LOCALITY, LISTEDNESS, AND MORPHOLOGICAL IDENTITY*

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Abstract. This paper investigates the syntax/morphology interface along four dimensions, in a study of English participial allomorphy. The results are developed in terms of the framework of Distributed Morphology. First, it is shown that considerations of syntactic locality play a direct role in morphological spell-out. Second, the manner in which vocabulary insertion proceeds is argued to be divided into distinct *cycles* of insertion, with potentially different conditions on insertion applying in Root-attached vs. non-Root-attached structural domains. Third, it is argued that the study of syncretisms must appeal to a notion that I call SUBSTANTIVE IDENTITY in defining what it means for morphology to be 'the same' across the distinct cycles of insertion. Finally, it is shown that in addition to structural locality, string adjacency is also a factor in morphological realization.

1. Introduction

Despite many differences concerning matters of implementation, most approaches to morphology assume that significant generalizations are missed if certain cases in which the same morphology is found in distinct syntactico-semantic contexts are not analyzed as systematic. Central to this research program is the idea that certain morphological identities must be stated systematically, while other identities in form merely represent instances of *(accidental) homophony*. I refer to the systematic cases of identity in form as *(systematic) syncretisms*. The dividing line between systematic syncretism and accidental homophony is often stated in terms of syntactico-semantic features, such that making the necessary distinctions requires explicit assumptions concerning the organization of the grammar, and, in particular, concerning the relationship between morphology and syntax/semantics. The discussion of the present paper is framed in terms of Distributed Morphology (Halle & Marantz 1993 and subsequent work); relevant assumptions drawn from this framework are presented as the analysis proceeds.

Several questions of interest surround the notion of *morphological identity* that is grammatically relevant in the statement of systematic syncretisms, and one of the primary tasks of morphological theory is to investigate what the grammatically relevant notion of morphological identity is. In this paper I examine the notion of morphological identity

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in the context of a set of questions concerning the nature of *listed* information in the grammar. All approaches to grammar must assume that some information is simply listed. How this information is listed, and whether or not listedness correlates with grammatical phenomena in a systematic fashion, is a significant research question. The aspect of listedness addressed here centers on the question of how lists are consulted for the purposes of morphological realization. The results of this paper show that the contents of the lists that are consulted for morphological realization are determined by considerations of syntactic locality. In particular, the spell-out of the same type of functional head accesses one list when that head is syntactically attached to a Root, and a potentially distinct list when it is separated from the same Root by additional syntactic structure. This fact about listedness is shown to have direct implications for the notion of morphological identity. Accessing distinct lists in the manner described above amounts to the claim that morphological realization is performed in distinct cycles – at the very least, one cycle for functional heads attached directly to Roots, and another for heads attached outside of the Root-attached domain. In this way, the analysis defines a clear case in which the factors determining allomorphy are statable directly in terms of domains of structural locality. The implication for morphological identity is found in the fact that dividing insertion into cycles requires two distinct notions of morphological identity; namely (1) identity within a cycle, and (2) identity across cycles. Concerning how identity in the second sense is to be defined, I argue that SUBSTANTIVE IDENTITY – identity in terms of the features conditioning insertion, not including the contents of lists – is the relevant notion. Finally, it is shown that although structural conditions on allomorphy like the locality effect outlined above are important, something further is required. In particular, I demonstrate that there is a role for *linear adjacency* in the statement of the conditions on allomorphy.

1.1. *Syncretism and morphological identity*

A starting point for the analysis of morphological syncretisms is the *separation* between the phonological and the syntactico-semantic components of the traditional 'morpheme'.[1] What this separation amounts to can be illustrated in the context of a further set of proposals that I assume here, drawn from Distributed Morphology. The syntax manipulates terminal nodes that consist of abstract feature bundles, at least in the case of functional heads. After the syntactic derivation, in the process called *vocabulary insertion*, phonological material is added to these terminal nodes. In vocabulary insertion, individual *vocabulary items*, which consist of a phonological *exponent* and its conditions on insertion,

[1] Hence the term *Separation Hypothesis*, as used by Beard (1966, 1995).

are consulted, such that the most highly specified vocabulary item determines which exponent appears in a particular position. Given these assumptions, a systematic syncretism occurs when a single vocabulary item spells out the same exponent in two distinct syntactico-semantic nodes. One of the guiding principles behind this separation of phonology from syntax and semantics in Distributed Morphology (and realizational theories of morphology in general) is that it provides a means by which morphological syncretisms can be stated systematically. The basis for the systematic analysis of syncretisms lies in the fact that vocabulary items involve *underspecification*. The terminal nodes that are the sites for insertion are fully specified; that is to say, they contain a full complement of syntactico-semantic features.[2] However, the vocabulary items that determine insertion into these positions need not be fully specified, with the result that a single phonological exponent may potentially appear in more than one syntactico-semantic context. To take a simple example, consider the Person/Number agreement prefixes for Objects and Subjects found in the Athabascan language Hupa (data from Golla 1970):[3]

(1) Hupa Subject and Object Markers

	SUBJECT	OBJECT
1S	W-	WI-
2S	n-	nI-
1PL	dI-	noh-
2PL	oh-	noh-

Concentrating on the Plural forms, while the exponents *dI–* and *oh–* appear in the Subject position, and distinguish 1st from 2nd person Plurals, such a distinction is not made in the Object position, where we find a single exponent, *noh–*. As noted above, the theory assumes that the morphosyntactic positions in which vocabulary insertion takes place are fully specified. The plural nodes from the example above are represented as follows:

(2) Feature Bundles

a. $\begin{pmatrix} +1 \\ +\text{PL} \\ +\text{SUBJ} \end{pmatrix}$ b. $\begin{pmatrix} +2 \\ +\text{PL} \\ +\text{SUBJ} \end{pmatrix}$ c. $\begin{pmatrix} +1 \\ +\text{PL} \\ +\text{OBJ} \end{pmatrix}$ d. $\begin{pmatrix} +2 \\ +\text{PL} \\ +\text{OBJ} \end{pmatrix}$

[2] Of course, the nature and identity of such features is the topic of an active research program.

[3] The forms here are only for 1st and 2nd person arguments; 3rd person and other types of arguments are not included for the sake of clarity.

Consider now the following vocabulary items, which spell out the plural part of (1):

(3) a. +1 +PL +SUBJ ↔ dI
b. +2 +PL +SUBJ ↔ oh
c. +PL +OBJ ↔ noh

While the 1st and 2nd Plural in Subject position are realized via distinct vocabulary items (3a) and (3b), realization in the Object nodes is effected by a single vocabulary item, (3c). The vocabulary item (3c) does not refer to the features [1] or [2], and in this sense it may be said to be underspecified with respect to the feature bundles to which it applies, (2c) and (2d). The fact that the 1st and 2nd Plural are non-distinct in Object position is systematic on this account, with the syncretism being captured via the single vocabulary item in (3c). Put slightly differently, there is a single *–noh*, despite the fact that this *–noh* appears in more than one plural context.

At the other extreme from systematic sycretisms of this type just illustrated, we have *accidental homophony*. This can be seen in the realization of 3s verb inflection of English, as compared with the realization of the feature [+PL]. Each of these nodes is (for regular verbs and nouns) realized as /–z/. In this case, unlike that from Hupa, there is no reason to think that this identity in form is systematic. Standard analyses therefore posit two distinct vocabulary items, each of which results in a node being spelled out with the exponent /–z/, but under distinct conditions:

(4) Homophony
AGR[3S] ↔ /-z/
[+PL] ↔ /-z/

In these two examples, the basis for the distinction between systematic and accidental identity in form is to be found in the abstract features that are realized. In the Hupa case, the *–noh* exponent appears in two distinct contexts that both involve the features [+PL] and [+OBJ]. In the English case, on the other hand, there is no feature content shared by AGR[3S] and [PLURAL]. The justification for the morphological treatment is thus strongly dependent on the syntactico-semantic analysis. Each of these two cases involves apparently identical morphology appearing in distinct syntactico-semantic contexts, but the analysis in terms of systematic vs. accidental is determined by the connection between 1st or 2nd Person Plural on the one hand, and the absence of a connection between AGR[3S] and [PLURAL] on the other.

