(84) a * What he did was know the answer
b * Knowing the answer is impossible to do
c * Knowing the answer just isn't done

However, in its dummy usage, *do* is used with all kinds of verbs, not just activities:

(85) a He did not play the banjo
b He did not know the answer
c He did not arrive

The only time that *do* is not used in negative contexts involving just a root and a tense is when the predicate does not denote an event, as with adjectival and nominal predicates:

(86) a He isn't tall * he didn't tall
b He isn't a student * he didn't a student

It seems that the element, which is present in all the cases of the selection of *do* as a dummy and which must therefore play a crucial role in this selection, is something that is common to all events, but absent in pure states. The one component associated with *do* that fits the bill is the event variable. We conclude therefore that it is the distribution of the event variable that determines the use of *do* in its dummy occurrence.

Our analysis of *do* will be similar to that of *have*, in as much as we will argue that a given input element, in this case the event variable [e], which is normally positioned near enough to the root to be spelled out by it, is, under the relevant circumstances, forced into a position where it must be spelled out

independently. Specifically this CU will need to be spelled out along with tense. Given that *be* and *have* are not associated with the event CU in the vocabulary, these will not be selected as dummies for spelling out tense in this case. Instead, this task falls to *do*, which has the relevant vocabulary specification.

What are the conditions under which the event CU is not spelled out along with the root? The following illustrates the distribution of this element[28]:

(87) a He ran ... [e] $\sqrt[S]{RUN}$ [past]
ran

b He was running ... [+past] [e] $\sqrt[S]{RUN}$ [prog]
was ~~$\sqrt[S]{\emptyset}$~~ run ing

c He had run ... $\sqrt[R]{\emptyset}$ [+past] [e] $\sqrt[S]{RUN}$ [perf]
had ~~$\sqrt[S]{\emptyset}$~~ run

d He did not run ... [e] [+past] [neg] $\sqrt[S]{RUN}$
did ~~$\sqrt[S]{\emptyset}$~~ ~~$\sqrt[R]{\emptyset}$~~ ~~[act]~~ not run

e He was not running ... [+past] [neg] [e] $\sqrt[S]{RUN}$ [prog]
was ~~$\sqrt[S]{\emptyset}$~~ not run ing

f He had not run ... $\sqrt[R]{\emptyset}$ [+past] [neg] [e] $\sqrt[S]{RUN}$ [perf]
had ~~$\sqrt[S]{\emptyset}$~~ not run

What we see is that the event CU is almost invariably realised with the root; with one exception. This is in the case where there are no aspectual CUs and the tense CU is not behind the root, cf. (87d). This situation is exemplified here with negation, but the same general condition applies with interrogatives too, where the tense CU must precede the subject and hence cannot follow the verb[29].

To account for this distribution pattern we can assume that the event CU, like the other event related CUs, prefers a position preceding and close to the root. This basic requirement is provided by the following constraints, ranked in the given order:

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[28] For the sake of clarity we do not include other event related CUs such as $\sqrt[R]{\emptyset}$, [act], etc. in these examples when unnecessary, although this is obviously not to be taken as a denial of their presence.

[29] For the constraints involved in positioning tense in these cases, see Newson (2010).

(88) a [e]P√ The event CU precedes the root
b [e]A√ The event CU is adjacent to the root

It is clear that the adjacency constraint is violated in the case in which *do* is used. Something causes the event CU to stray further from the root and precede the tense. This cannot be a constraint ordering the event CU and the tense however, as in most cases the event CU follows the tense. Instead it seems that the event CU has to precede the tense only when the tense appears by itself, with no aspect CUs present. When tense follows the root, the event CU can precede tense and be adjacent to the root at the same time and so its position will remain unaltered. But when tense precedes the root, the event CU can no longer maintain its root adjacent position and is forced away from it.

Observe that, in all other cases, the event CU is surrounded by tense and aspect CUs. Let us assume this to be a basic requirement of its distribution – i.e. that it must be anti-adjacent (=obligatorily internal) to the inflection domain. When there is only one member of this domain present, the anti-adjacency constraint becomes inapplicable as it is impossible to be inside a domain consisting of just one element. Under this condition it appears that it is more important for the event CU to precede this domain than it is for it to be adjacent to the root.

