

A Misconceived Approach to Morphology

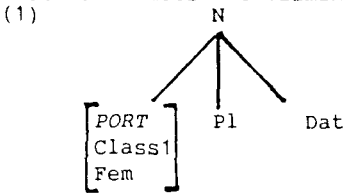
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0. Introduction

Halle (1990) proposes an approach to morphology that, in a wide range of cases, eschews morphosyntactic features on nonterminal nodes in favor of abstract morphemes in terminal strings. This represents a rejection of the proposals in *Aspects* (Chomsky 1965) and most subsequent work on the morphology-syntax interface, and a reversion to some of the earliest work in generative grammar, in particular *Syntactic Structures* (Chomsky 1957) and *The Grammar of English Nominalizations* (Lees 1960), and also of *SPE* (Chomsky & Halle 1968).

Halle's analysis of a form like the Latin dative plural *portis* 'to (the) gates' involves a representation like that in (1), with plural number and dative case as formatives separate from the stem formative *PORT* (with its morphological feature of declension class and its morphosyntactic feature of gender; note that Halle does not eliminate features altogether).



Halle maintains that the onus is on opponents of the approach that he favors, with abstract morphemes like 'Pl' and 'Dat' instead of feature specifications like [Num:Pl] and [Case:Dat]. He represents his main argument for abstract morphemes as nothing more than a simple application of Occam's Razor: the rules that spell out features as affixes in a realizational approach, he asserts, can be dispensed with at no cost under the abstract morpheme approach:

In a framework where abstract morphemes are initially instantiated as features on non-terminal syntactic nodes, it is necessary to provide a series of rules that will "spell out" these features as prefixes or suffixes. To the extent that this procedure makes no appeal to independently motivated syntactic phenomena, the burden of proof falls to its proponents. (Halle 1990, 155)

But there is no basis for Halle's claim that some special burden of proof must be met by realizational morphologists. Halle has neglected to note that his own approach will necessitate

intraword constituent structure rules to specify that, for instance, the three formatives in (1) make a constituent (of category N) and that the string of formatives in (2a) is bracketed as in (2b) rather than (say) as in (2c).

- (2) a. LET SLEEP Ing DOG Pl LIE
b. [LET] [SLEEP Ing] [DOG Pl] [LIE]
c. {LET} {SLEEP} {Ing DOG} {Pl LIE}

The chunking of material into word-like units is crucial in both morphology (where they serve as the domains within which generalizations are stated) and syntax (where they are the atoms over which generalizations are stated). Halle's strings of formatives crucially have structure, in both components. This holds for theories in which the same chunking is assumed for both morphology and syntax, including those in which there are multiple levels of syntactic representation, one of which will serve as the interface to morphology; and it also holds for theories in which the chunking for morphological purposes can be different from the one for syntactic purposes, as in the *Syntactic Structures* analysis of English auxiliaries via 'Affix Hopping' (Rule R of Chomsky 1981).

There is no analog of intraword constituent structure rules in a realizational approach. Words and lexical (zero bar-level) categories are in one-to-one correspondence; at the syntactic level words have no internal constituents (though they have sets of feature specifications, i.e. categories), and at the level defined by (the output of) the morphological rules they comprise stems as modified or augmented by various phonological operations.

There is thus a direct tradeoff here that prevents the choice between frameworks from being anything as simple as an Occam's Razor application: Halle pays for not having feature complexes and realization rules in that he has to provide (or arrange for the syntax to simulate) constituent structure rules that put stems together with affixes. In addition, he has to posit *string rewriting rules*, which play no role whatsoever in realizational frameworks. The issue of parsimony of rule types is probably not the way to differentiate these frameworks anyway; but it certainly cannot be said to favor Halle's approach over the realizational one.

The position we argue in this paper is that when appropriate criteria for theory choice are brought into play, Halle's proposals are clearly seen to be disfavored. Section 1 observes that the abstract morpheme approach fails to entail the Strong Lexicalist Hypothesis, section 2 that it spawns a host of pseudo-problems about the linear ordering of abstract morphemes. Section 3 argues via a Swahili example that the approach is ill suited to coping with dependencies between nonadjacent affixes in inflectional morphology, section 4 that with respect to 'zero affixes', required in virtually all representations, it misses generalizations, lacks independent motivation, and is insufficiently restrictive. Section 5 points out that Halle's reliance on language-particular (henceforth *parochial*) rule orderings to control morphological rule interactions entails an

additional reduction in restrictiveness. (Several of these criticisms are treated further in the discussion of 'realizational' versus 'combinatory' morphology in Zwicky, to appear.)