2. English Participles

The two cases of surface identity in form examined above in section 1.1 were selected to represent relatively clear extremes. It is not always the case that instances of putative morphological identity can be readily

categorized as either systematic syncretisms or accidental homophonies. In this paper, I examine an identity in form that has these intermediate properties. In particular, I address the question of whether the *–en* in the "adjective" *rott-en*, as in *The rott-en apples . . .* , is the same *–en* that is found in passive "participles" as in *The letter was writt-en by John*. A great deal of work has been devoted to the analysis of English participles, and questions about allomorphy have played a somewhat important role in this area. A familiar assumption, which is challenged below, is that there is always identical allomorphy in the "adjectival" and "verbal" passives. This assumption has been influential in the syntactic analysis of the various participles. To take a specific example of this influence, Lieber (1980:229–230) states that Adjectival and Verbal passive participles are always identical, and proposes to account for this pattern by deriving the Adjectival passive participle from the Verbal passive participle: $V_{part} \rightarrow [V_{part}]_A$. Bresnan (1982), who argues for a Lexicalist treatment of passivization across the board, appeals to aspects of Lieber's analysis in support of this view. Briefly, Bresnan argues that adjective formation is lexical, and that adjectival passives are formed from verbal passives. She then concludes that the formation of verbal passives must itself be lexical, because verbal passives are the input to a lexical (word-formation) process. The conclusion is based in turn on the idea that syntactic transformations cannot feed lexical rules, a position which follows from the organization of the EST grammar (as typically associated with Wasow (1977), at least in the participial domain).

In the present context, the examination of participial allomorphy and the relationship between allomorphy in "participles" and "adjectives" leads to a distinct set of questions. Below it is shown that while it is true that for a majority of Roots in English there is no difference between putatively "adjectival" participles and e.g. "passive" participles, there are a number of cases in which a Root appears with distinct participial allomorphs: $\sqrt{\text{ROT}}$, *rott-en*, *rott-ed*; $\sqrt{\text{SINK}}$, *sunk-en*, *sunk-Ø*, and so on. There are, in addition, further cases such as *open-Ø* versus *open-ed*, which manifest a similar distinction.

The analysis below develops the idea that both the allomorphy facts concerning forms like *rott-en* and the nature of the apparent syncretism between "adjectival" and "participial" forms can be understood structurally. The structural treatment requires some background concerning the structure and interpretation of different participial forms. I appeal to a three-way distinction between *Stative*, *Resultative*, and *Eventive Passive* participles in English.[4] These are illustrated in (5) with

[4] To this list one could also add the *perfect* participles, from examples like *John has written several books*. Because the point can be made with the limited set of participles discussed in the main text, I will not address the perfect here.

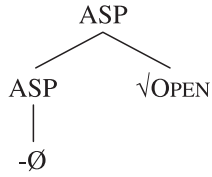
For an approach similar to that assumed here see Marantz (2001), who sketches a

the Root $\sqrt{\text{OPEN}}$:[5]

(5) a. **Stative:** The door is open.
= The door is in an open state.
b. **Resultative:** The door is opened.
= The door is in a state of having become open (state resulting from event)
c. **Eventive Passive:** The door was opened by John.
= John opened the door

I assume here an approach to these forms that relates certain types of eventive interpretations to the presence of syntactic structure. In particular, I assume that grammatical eventivity is associated with the presence of *v*, a verbalizing head; for this assumption in a framework like that advanced here see Harley (1995) as well as Travis (1994) and Kratzer (1996). Structurally, the Stative has the structure in (6), in which a functional head, labelled "ASP" here, is attached to the Root.[6] The trees that illustrate the Stative, Resultative, and Eventive Passive are done in terms of the examples in (5); for expository purposes, the ASP heads are shown with the exponents that are inserted into those heads:

(6) Stative



There is no *v* in this structure, encoding the fact that the interpretation of the Stative is neither resultative nor eventive. The other two types of participle noted above each have verbalizing structure to which the ASP head attaches, such that ASP is not in a direct relationship to the Root. Simplifying somewhat, the structures for the Resultative and the Eventive Passive are as follows):[7]

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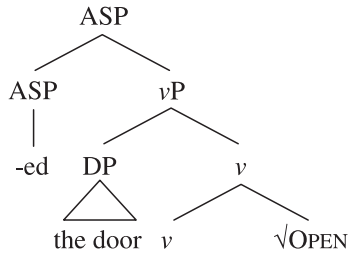
treatment of participles based on a two-way distinction; Kratzer (1994, 1998, 2001) also investigates participles in ways that involve similar semantic distinctions, but in a framework that makes different assumptions about syntax, morphology, and the "Lexicon".

[5] Technically (5b) is ambiguous, with the present tense "habitual" reading of the Eventive Passive as well.

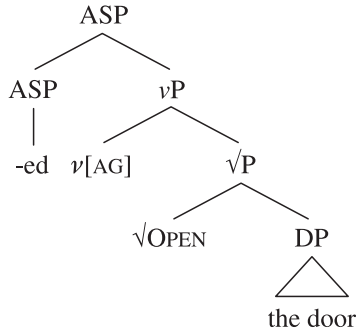
[6] Disregarding the label 'ASP' on the functional head, this is the structure that one would associate with a standard "adjective". For the relationship between the label ASP and the label *a* for 'adjective', see below.

[7] See Embick (2002) for the analysis of Resultative participles in these terms. In the Resultative participle the *v* is associated with "inchoative" semantics (Embick 2002), that is, with a meaning like that associated with 'become'. The feature [AG] (for 'AGentive') in the Eventive Passive is responsible for the licensing of agentive interpretations, as in the work of Kratzer (1994, 1996).

(7) Resultative



(8) Eventive Passive



Since each of these participles contains a *v* head, I will sometimes refer to them together as *v-participles.* Considering the Statives along with the *v*-participles, the ASP head is in each case the head in which the "participial" exponents *–ed*, *–en*, *–t* and so on are inserted.

3. The generalization(s) about allomorphy

Returning to the question of allomorphy in the Stative, the existence of forms like *rott-en* raises the question of whether the *–en* found in this form is the same as the *–en* found in passives like *The letter was writt-en by John* or perfects like *John has writt-en the letter*. In the context of the discussion above, which contrasts the two extremes of systematic syncretism versus accidental homophony, it is shown below that these are instances of the same *–en*. More generally, and moving beyond just the realization of *–en*, there are reasons for positing systematic connections between "participial" and "adjectival" structures.[8] For the cases in which there seem to be different participial allomorphs for the same Root like *rott-en* and *rott-ed*, I establish the following generalization for the English facts:

[8] This is, of course, the traditional position in some sense; however while the traditional viewpoint tends to emerge on the basis of exclusively morphological considerations, the argument here is based on syntactico-semantic criteria.

(9) ALLOMORPHY GENERALIZATION: A "stand-out" participial allomorph, like the *–en* in *rott-en* as opposed to perfect and passive *–ed*, is found only in the Stative syntactic structure.