Putting this all together, we propose the following two constraints:

(89) a [e]*A$\mathbb{D}_I$ The event CU is anti-adjacent to the inflection domain
b [e]P$\mathbb{D}_I$ The event CU precedes the inflection domain

The ranking of the four relevant constraints is fairly straightforward: the anti-adjacency constraint outranks the domain precedence constraint, forcing the event CU inside the domain whenever possible. The domain precedence constraint outranks the root adjacency constraint forcing the event CU away from the root whenever the domain precedence constraint is applicable. The root precedence constraint outranks the root adjacency constraint, meaning that [e] will always precede the root, though it will strive to be as close to it as possible. A ranking consistent with all these is as follows:

(90) [e]*A$\mathbb{D}_I$ > [e]P$\mathbb{D}_I$ > [e]P√ > [e]A√

There is one appearance of the dummy *do* which is seemingly problematic for our account. Consider the use of *do* in emphatic imperatives:

(91) a do take a seat
b do be quiet

Our account would predict that in these cases it is either [e] or [act] that is forced to the front of these expressions (for whatever reason) and this has to be spelled out as *do*. While this is consistent with cases like (91a), which involves an activity predicate, it seems to be at odds with (91b) which involves a stative predicate. Yet this cannot be the case. It is well known that statives resist imperative contexts:

(92) a * know the answer!
b * be tall!

In order for an adjective to appear in such contexts (as in *be brave!* or *be smart!*) it must be that these are being used non-statively. We have seen that it is possible to add event FCUs to certain adjectives to turn an expression into an activity and this, presumably, is what is going on in cases like (91b). The CU that *do* spells out in such examples is therefore not part of the stative predicate spelled out by the adjective, but, as we would expect, part of the activity event structure that is added to this. This not only accounts for why *do* is used in such cases, as opposed to *be* or *have*, but also why the phenomenon is restricted to certain adjectives which are compatible with an activity reading:

(93)	a	he is being noisy	don't be noisy
	b	he is being nice	do be nice
	c	* he is being tall	* do be tall
	d	* he is being dead	* don't be dead

This completes our account of the dummy usage of the three minimal content verbs. The story is a fairly complex one, involving differing distribution patterns of a number of event related FCUs. Surprisingly however, a rather small number of constraints, over and above those which determine the basic organisation of FCUs and roots, are needed to capture these complex patterns. We repeat these below:

(94) constraints ordering event FCUs with respect to the root

$\sqrt[R]{\emptyset}$P$\sqrt{}$	$\sqrt[R]{\emptyset}$ precedes the root
$\sqrt[R]{\emptyset}$A$\sqrt{}$	$\sqrt[R]{\emptyset}$ is adjacent to the root
[e]P$\sqrt{}$	[e] precedes the root
[e]A$\sqrt{}$	[e] is adjacent to the root

(95) constraints ordering specific event FCUs

$\sqrt[R]{\emptyset}\mathrm{A}\mathbb{D}_{\mathrm{temp}}$	$\sqrt[R]{\emptyset}$ is adjacent to temporal domain
$\sqrt[R]{\emptyset}\mathrm{P}$[perf]	$\sqrt[R]{\emptyset}$ precedes [perf]
[e]*$\mathrm{A}\mathbb{D}_{\mathrm{I}}$	[e] is anti-adjacent to the inflection domain
[e]$\mathrm{P}\mathbb{D}_{\mathrm{I}}$	[e] precedes the inflection domain

5 Conclusion

There is a very real sense in which we are just scratching at the surface of the phenomena we have investigated in this paper, and there is much more material that came to light as we were writing this that we could not include merely for reasons of space. This will be material for future papers. There is also room for improvement to the analyses presented here: tightening up assumptions and confronting problematic data. However, we have been encouraged by the fact that we have managed to get this far and that the system continually seems to provide surprising results where we had not really expected to find them. The notions of decomposition and late insertion are becoming more and more popular from a number of different perspectives. We believe that our particular approach, radical in its assumptions though it may be, has much to offer in pushing these notions to their limits to discover the extent of their usefulness in understanding natural language.

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