In conclusion, section 6 comments briefly on possible wider implications for theory construction consequent on the choice between category-oriented or formative-oriented algebras as a formalism for morphology. The issues we consider here are independent of arguments over level-ordering in morphology and over the choice between combinatory and realizational frameworks for morphology, despite the fact that this choice is sometimes labeled as being between 'morpheme-based' and 'process-based' frameworks. However, since Halle appears to posit abstract morphemes for roughly the same features that are eliminated in favor of abstract segments in syntactic representations of the sort proposed in Pollock (1989), we believe that our case against Halle's morphological proposals undercuts the overall support for Pollock's syntactic hypotheses.

1. The Strong Lexicalist Hypothesis

A particularly unhappy consequence of Halle's view is that it does not entail the the Strong Lexicalist Hypothesis (SLH; see Scalise 1984, 101f and references cited there on this principle, which elsewhere we have called the Principle of Morphology-Free Syntax). The SLH forbids access to word-internal structure by syntactic rules, and has been stated in various ways: 'Syntactic transformations are never allowed to perform morphological operations' (Lapointe 1978, 3); 'syntactic rules are not allowed to refer to, and hence cannot directly modify, the internal morphological structures of words' (Lapointe 1980, 222); 'No deletion or movement transformations may involve categories of both W[word]-structure and S[entence]-structure' (Selkirk 1982, 70).

Under the *Aspects* view, the SLH follows from component divisions, without further stipulation; the phonological units that realize the words do not even belong to the vocabulary in which the syntactic rules operate. In Halle's approach this is not true. If Affix Hopping can shift an inflectional affix into place across intervening syntactic material and phrase boundaries, it is not clear why affixes or stems could not be moved apart by syntactic rules to yield (e.g.) Suffix Topicalization or Heavy Stem Shift constructions. If the SLH is a valid universal constraint on grammars, as the majority of morphologists and syntacticians agree it is, it must somehow be added in Halle's framework as a stipulation.

We should add that it is not clear to us how this can be done. To order syntactic rules before morphological ones in grammars would not be sufficient. Halle has made no clear distinction between morphological and syntactic rules on which the ordering could be based, so rules of particular grammars would have to be tagged as belonging in the morphology or in the syntax, and this would amount to nothing more than a parochially stipulated ordering between certain blocks of rules; but since

advocates of parochial rule ordering hold that dialects can differ by having different orderings for identical rule sets, this would not be strong enough to exclude the possibility of dialects with morphological rules that fed or bled syntactic rules.

2. Linear precedence

Feature complexes do not have precedence relations defined on their constituent feature specifications; a feature complex (a category as defined in Gazdar et al. 1988) is an unordered set of feature-value pairs. Abstract morphemes, on the other hand, occur in strings, not sets, and bear linear precedence relations to each other. This fact is the source of a morass of pseudo-problems in Halle's framework about which he says almost nothing. For example: which of the possible orders of the morphemes in Latin *amō* 'I love (first person singular present indicative active)' is the right one? *LOVE* + Ind + Act + Pres + 1P + Sg is one possibility; there are $6! - 1 = 719$ others.

The realizational approach does not face this artifactual question; *amō* has a single feature representation, say one in which the stem *am-* is associated with certain feature specifications: {Mood:Ind, Voi:Act, Tns:Pres, Pers:1, Nu:Sg}. The realization rules will indicate that this feature complex (not necessarily any particular one of the feature specifications) calls for suffixation of *-o* to the stem. There is no issue of where the tense, person, number, and other morphemes are relative to each other, or where they go if they are not called upon to contribute segments to the phonological representation (see section 4).

Halle omits from his representations nearly all the abstract morphemes the forms must contain, and shows only the morphemes that are crucial to the point at hand. This is fair enough as an expository technique, but it conceals the proliferation of spurious alternative representations to which the theory gives rise (and the epistemological problem of how learners can determine, after identifying the abstract morphemes that compose a word, which string representation containing those morphemes is the correct one).