The analysis of this generalization involves two major points, which are summarized in (10):

(10) a. **Structural Locality and Allomorphy:** According to the analysis I present below, the allomorphy pattern results from considerations of locality; the Stative structure is special because the participial head ASP is attached directly to the Root. The lists consulted for vocabulary insertion into Root-attached heads differ from the lists consulted for insertion in non-Root-attached heads. A consequence of the analysis is that vocabulary insertion be divided into distinct *cycles*, a Root Cycle, for Root-attached heads, and an Outer Cycle, for non-Root-attached heads. As noted, insertion in these different cycles accesses distinct lists for the same type of functional head, such that *–en* is inserted in the context of $\sqrt{\text{ROT}}$ in the Root Cycle, but not the Outer Cycle.

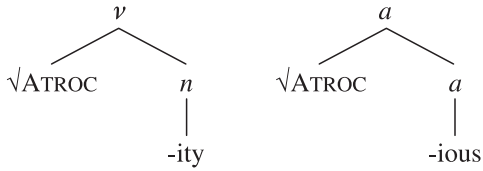
b. **Root-Visibility in the Outer Domain:** The structural analysis, relying on the difference between Root-attachment and higher attachment, is only part of what must be said about what is visible for contextual allomorphy. Even in cases in which a Root takes the same participial allomorph in all of the environments noted above there is a question about allomorphy. In the *v*-participles, ASP and the Root are separated by *v*. Nevertheless, the ASP head shows Root-determined contextual allomorphy; for instance, the insertion process at the ASP head in the Eventive Passive of e.g. $\sqrt{\text{BREAK}}$ must be able to "see" the identity of this Root in order to insert the appropriate exponent. How the information about the identity of the Root is visible for insertion of ASP in such cases is of interest because it appears to provide evidence for 'global' visibility of the Root in complex structures, something which should be avoided if possible. In section 7 I address this question in detail, and argue that linear adjacency of the ASP head and the Root is relevant for contextual allomorphy.[9]

[9] In many ways, the questions posed in the text parallel questions posed in the 1970s and early 1980s, which resulted in the *Adjacency Condition* of Siegel (1978) and Allen (1979) and the *Atom Condition* of Williams (1981); see below, section 7.

Another thread in the literature on what is visible for allomorphy concentrates on differences between "inwards" and "outwards" sensitivity. In an example like Root-X-Y-Z, this is the question of whether insertion at Y could be sensitive to what has been inserted at X or Z. For this type of question, Carstairs (1987) offers a number of interesting observations. Bobaljik (2000) argues that if one assumes insertion from the Root outwards, as has been the norm in Distributed Morphology, then contextual allomorphy at Y could refer to the actual exponent inserted at X, but not to the exponent inserted at Z. For some comments relevant to this latter claim, see also Carstairs-McCarthy (2001).

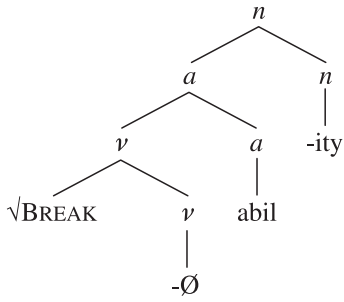
Regarding the first of these points, (10a), the discussion of the behavior of ASP heads in participles involves the idea that the same type of syntactic head may appear either as attached to a Root, as in the case of the Stative, or attached outside of the Root, as in the case of the *v*-participles. This facet of the syntax of word-formation has been illustrated clearly in the domain of "derivational" morphology in recent work by Marantz (2001). Building on generalizations that derive ultimately from Aronoff (1976), Marantz argues that cases of apparent *truncation*, as in e.g. *atroc-ious* ~ *atroc-ity*, are cases in which category defining heads, in this case *a* and *n*, are attached to Roots:

(11) atroc-ity (12) atroc-ious



The relevance of such cases for the analysis of participles is that *n* heads like that realized as *–ity* in (11) can be attached to functional heads in addition to being attached to Roots. One productive case of this type which is realized with the phonological form *–ity* is found with "potential" forms in *–able*; consider e.g. *break*, *break-able*, *break-abil-ity*. The structure for e.g. *break-abil-ity* involves an *n* attached to an *a* head:

(13) break-abil-ity



There are two points to be made here, one having to do with syntax, and one having to do with morphological spell-out. On the syntactic side, these examples demonstrate how heads of the same type, e.g. *n* heads in this example, can attach both to Roots and to other functional heads. On the morphological side, examples of this type illustrate that some vocabulary items, such as the vocabulary item with the exponent *–ity*, determine insertion into both (1) heads attached to Roots, and (2) heads attached outside of Roots. A similar point can be made for *–i/able*, which

realizes both *a* heads that are attached to Roots (as in *horr-or*, *horr-ible*) and *a* heads that are attached to functional heads (*formal*, *formal-ize*, *formal-ize-able*).[10] In the participial domain, the situation is quite similar. There are ASP heads that attach directly to Roots (= Statives), and ASP heads that attached to verbalized structures with *v* (= *v*-participles). For the purposes of morphological realization, there are many cases in which the same "participial" exponents are found in the Root-attached and non-Root-attached domains. The exceptions to this are of course the cases covered by (9), and are analyzed below.

4. Structures and allomorphy patterns

In this section I establish the Allomorphy Generalization (9) in two steps. The first is a review of a number of allomorphy facts concerning the forms of Statives and participles. After this, I give syntactico-semantic diagnostics that can be used to identify Statives. There are three major classes in which Stative forms differ from corresponding participial forms, as in (14):

(14) Stative Different

	Root	Stative	Other Participles
1.	√BLESS	bless-èd	bless-ed
	√AGE	ag-èd	ag-ed
	√ALLEGE	alleg-èd	alleg-ed
2.	√ROT	rott-en	rott-ed
	√SINK	sunk-en	sunk
	√SHAVE	(clean-) shav-en	shaved
3.	√OPEN	open	open-ed
	√EMPTY	empty	empti-ed
	√DRY	dry	dri-ed

The first case involves syllabic *–èd* (cf. Dubinsky & Simango 1996); this appears only in the Stative. The second class consists of cases in which we find multiple participial allomorphs for the same root (cf. Aronoff 1994, Lieber 1980).[11] These are cases like *rott-en*, mentioned above, and e.g. √SINK, with both *sunk-en* and *sunk-Ø*.[12] In the third pattern, the Stative

[10] For this point in the domain of nominalizations found with the exponent *–ing* see Kratzer (1996) and Harley & Noyer (1998).

[11] Note that cases of this type must be distinguished from cases in which there are true *doublets*. For instance, some speakers of English have the participial forms *prov-ed* and *prov-en* for the verb *prove*. If the forms are interchangeable across all three morphosyntactic contexts, Eventive Passive, Resultative, and Stative, this is a different phenomenon from that being discussed in the main text.

[12] There are a few additional observations to be made about some of these examples. In some cases there are restrictions on the "special" forms to attributive position: *The sunken ship . . .* vs. **The ship is sunk-en*. In some cases this is complex, as with *drunk-en* and *drunk-Ø*, both of which may be Statives.

form has a *–Ø*, as in *open-Ø* vs. *open-ed*; these are typically regarded as involving "basic" adjectives. While these forms do not have an overt affix in the stative, they show a difference between the Stative and the Resultative, as in *open-Ø* vs. *open-ed*, or *empty-Ø* vs. *empti-ed*, and so on. In addition to the patterns in (14), there are a number of cases in which there is identity in form across all of the relevant environments, as in *clos-ed*.

The Allomorphy Generalization in (9) states that the "special" forms of Roots like $\sqrt{\text{ROT}}$ or $\sqrt{\text{OPEN}}$ are, in terms of the structural distinctions I have motivated, Statives. That is, they involve the attachment of a head directly to the Root, and no *v* or other verbalizing structure. I now demonstrate that this is correct by showing that the "special" forms receive the interpretation of Statives, and not of Resultatives. While there is no single diagnostic that can be used to distinguish all of the Statives from the Resultatives, distinct tests performing this function can be developed.