3. The problem of discontinuities

Discontinuous dependencies pose significant difficulties for the abstract morpheme approach. We will illustrate this point with some data from Swahili morphology (discussed in Zwicky & Pullum 1989, independently and more formally treated in Stump 1991). In a Swahili verb, the information that a form is negative appears in two out of three possible places within the form (depending on the tense/aspect in question), and no two of these three places are contiguous to one another. The relevant slot template is roughly: (Neg) + Subj + Tns/Asp + (Obj) + STEM.

Matters are straightforward in the future, which has *ta-* in the third slot and the negative marker *ha-* optionally in the first. For the past and perfect, however, the occurrence of *ha-* in the first slot requires the occurrence of special Tns/Asp

markers in the third, and for the two presents, the occurrence of *ha-* requires both the absence of a marker in the third slot and the selection of a verb stem in *-i* rather than *-a*:

(3) wa-wa-som-a	ha-wa-ta-som-a	
'they will read'	'they won't read'	
wa-li-som-a	ha-wa-ku-som-a	
'they did read'	'they didn't read'	
wa-me-som-a	ha-wa-ja-som-a	
'they have read'	'they haven't read'	
w- a- som-a	} ha-wa-∅- som-i	
'they do read'		'they don't read, aren't reading'
wa-na-som-a		
'they are reading'		

In a realizational framework, there is nothing problematic here. We can state rules like those summarized informally below:

- (4) a. *ha-* in slot 1 realizes {+Neg}
- b. *ta-* in slot 3 realizes {Tns:Fut}
- c. *li-* in slot 3 realizes {-Neg, Tns:Past}
- d. *ku-* in slot 3 realizes {+Neg, Tns:Past}
- e. *a-* in slot 3 realizes {-Neg, Tns:Pres, Asp:NonProg}
- f. The stem in *-a* is the default
- g. The stem in *-i* is used for {+Neg, Tns:Pres} forms

A more explicit statement of the realization rules needed, together with a nonstipulative account of the precedence relations between them, is given by Stump (1991). Realizational frameworks have no problem with multiple exponents of the same feature or single exponents for sets of features. But these options are not available to Halle, who must reduce every such feature specification to an abstract morpheme in a certain position. Data such as those from Swahili verb morphology offer a powerful argument against Halle's framework (and also, as Stump stresses, against those concrete morpheme frameworks in which affixes are subcategorized for insertion into certain positions in morphological structure).

4. The problem of zeroes

A realizational approach allows us to say that affixes occur only when some rule calls for them, so that a zero-inflected form is nothing more than the stem, unaffected by any rule; *work* in *They work* will have no affixes at any level of analysis.

But Halle must stipulate every zero as well as every non-zero. For the most part, zeroes will be described either by rules deleting affixes (Halle's analysis for the English plurals *sheep*, *men*, and *moose*, and presumably the one for English Pres *work*) or by rules conflating sequences (Halle's analysis for Latin and Russian case/number suffixes on nouns). However, there is no evidence for the alleged phonologically empty affixes in forms of

the first type or for the multiple alleged affixes in forms of the second type; these 'extra' affixes are just artifacts of the analysis.

It is a consequence of Halle's framework that every English finite verb form will contain person and number agreement morphemes, although most of them have zero phonological realization. Interesting factual evidence against this claim comes from the majority of dialects in American English, in which *Go get the newspaper* is grammatical but **He went got the paper* is not (see Pullum 1990 for a recent study of this construction and a review of the previous literature).

Both verbs in this construction must be uninflected. But present tense inflections that are phonologically zero are treated as if they completely lacked inflection; *Every day I go get the paper* is fine. If morphological inflection rules are operations on the phonological material in stems (realizing morphosyntactic features), the constraint can be stated to require both verbs to be bare stems. But for Halle, the representation *GO-Pres-1P-Sg* is (incorrectly) just as distinct from *GO* as the representation *GO-Past-1P-Sg*, so the level of morphological representations does not permit the generalization to be captured. But the post-realization phonological level is too concrete to allow for the constraint to be stated, because at that level abstract morphemes are eliminated and only phonological material is present, and the constraint on *go get* is defined only on a specific syntactic construction, not on the numerous partially similar constructions involving the same verbs (*go, come, etc.*).

There is a critical advantage with respect to zeroes that accrues to any framework with rules that match (sets of) abstract syntactic features (rather than abstract affixes) with phonological material appearing in stipulated slots. In such a framework there are two different places for a condition to play a role: as a condition on a rule itself (predicting gaps) and as a condition on its phonological content (predicting zeroes).