An initial diagnostic for distinguishing Statives and Resultatives, employed in Embick (2002), involves an environment after a verb of creation. In such an environment, pure Statives are allowed, as in (15a), but Resultatives are not (15b):

(15) a. The door was built open.
b. *The door was built opened.

In the (b) case, the interpretation requires that the door be in a state resulting from a prior event, and this is incompatible with the broader context. The contrast in (15) is the same as that found in cases like the following, in which a canonically Stative Root is contrasted with the Root $\sqrt{\text{DESTROY}}$, which resists the Stative environment:

(16) a. This door was built tall.
b. *This door was built destroyed.

In (16b), *destroyed* can only be interpreted as a Resultative, and the sentence is deviant accordingly.

While not all of the forms we would like to test for Stative status can be used felicitously in the verb of creation environment, the patterns established by (15) and (16) provide the basis for further diagnostics. One such diagnostic is Prefixation with *un–*, which is fully productive with Resultatives, but not so with Statives.[13] The difference in productivity is what is important here, since *un–* does appear with some Statives ("adjectives"): *un-happy* and so on. However, prefixation is not productive across the class of Statives, but it is with Resultatives: **un-open* versus *un-open-ed*. When *un–* is prefixed to forms with distinct "participial"

[13] In the previous literature, this pattern is found in the claim that *un-* attaches to adjectives but not to verbs, in Wasow (1977). See also Kratzer (1994), (2001) for some related discussion.

affixes, we find that once again the "special" forms pattern with *open*, indicating that they are Statives:[14]

(17) *un-rotten, un-rott-ed
*un-bless-èd, un-bless-ed
*un-shrunk-en, un-shrunk
*un-dry, un-dri-ed

In addition to the tests adduced above, a common approach is to employ adverbial modification as a means of distinguishing Statives from Resultatives (and other participles), the idea being that certain adverbials require eventivity, and in particular certain functional projections associated with event structure or aspect.[15] Some adverbials seem to distinguish Statives from Resultatives in the same way as the prior two diagnostics.[16] However, the situation is somewhat complex, and I will not review the facts here; a systematic discussion is found in Embick (2002).

To conclude, while there is not a single diagnostic that distinguishes Statives from Resultatives, the tests employed in this section establish that such a distinction can be made systematically. For the investigation of allomorphy to be undertaken below, the significant pattern is that when there is a "special" form, it is always a Stative.[17]

[14] There are, at the same time, some "special" forms that permit *un*-prefixation, such as *un-shav-en*. These forms do not constitute a problem for the use of the diagnostic above. Rather, in such cases, other diagnostics must be used to probe for Stative interpretation.

A further point concerns the interpretation of *un*-prefixed statives, pointed about by an anonymous reviewer. There is an interpretive difference between *unhappy* and *not happy*, with the former showing a "contrary" interpretation.

[15] This assumption has played a role in the analysis of nominalizations, see Alexiadou (2001) for a recent discussion. In the domain of Statives, etc., some caution must be employed with this type of diagnostic, as it returns somewhat erratic results even with canonical "adjectives". Consider, for instance, the following examples:

(i) a. A recently sick person
b. A recently rich person

Although these examples might be somewhat awkward, they seem grammatical. However, they differ interpretively. The interpretation of (a) is of a person who was sick recently, but who may or may not be sick at the time of utterance. In (b), the interpretation points to a person who became rich recently.

[16] One is tempted here to employ adverbs like *quickly*, which apparently produce the relevant contrast:

(i) a. *The quickly open door
b. The quickly opened door

The problem with examples of this type is that it is very difficult to rule out an Eventive Passive interpretation for (b). In addition, *quickly* is felicitous with Statives, given a certain interpretation: *Having been left out in the sun, the meat was quickly rotten*.

[17] There are other formations which take affixes otherwise associated with participles as well, although how they fit into the classification in the text is not quite clear. First, there are several roots which are typically never verbal in the first place, but which have *–ed* affixed forms, which have a 'provided with' or 'characterized by' interpretation: *beard-ed*, *spott-ed, red-hair-ed, sabre-tooth-ed*. In addition, there is a class containing forms like the following, which have a 'made of' interpretation: *wood-en, silk-en, gold-en, flax-en, lead-en*.

The first (*beard-ed*) type is extremely common and productive. There is sometimes a

5. The nature of the pattern

The questions I have raised in the preceding sections concern the relationship between forms like *rotten* and *rotted*, and, in general, whether certain Statives contain the same exponent found in Resultatives or Eventive Passives. In answering this question, let us begin by clarifying the relationship between the form *rotten* and the Root $\sqrt{\text{ROT}}$. There are four basic options.

An initial option (Option 1) is that the forms are unrelated. Thus in the case of e.g. $\sqrt{\text{ROT}}$, there would be a distinct Root, $\sqrt{\text{ROTTEN}}$, with no internal structure and no relation to $\sqrt{\text{ROT}}$. That is, the relationship between $\sqrt{\text{ROT}}$ and $\sqrt{\text{ROTTEN}}$ would be like that between $\sqrt{\text{SPIN}}$ and $\sqrt{\text{SPINACH}}$, at least derivationally; the former pair would, of course, have (coincidentally) similar lexico-semantic content. Option 2 is that *rotten* is related to $\sqrt{\text{ROT}}$ by virtue of being a stem-allomorph of that Root, much as *broke* stands to *break*. According to this view, *rotten* is not internally complex. Rather, a readjustment rule applies to the Root, in the same way that a readjustment rule alters the phonology of the stems of Roots like $\sqrt{\text{BREAK}}$ and $\sqrt{\text{SELL}}$ in the past tense (*broke-Ø* and *sol-d*). Option 3 holds that *rotten* is internally complex with an exponent *–en* that is accidentally homophonous with an *–en* found with Resultatives and Eventive Passives. That is, while the form *rott-en* consists of two pieces, the *–en* found in *rott-en* is simply homophonous with the *–en* found in e.g. *The letter was writt-en by John*. Option 4, the final option to be considered, is that *rotten* contains a "participial" exponent *–en*. The form *rott-en* is related directly to the Root $\sqrt{\text{ROT}}$, and shows the exponent *–en* which is otherwise found in a number of participles. That is, the *–en* found in *rott-en* is identical with the *–en* found in *The letter was writt-en by John*.

Beginning with Option 1, it seems rather unlikely that there is no connection between *rot* and *rotten*. This is especially clear in cases in which the allomorph found in the Stative is the same as that found in the Resultative and Eventive Passive, as with *clos-ed*. If we assume that the Statives are not transparently derived, then *closed* as a Stative would not be related to the Root $\sqrt{\text{CLOSE}}$, while *closed* as a Resultative or Eventive Passive would be so related. This is a rather bizarre consequence, and suggests once again that Option 1 must be rejected for the most part.[18] Option 2 holds that forms like *rot* and *rotten* are related to each other, i.e. derived from the same Root. However, this option states further that

requirement that a modifier be present, as in *#hair-ed* versus *black-haired*. The nature of this requirement is unclear. It is possible in this case that the head realized as *–ed* is actually attaching above an *n* head, but I will not pursue this analysis here. For the second (*wooden*) type, see Borer (1990) for some pertinent observations.

[18] At the same time, there are some instances in which this analysis might be correct. For instance, the relationship between *melt* and *molten* is less transparent than that between *rot* and *rotten*. Positing distinct Roots $\sqrt{\text{MELT}}$ and $\sqrt{\text{MOLTEN}}$ might be justified in this case, as well as some others.

there is no complex internal structure in *rotten*; it is simply a stem allomorph. Behind this option lies a general question, concerning how affixation and stem-allomorphy can be distinguished from each other. I cannot address that question here, but I will assume for the purposes of this discussion that such distinctions can be made.[19] The basis for this is the assumption that, all other things being equal, learners prefer a piece-based analysis to an analysis involving stem allomorphy when there is clearly overt affixation. This assumption could certainly be investigated further in its own right, but for present purposes I take it to be correct; as a result, Option 2 is ruled out.

Option 3 holds that *rott-en* is in fact derived from $\sqrt{\text{ROT}}$, but that the *–en* found in that form has no relation to the *–en* found in e.g. Resultatives or Eventive Passives. Regarding homophony in general, I assume the following:

(18) AVOID ACCIDENTAL HOMOPHONY: Learners seek to avoid accidental homophony; absent evidence to the contrary, identities in form are treated as systematic.

The manner in which this principle functions is constrained by matters discussed in section 1. In particular, (18) is relevant when there is a morphosyntactic basis for treating a surface identity as involving a systematic syncretism. In this light we may contrast Option 3 with another case that might be clearer. It seems straightforward to say that the *–en* in *ox-en*, or the *–en* in *flatt-en*, are simply homophonous with the *–en* in *writt-en*. Extending the considerations advanced in section 1, the reason for this is that the nodes being spelled out in each of these cases have little to do with one another syntactico-semantically: in one case we are spelling out ASP, in another [PLURAL], and in the third an inchoative variety of *v*. There is no overlap in features or node labels here, so there is no reason to suspect a systematic identity in the different *–en* exponents. In the case of the Statives and the *v*-participles, however, there are clear reasons for positing a systematic syncretism.

One clear syntactic point is that the Stative, Resultative, and Eventive Passive participles have common distributional properties. For the most part, they appear both in prenominal (attributive), and in predicative position.[20] The common distribution provides a strong basis for treating the two forms as involving heads of the same type. Beyond this syntactic affinity, and concentrating more on the relationship between the Stative and the Resultative, it is clear that these two formations have semantic properties in common. Both are stative in a broad sense, although in the Resultative the state results from a grammatically represented event, while

[19] There are, of course, some grey areas, such as reduplication, autosegmental affixation, and "templatic" prosodic morphology.

[20] Although, as noted, some forms like *sunken* appear only in attributive position.

in the Stative it does not.[21] In light of these distributional and interpretive connections between Statives and Resultatives, I conclude that the presence of "participial" exponents in the Stative (and vice versa) should be treated as a systematic syncretism, and not an accidental homophony.[22]

To this point I have referred to this type of node as *ASP*, but the actual identity of the label is not as important as the distribution of this type of head. Whatever the label for this head is, the argument connecting Statives and *v*-participles above shows that the same type of head appears both in "participles" and "adjectives". As long as this point is maintained, the choice of the label itself is arbitrary. It could equally be labelled *a* for "adjective", or, perhaps more neutrally, *z*. Settling on a particular label requires a detailed study of the relationship between features and node-labels, something which has not been undertaken. For instance, whether or not ASP in Statives and Resultatives has the exact same feature content is a further question, which I will not go into here.[23] For present purposes, it suffices to note (1) that the ASP head in each case is associated with stativity, and this provides an interpretive basis for identifying the heads, and (2) that, according to the comments above, a head of this type appears both in "adjectives" (= Statives) and in *v*-participles.

6. Locality and cycles of insertion

As an initial step in the analysis of participial allomorphy, let us first consider a provisional analysis of the fact that we find identical participle allomorphs in the Resultative, Eventive Passive, and Perfect. On the assumption that there is a head ASP[PRES] found in present participles, the spell-out rules are as in (19):

(19) Provisional spell-out of ASP

ASP[PRES]	↔	-ing
ASP	↔	-en/____{√BREAK, √SPEAK, . . .}
ASP	↔	-Ø/____{√HIT, √SING, √SHRINK . . .}
ASP	↔	-t/_____{√BEND, √BUY, . . .}
ASP	↔	-ed

[21] There is, of course, a mystery with the Eventive Passive, which is identical in form to the Resultative. This type of participle is not stative. There seem, moreover, to be no interpretive consequences of the fact that the passive is formed with a participle – Eventive Passives have the same aspectual interpretation as corresponding actives do.

[22] Although the primary argument in the text is based on syntactico-semantic effects, there are also diachronic patterns suggesting a strong connection between the Stative and certain participial forms. To take one example, the Latin verbal system forms a periphrastic passive in the Perfect tenses, based on the so-called "past passive participle" in *–t–/–s–*. This participle is derived from an earlier de-verbal adjective in Indo-European, which was presumably a pure Stative in the terms under discussion here (see Brugmann (1895) for the diachrony, and Embick (2000) for the Latin passive). These developments suggest that speakers identify the vocabulary items appearing in the two domains, as the analysis here predicts.

[23] See Embick (2002) for some remarks on this point.

This provisional set of vocabulary items accounts for the fact that Roots show identical participial allomorphs in the Resultative, Eventive Passive, and Perfect despite the syntactico-semantic differences between these structures. Each contains a head ASP that is not of the ASP[PRES] type found in the progressive, and each is thus realized in the same way.

Consider now how the Statives could be integrated into the list of spell-out rules in (19). As a first attempt, I will simply add the Roots that take irregular allomorphs in the Stative to the lists found with these vocabulary items, as in (20):

(20) Spell-out of ASP
ASP ↔ -en/____{√BREAK, √SPEAK, √ROT, √SHRINK, . . . }
ASP ↔ -Ø/_____{√HIT, √SING, √OPEN, √SHRINK . . . }
ASP ↔ -t/_____{√BEND, √BUY, . . . }
ASP ↔ -èd/____{√BLESS, √ALLEGE, √AGE, . . . }
ASP ↔ -ed

There are two problems with this approach. First, insertion with these vocabulary items incorrectly results in the Stative form appearing in non-stative environments in a number of cases. For e.g. √BLESS this set of rules would derive **The book was blessèd by the priest*. Second, there are conflicts with examples like *shrink*, which appear on two separate lists. The general problem, common to these two specific problems, is that the Stative environment is not specifically identified in the manner in which insertion operates. In particular, the facts indicate that insertion at ASP has to see the identity of the Root whether ASP is attached to the Root (the Stative), or separated from the Root by *v* (the *v*-participles). What is needed is a way of specifically referring to Root-attachment in the insertion process.

Consider now a treatment which takes "root-attached" to be a visible property, i.e. something that can be referred to in the lists determining allomorphy. Abbreviating root-attachment as √ROOT*, the relevant vocabulary items are as follows:

(21) Spell-out of ASP: Reference to Root-attachment
ASP ↔ -en/____{√BREAK, √SPEAK, √ROT*, √SHRINK*, . . . }
ASP ↔ -Ø/_____{√HIT, √SING, √OPEN*, √SHRINK, . . . }
ASP ↔ -t/_____{√BEND, √BUY, . . . }
ASP ↔ -èd/____{√BLESS*, √ALLEGE*, √AGE*, . . . }
ASP ↔ -ed

Treating root-visibility as a property that can be referred to in lists avoids the difficulties noted above with reference to (20). There are, however, further aspects of this approach which suggest that it is inadequate. First, the affix *–èd* appears exclusively on Statives. This means that every item on its list must be marked with *. The generalization, however, is that this exponent only appears in the Root-attached environment, and the

listing solution does not account for this systematically. Rather, this property is simply an accident of the list associated with *–èd* as it is represented in (21). By itself this consideration might not be conclusive. However, it has been demonstrated that a majority of derivational affixes (in English) attach only to Roots (see Marantz (2001), building on Fabb (1988) and Plag (1999)). This raises the question of whether collapsing Root-attached and non-Root-attached vocabulary items as in (21) misses a larger generalization about the manner in which insertion is structured. In particular, these generalizations suggest that there are certain vocabulary items which can only be inserted in the Root-attached domain, and that an analysis of insertion must take this into account.