Suppose we said that a rule realizing {Past} for verbs in some language was subject to a condition that it applied only to stems ending in a vowel. This formulation would predict that verbs with stems ending in a consonant had defective paradigms, that there was a gap (at least as far as this particular rule is concerned) in the set of verb forms. Now suppose we said that a rule realizing {Past} for verbs in some language included the requirement that if the stem ends in a vowel, certain phonological material occurs in a particular slot. This formulation would predict that verbs with stems ending in a consonant had Past forms, but without any alteration in the stem.

Zeroes of this sort are in fact very common. Consider the failure of realization for English Poss Z for words ending in a Z affix (*kids'* vs. *children's*), or the failure of realization for the German schwa Pl for nouns ending in schwa plus a sonorant (*das Zimmer* 'the room', Pl *die Zimmer*, vs. *das Schaf* 'the sheep', Pl *die Schafe*), or the failure of realization for the Russian /l/ Past word-finally for verb stems ending in a consonant (/pek/ 'he baked' vs. /pek-l-a/ 'she baked'), or the failure of realization for *ge-* as an exponent of PastPrt in German for verb stems that do

not begin with an accented syllable (*trompetet* 'trumpeted' and *versagt* 'denied' vs. *ge-sagt* 'said'; the observation that accent rather than occurrence of a prefix is crucial here is due to Kiparsky 1966).

There are some zeroes that Halle's framework can describe as, in effect, failures of realization -- namely, those where it is possible to motivate a rewriting rule inserting the material that is in alternation with zero (as in the German PastPrt case, where the alternation is with *ge-*). However, for the most part, zeroes have to be described by rules deleting affixes, despite the fact that there never seems to be any evidence suggesting that there actually are affixes in such forms.

5. Rule ordering

Halle not only opts for a powerful derivational theory, he also permits parochial stipulations as to the order in which rules apply. From a metatheoretical point of view, this is a decidedly retrograde move. In syntax, the case against parochially stipulated linear ordering of rules was already widely accepted by the mid-1970s (Pullum 1979a), and from 1977 on, the notion that syntactic rules were unordered was adopted without remark by MIT linguists (cf. Chomsky & Lasnik 1977, 431). In phonology, developments in the same year (Lieberman & Prince 1977) began to de-emphasize the issue of rule ordering in phonology as well, moving away from the string manipulations of SPE in favor of more structural and multi-dimensional conceptions of phonology. Efforts at arguing for the necessity of rule ordering in phonology were largely tabled (Zwicky 1987 represents a more recent return to the topic).

The arguments against parochially stipulated rule ordering on restrictiveness grounds were strong. For a given set of n rules, a theory in which principles of rule interaction are universal determines exactly one grammar corresponding to that set of rules, while a theory assuming parochially stipulated linear ordering of rules determines a class of $n!$ distinct grammars. Thus, assuming the fifty rules of Chomsky & Halle (1968) are the correct phonological rules for English and permitting only strict linear orderings, the right actual phonological component would have to be sifted out from among the $50! \approx 3 \cdot 10^{65}$ possible orderings of those rules. (The situation is even worse if partial orderings are allowed; see Pullum 1979b.)

In other words, parochial linear ordering theories are unacceptably weak. They admit of a wildly enhanced range of variation in possible grammars. (Levine 1976 and Pelletier 1980 are correct in arguing that nothing is at stake as regards what languages can be generated; but this is mainly because linguists have set so few limits on their theoretical vocabulary. The effects of rule ordering can be coded into unordered rules simply by tagging them with numerals or other markers to prevent unwanted feedings; but it remains true that for a fixed set of features or rules, the class of grammars is vastly increased by allowing parochial ordering.)

Despite the methodological undesirability of parochial rule ordering, Halle assumes it not only for phonology, but also for morphology, where no arguments for it have been mustered in the literature. This is in contrast to syntax and pre-1977 phonology, where the literature contains well-known (though often flawed) arguments for parochial ordering.

Halle pays no heed to the possibility that known universal principles might suffice to determine at least some of the applicational precedences and interactions among the rules he proposes. Relevant universal principles include the Obligatory Precedence Principle (an obligatory rule applies before an optional rule; Ringen 1972); the principle that nonautomatic rules apply before natural phonological processes (Donegan & Stampe 1979); and the Proper Inclusion Precedence principle (Sanders 1974) or Elsewhere Condition (Kiparsky 1973a).