A second problem centers on the status of *–ed* in (21). This is treated as the default for ASP, since in the formation of the participles it is the regular exponent. At the same time, the structure associated with Statives involves simple Root-attachment. This makes the Statives structurally the same as many "adjectives". It is not the case that *–ed* is the default exponent for the formation of "adjectives" in English. To the extent that there is a default exponent of a Root-attached ASP head in English, it is probably not *–ed*. What is required is a way of stating that although *–ed* appears systematically in a number of environments, it is a default in the Outer "participial" domain, but not in the Root-attached domain.

Alternatively, rather than treating Root-visibility as the relevant property, the lists could make reference to the presence of *v*:[24]

(22) Spell-out of ASP: Reference to *v*
ASP ↔ -en/____{*v*-√BREAK, *v*-√SPEAK, √ROT, √SHRINK, . . . }
ASP ↔ -Ø/_____{*v*-√HIT, *v*-√SING, √OPEN, *v*-√SHRINK, . . . }
ASP ↔ -t/_____{*v*-√BEND, *v*-√BUY, . . . }
ASP ↔ -èd/____{√BLESS, √ALLEGE, √AGE, . . . }
ASP ↔ -ed

Some further modifications to (22) are necessary. In order to function properly, an analysis that refers to *v* environments must also refer to the Root-attached environment. Consider the first vocabulary item in (22). It cannot be interpreted as a rule that adds the exponent *–en* to ASP whenever the Root √ROT is visible. This would result in the presence of *–en* in all participles for this Root, which is contrary to fact. The vocabulary item associated with *–en* must, therefore, carry reference to Root-attached environment. This is very much like what was done in (21) above. Illustrating with the vocabulary item that inserts *–en*, a representation incorporating this change is given in (23), where the * is used for Root-attachment as it was above:

[24] The need to discuss this option in detail was made clear to me by an anonymous reviewer.

(23) Spell-out of ASP: Reference to *v* and Root-Attachment
ASP ↔ -en/____{*v*-√BREAK, *v*-√SPEAK, √ROT*, √SHRINK*, . . . }

Taken as a whole, this analysis is similar in most ways to that presented in (21) above. As such, it is open to the same objections. In fact, since the solution with *v*-Reference must refer to the *-environment as well, it is more properly described as a version of (21), which incorporates the information required in (21) as a subcomponent. While it might be possible to fall back on this type of listing solution, one of the primary questions raised in the discussion of (21) above has not been addressed. Certain exponents, such as *–èd* in the discussion above, appear only in the Root-attached environment. According to the treatments discussed to this point, this is an accident of the list associated with this vocabulary item. If the observations of Fabb and Marantz concerning Root-attached versus non-Root-attached affixes are on the right track, however, this fact is worthy of a systematic treatment. Some general points about vocabulary insertion point to this same conclusion. One of the primary notions behind morphological realization in Distributed Morphology is the idea that there is *competition* for insertion. In cases like that with ASP, it is clear that once this head is attached outside of other functional heads, the vocabulary item inserting *–èd* is no longer relevant – this exponent never appears outside of the Root-attached environment. In this way, this vocabulary item does not compete with e.g. *–en* in the way that the vocabulary item for *–t* does. But the treatments that have been proposed immediately above do not encode this generalization. An analysis that makes the Root/non-Root distinction directly has not been considered in detail. In the remainder of this section I propose a treatment that makes a sharp distinction between these contexts for insertion.

The treatment I propose is based on the manner in which locality considerations play a role in morphosyntactic derivations. Stated in structural terms similar to those discussed above, a distinction may be made between (1) functional heads attaching directly to the Root, and (2) functional heads attaching higher, i.e. outside of other functional heads (Marantz (2001); recall section 3 above). For convenience, I refer to vocabulary insertion taking place in Root-attached positions as occurring the *Root Cycle*; outside of the Root-attached heads, insertion takes place in the *Outer Cycle*.[25] Concretely, the Root Cycle/Outer Cycle distinction applied to ASP is as in (24):[26]

[25] Built into this definition is the idea that being Root-attached is an important property. Technically, one could say in a case with multiple affixes, e.g. √ROOT-*x*-*y* that *x* is in an Inner Cycle with respect to the Root, while *y* is in an Inner Cycle with respect to *x*. Whether or not this extended or relativized sense of Inner vs. Outer is required, I will continue with simply 'Root-attached' vs. 'Outer' in the text.

[26] Notice that in the Root Cycle I have included a list of the Roots that condition the insertion of *–ed*. The reason for this was noted above – while *–ed* may be the default

(24) a. Spell-out of ASP: Root Cycle
ASP ↔ -en/_____{√ROT, √SHRINK, . . .}
ASP ↔ -Ø/_____{√OPEN, √EMPTY . . .}
ASP ↔ -t/_____{√BEND, . . .}
ASP ↔ -èd/_____{√BLESS, √ALLEGE, √AGE, . . .}
ASP ↔ -ed /____{√CLOSE, √OBSTRUCT, . . .}
b. Spell-out of ASP: Outer Cycle
ASP ↔ -en/_____{√BREAK, √SPEAK, . . .}
ASP ↔ -Ø/_____{√HIT, √SING, √SHRINK . . .}
ASP ↔ -t/_____{√BEND, √BUY, . . .}
ASP ↔ -ed

The property of this analysis that resolves the listing difficulties identified above is that the lists are different in the two cycles. So e.g. √ROT is on a list in the Root Cycle (for *–en*) but not in the Outer Cycle, while √SHRINK is on the list for *–en* in the Root Cycle and on the list for *–Ø* in the Outer Cycle. In many cases, Roots take the same allomorph in both the Root and Outer Cycles, as one might expect.

Separating insertion into distinct cycles has clear implications for the notion of what constitutes a systematic syncretism. Much of the discussion above centered on the idea that Statives and *v*-participles are involved in systematic syncretisms. Yet one consequence of the separation of insertion into distinct cycles is that we have the following vocabulary items as part of the realization of ASP:

(25) a. Root Cycle: ASP ↔ -en/____{√ROT, √SHRINK, . . .}
b. Outer Cycle: ASP ↔ -en/____{√BREAK, √SPEAK, . . .}

More generally, we have pairs of vocabulary items, each responsible for inserting *–t*, *–en*, and *–Ø* in the two different cycles. For *–ed*, we have a list as well, but only in the Root Cycle. For syllabic *–èd*, we have only a Root Cycle list, with no insertion of this exponent in the Outer Cycle. Given (25), and similar Root/Outer pairs with distinct lists that could be produced for the other exponents, we are led to the following question:

(26) Are the vocabulary items in (25) the same?

That is, does separating the two cycles account for the identities in form systematically, or as a type of accidental homophony? In effect, the discussion has come full circle. Even with the assumption that Statives share a common syntactico-semantic head with *v*-participles, the node ASP, we are faced once again with the question of whether e.g. the *–en* in Stative contexts is the same as that found in Resultative or Eventive Passive contexts. Since we have two apparently distinct vocabulary items

realization of ASP with e.g. Resultatives and Eventive Passives, it is not the default for Statives.

in (25), something further must be said if the question about identity is to be answered.

Having arrived at this apparently puzzling conclusion about morphological identity, there are three possibilities to consider. The first is that the reasoning leading to this conclusion is correct, indicating that the *–en*'s are in fact accidentally homophonous. In light of the discussion of section 4 I will adhere to the position that an appeal to accidental homophony in this case is unwarranted. The second possibility is, as noted above, that one could simply adopt one of the listing solutions considered above (recall the discussion of (21) and (22) above. As I have stressed, adopting this solution does not account systematically for the fact that certain exponents are inserted in only the Root-attached environment. While it is possible to fall back on this position, this is not the stance I will investigate here. Rather, I conclude this section with a third option. This option holds that the reasoning behind the analysis above is correct, but there are two notions of *morphological identity*: identity within a cycle, and identity across cycles. This position requires a definition of *morphological identity* which is cycle-dependent, which I present below.

Support for the claim that identity is cycle-dependent, which is in many ways a claim about how lists relate to grammatical structures and notions of grammatical locality, can be adduced from other domains. It is important to focus on lists in this context, because lists are responsible for the question in (26): if the vocabulary items in (25) did not have different lists, then clearly they would be regarded as identical (i.e., not separated in the first place). In order to illustrate the nature of listed information, consider a parallel that comes from the manner in which lists play in encoding idiomatic interpretations. This is a property of the *Encyclopedia*, which lists non-compositional meanings. To take an example, consider a head *x* that may attach either to a Root as in (a), or outside of the Root as in (b):

(27) Example structure (abstract)
  a. ROOT-*x*
  b. ROOT-*y*-*x*

Marantz (2001) argues that the relationship between the Root and *x* could yield an idiomatic interpretation in (a), but not in (b). What it means in this case to have an idiomatic interpretation is to consult a list, viz. the Encyclopedia. In other words, a list is consulted in one configuration involving both the Root and *x* are combined, but not in another. The fact that a list is consulted in the (a) case but not the (b) case does not mean that the Root and *x* are different in the two cases.[27] The principle to be extracted from this discussion is as follows:

[27] I am not suggesting here that "special meanings" are somehow restricted to word-sized objects. Much of the discussion of idioms and light-verb constructions in Distributed

(28) LISTEDNESS: Listed information is cycle-dependent. Whether a list is accessed for insertion, and the particular contents of that list, are determined by whether or not the node to be spelled out is in the Root or Outer Cycle.

Given this view of listedness, and the relationship between lists and syntactic structure, we can then ask how morphological identity is to be defined. Within a cycle, the conditions are quite straightforward, and were discussed in section 2 above. Identity within a cycle can be stated as follows:

(29) MORPHOLOGICAL IDENTITY: Vocabulary items are identical when they pair identical features/nodes with identical exponents.

The question about lists does not really arise here, because no analysis would countenance two vocabulary items with identical feature/node content and identical exponents that differed only in the contents of their lists – the two lists would be compressed into a single list for a single vocabulary item (see below).

If we are to maintain the idea that there is a systematic syncretism between Statives and *v*-participles, it must rely on a notion of identity across cycles that is distinct from (29). I propose to define this condition as follows:

(30) SUBSTANTIVE IDENTITY: Two vocabulary items show *substantive identity* when (1) the features responsible for insertion are the same, and (2) these features are paired with identical exponents.

This is identity up to the contents of lists. Thus in an abstract example like the following, the two vocabulary items responsible for the insertion of –X show substantive identity:

(31) a. Root Cycle: $\text{Label}_i[\alpha]$ ↔ -X/List1____
b. Outer Cycle: $\text{Label}_i[\alpha]$ ↔ -X/List2____

If either the label (here abstract Label_i) or the feature content (if any) conditioning insertion were different, then there would be two separate, homophonous –X's.

It is clear that Substantive Identity as defined here is a notion that can only be defined across cycles. Within a cycle, no analysis would posit separate vocabulary items like in (31). Rather, –X would be inserted in the context of a set of elements that are the union of List1 and List2.

In terms of information content, MORPHOLOGICAL IDENTITY is "stronger" than SUBSTANTIVE IDENTITY because it requires identity in terms of substantive features, the phonological exponent, and the

Morphology has been explicitly directed against this correlation (Harley 1995, Marantz 1997). Rather, the point is merely that the same object can trigger the consultation of a list in one environment, but not in another, and at the same time be a single grammatical object.

contextual list; SUBSTANTIVE IDENTITY requires only the former two types of identity. According to the definition, then, there is no accidental homophony in the realization of "participial" exponents in Statives. The *–en*, *–ed*, etc. found in the two Cycles are the same, and are predicted to be treated identically by any morphological processes that refer specifically to the identity of one of these exponents, or, for that matter, in experimental tasks probing grammatical representation.[28] There are various options in terms of how to represent the effects of SUBSTANTIVE IDENTITY on the vocabulary insertion process. One possible implementation operates in terms of there being single vocabulary items as in (32):

(32) ASP ↔ -en
ASP ↔ -Ø
ASP ↔ -t
ASP ↔ -èd
ASP ↔ -ed

In the course of the insertion process, the structural position of the ASP head determines further conditions on the realization of these items, by activating distinct lists – one list for the Root-attached cycle, and a potentially different list for the Outer Cycle.

Concerning morphological identity more generally, the question of whether SUBSTANTIVE IDENTITY as defined here is the correct notion of trans-cycle identity is an open one. It must be recalled that the move to this notion is prompted by the separation of cycles in the first place. A listing solution, like those discussed earlier in this section in (21) and below, does not require additional comment on the question of identity. Ultimately, then, the question is whether Root-Attached versus non-Root-attached differences should be taken to be part of the grammar of insertion. If they are, the answer that I have investigated here, then SUBSTANTIVE IDENTITY, or something like it, is required. If these generalizations are not treated as part of the insertion process, then the listing solution with reference to *v*- or Root-attachment can be appealed to. In any case, the predictions of the present analysis are clear, and further investigation in this domain promises to have interesting consequences.[29]

[28] There are, as far as I know, no further morphological processes that refer specifically to the identity of e.g. *–en* or *–ed* that could be used to tell whether vocabulary items that show substantive identity are treated identically.

[29] A further question of interest concerns the relationships between the distinct lists that may, according to this analysis, be associated with the same vocabulary item. The assumption might be that the contents of the two lists are identical in cases where Root-visibility is at issue. There are other patterns as well. In the participle system, for instance, there is no Root which takes a listed allomorph in the Outer Cycle (*v*-participles), but *–ed* in the Root Cycle. The status of such generalizations is not clear at present.

7. Root-determined allomorphy without root-attachment

The analysis put forward in the preceding sections is based directly on a notion of locality – the Root Cycle and Outer Cycles are distinguished from one another in purely structural terms. In this way, the analysis directly relates possibilities for allomorphy with a syntactic structure in which the ASP head is directly attached to the Root. In another way, however, the patterns of allomorphy found in English participles seem to display some apparently non-local properties. One notable fact about the spell-out of English participial allomorphs is that there is Root-determined allomorphy in both the Root and Outer Cycles. The analysis given above holds that the insertion of the proper allomorph depends on lists of Roots, whether the head ASP is being spelled out in the Root Cycle or the Outer Cycle. Sensitivity of a head to features of the Root in the Root Cycle is uncontroversial, as discussed above. The apparent sensitivity to Root features in the Outer Cycle is, however, a question which deserves serious attention. In the cases of Outer Cycle insertion, there is no directly local structural relationship between the Root and ASP, because there are intervening *v* heads (recall the Resultative and Eventive Passive structures in (7) and (8)).

At the heart of the matter are further questions concerning the role of locality in contextual allomorphy. Specifically, we must ask at this point if the analysis of participial allomorphy requires the *global visibility* of the Root:[30]

(33) **Global Visibility of the Root:** In a structure Root-X_1- . . . X_n, the Root is visible for insertion (and therefore contextual allomorphy) at each head X.

The second option is based on the idea that the Root and the ASP head in the Outer Cycle stand in a particular relationship with one another when vocabulary insertion occurs. In particular, in every case in which there is an irregular allomorph of ASP in the Outer Cycle, ASP is linearly adjacent to the Root at the point of insertion at ASP.[31] This suggests that the patterns of irregularity in the participial domain implicate linear adjacency rather than forcing global visibility of the Root. In order to make this more precise, consider the following condition, derivative of

[30] Visibility of this type is also at issue in approaches that allow *percolation* of features from the Root. The system of Williams (1981) seems to have this property; features of the Root (the "head" in this case) percolate, such that " . . . a feature on a morpheme in head position will be relevant to all further stages of derivation, because it will be inherited in each successive stage of the derivation." (1981:254). It remains to be seen if all of the cases that have been adduced in favor of the percolation based approach to visibility are amenable to treatment in terms of the condition on linear adjacency in (34) below.

[31] The participial forms for verbs with overt verbalizing morphology are invariably regular, at least as far as suffixation goes: *–en*, *–ize*, and *–ify* all take *–ed*.

early discussions of the factors determining allomorphy such as Siegel (1978) and Allen (1979):[32]

(34) **(Linear) Adjacency Condition:** Contextual allomorphy at x can be sensitive inwards only to a linearly adjacent element.

I am assuming here that linearization applies from the Root out, and immediately precedes insertion.[33] Linearization is represented by the * operator, and I replace hiearchical],[brackets with parentheses),(for exposition. Informally, then, in a hierarchical object such as [$\sqrt{}$ROOT X] Y], Linearization first applies to [$\sqrt{}$ROOT X], followed by insertion at X; the processes then apply to ($\sqrt{}$ROOT * X) and Y. Finally, and this is crucial, I assume that phonological *–Ø* affixes are irrelevant for the purposes of linear adjacency; I refer to this property as *Ø-Transparency*. The derivation of the participle *brok-en*, based on a form that requires insertion in the Outer Cycle (i.e. a v-participle), is illustrated in (35). The derivation proceeds as follows:[34]

(35) Derivation of *brok-en*

INPUT:	[[$\sqrt{}$BREAK *v*] ASP]
Linearization 1:	[($\sqrt{}$BREAK * *v*) ASP]
Insertion 1:	[($\sqrt{}$BREAK * -*Ø*) ASP]
	Ø-Transparency: ($\sqrt{}$BREAK * -*Ø*) → ($\sqrt{}$BREAK)
Linearization 2:	($\sqrt{}$BREAK * ASP)
Insertion 2:	($\sqrt{}$BREAK * -*en*)

The relationship between the Root and ASP in this derivation is crucial for the discussion of global visibility versus adjacency. At the point

[32] The Adjacency Condition as developed in Siegel and Allen does not refer to linear adjacency, but instead to cycles of morphological rule application. Specifically, a rule X cannot refer to Y, unless Y is in the cycle that is adjacent to (= applies immediately before) X; there are of course parallels between this formulation and the type of structural locality conditions I have discussed above. In any case, the cycle-based view does not suffice in the participle domain.

Concerning the linearity-based version stated in the text, there are some further technical questions which have potentially interesting empirical consequences. In the cases discussed in the text, involving participles, we are dealing with simple structures involving ($\sqrt{}$ROOT * ASP) at the point of insertion. In cases in which insertion takes place in a more complex structure, different questions arise. Consider the following case, in which insertion has taken place to insert /–x/ and /–y/, and insertion at Z is at issue:

(i) (((Root* /-x/) * /-y/) * Z)

Is what counts as adjacent to –Z simply the exponent /–y/ (and the features on that node), or the entire complex (($\sqrt{}$ROOT * /-x/) * /-y/), or both? Answers to this question have potentially subtle empirical consequences which have yet to be explored.

[33] The idea that linearization precedes insertion in this way is implicit in Embick & Noyer (2001).

[34] One point that the derivation in (35) abstracts away from is the phonology of the Root. At some point, the Root phonology (in this case /bræ:k/) must be taken into consideration.

when vocabulary insertion occurs at ASP, this node is adjacent to the Root. The fact that the Root is visible for allomorphy at ASP in this structure therefore does not require the global visibility of the Root. In light of the options considered above, concerning why there is still Root-determined allomorphy in the Outer Cycle, this analysis allows us to hold the more restrictive option, that based on the (Linear) Adjacency Condition.

The argument of this section shows only that Global Root Visibility is not required in the case of English participles. Ultimately whether or not the restrictions on visibility should be weakened, such that Roots would always be visible in such structures, is largely an empirical matter.[35] The *Adjacency Condition* itself is also something that warrants close scrutiny. Although this condition seems to be required in the case examined above, and while the condition seems preferable to Global Visibility, it is an apparently negative result. Perhaps the ideal state of affairs would be one in which the information required for insertion is strictly determined by structural factors alone, such that insertion at ASP could not be influenced by the identity of the Root in the forms examined above because of the intervening *v* heads. The fact that linear adjacency, a PF-notion, imposes constraints on top of those provided by the structural notion of locality for the purposes of insertion, is quite suggestive.[36]

8. Conclusions

The importance of syncretism in the study of the syntax/morphology interface results from the fact that approaches to syncretism differentiate viable theoretical alternatives. A primary argument against the traditional *lexical item*, i.e. against primitives or "morphemes" that contain both syntactico-semantic and phonological information, is the existence of syncretisms that are viewed as systematic. The idea that phonological

[35] An insightful discussion of these matters is provided by Hay (2000), who examines the (differing) empirical domains of the Adjacency Condition of Siegel (1977) and Allen (1978) on the one hand, and the *Atom Condition* of Williams (1981) on the other. It is an open question at this point whether the combination of structural and linear conditions on allomorphy extend to the full set of cases that were treated by either the Adjacency Condition of the 1970s or the Atom Condition.

Some specific cases have been cited as especially problematic for locality-based conceptions of allomorphy; for instance, Carstairs-McCarthy (1992) notes some apparent problems for conditions involving adjacency, in the domain of Latin deponent verbs. See Embick & Halle (forthcoming) for an analysis.

[36] There are some further questions that could be posed concerning *zero transparency*. For instance, as Marantz (personal communication) has pointed out, one might ask whether all *Ø*-exponents are transparent, or if transparency is only a property of default *Ø*'s as opposed to blocking *Ø*'s. The *–Ø* that is transparent in the *v*-participles is the default realization of *v* in English, so what one would have to find in order to answer this question is a case in which a blocking *–Ø* shows transparency as well.

material is inserted into syntactic structures after the syntactic derivation, *Late Insertion*, is one of the defining architectural features of Distributed Morphology and other realizational theories. The move to Late Insertion is motivated by empirical considerations, viz. the fact that languages show systematic syncretisms, and not by conceptual concerns; what is therefore required given this position is a detailed account of how vocabulary insertion occurs. Moving beyond the basic motivation for separating phonology from syntax/semantics, the analysis of this paper provides further insight into the structure of the insertion process by (1) illustrating the role that structural locality plays in insertion; (2) arguing that insertion should be performed in cycles, with access to potentially distinct lists in each cycle; (3) identifying a notion of SUBSTANTIVE IDENTITY for syncretism across cycles; and (4) emphasizing the role played by linear adjacency in the statement of conditions on allomorphy. Taken together these results provide a number of further predictions, predictions which potentially cut across a number of phenomena and which direct attention to some subtle and interesting empirical questions.

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