The latter principle is particularly important. Intuitively, it says that special cases override more general cases that compete with them. This is clearly applicable in some of the cases in Halle's rule sets, but he does not appear to notice the issue, and stipulates those orderings just as if they were unpredictable (see the ordering of the two subcases '[Class 2, +neut]+____' and '[Class 2]+____' at the top of page 161, for example; the former is the special case of the neuter, the latter the general case).

Even if it were demonstrated clearly that some parochial stipulations are needed in grammars to direct rule interactions, it is of course incorrect to assume that ordering constraints are the only candidates. The point that 'rule ordering is not the only device that can be employed to ensure proper rule application' (Kenstowicz 1976, 280) has been made and defended in detail by a number of scholars, among them Kiparsky (1973a, 1973b) and Zwicky (1982, 883ff, expounding and clarifying a view due to Stampe & Donegan); Halle, again, seems to be oblivious to this possibility.

Halle counterposes his treatment of rule interactions (involving stipulations on order of application) to Anderson's treatment via 'disjunctive blocks' of rules, but the two frameworks are virtually isomorphic in this regard, since Anderson stipulates a linear ordering of the rules within each such block, 'with earlier rules in a block taking precedence over later rules' (1986, 12).

Both Halle and Anderson actually require rules to be linearly ordered with respect to one another, even when their interaction is fully predictable from the nature of the rules themselves, as when Anderson lists a Georgian rule for the more specific feature-set [+me, +pl] earlier than a rule for the more general feature-set [+me], and even when they cannot possibly interact, as when Anderson lists a Georgian rule for [+you] before one for [+me], though these features cannot cooccur in a category. It can scarcely be viewed as an advantage of a framework that it obliges us to assign an ordering to rules even when there is no conceivable evidence that could bear on this assignment. Such a requirement just maximizes the range of admissible grammars in a way that is devoid of empirical consequences.

Rule ordering is not necessarily the way to deal with situations in which two rules provide expression for compatible

feature-sets but have incompatible results. This is important, because such situations are ubiquitous in morphology. For example, in English, we cannot have both an *-ed* PastPrt affix and an *-en* PastPrt affix in a single verb form, because the two affixes fill the same slot. It is necessary to guarantee in some way that when these two rules are in competition, the *-en* rule wins: it overrides or precludes or suppresses the *-ed* rule. And in Georgian, the *g-* 2P Obj affix and the *v-* 1P Subj affix cannot both occur in a single verb form, again because the two affixes fill the same slot. We might need to stipulate that when these two rules are in competition, the *g-* rule wins over the *v-* rule. We might therefore require a system of stipulations as to defaults and overrides in rule competition. But this does not necessarily mean we need a rule-ordering statement of any kind, let alone a strict linear ordering imposed on all rule sets.

Stipulated rule ordering is one system for determining priorities between the effects of separate rules, and it might serve as well for the stipulation of rule invocations, but it is not the only such system, and, given that it is a very powerful mechanism, it is not one the thoughtful theorist should want to adopt without the most compelling sort of evidence. Direct stipulation of override/default relationships between rules, and of invoking/invoked relationships between them, is also available; and such a technique is perfectly compatible with a static-condition framework for inflectional morphology. (For further development of these ideas for both morphology and syntax, see Zwicky 1989.)

6. Conclusion

We will make one further observation about relations between morphological and syntactic theories. Halle appears to posit abstract morphemes for the same features that are eliminated in favor of abstract segments in Pollock-style syntactic representations. Person, number, tense, negation and similar morphosyntactic categories -- essentially, all the grammatical categories or features that determine verbal affixes -- turn up segmentalized as 'functional heads' in syntactic work following the direction of Pollock (1989). The question arises of what relation this line of work in syntax bears to Halle's proposals for morphology.

It is not clear that Pollock-style syntax has to be interpreted in a way that yields strings of functional morphemes. It seems to be assumed by Pollock that in a structure of the form [_{TP} T [_{AgrP} Agr [_{VP} EAT ...]]], moving EAT to Agr and then to T by head-to-head movement will yield an adjoined structure at the T position that looks something like [_T [_{Agr} [_V EAT] Agr] T]. But this is not fully clear, for some of the elements in the morpheme strings Pollock provides appear to be feature specifications (see e.g. the '-Past' in (66) on p. 393). It does not seem essential that strings of morphemes should result; Pollock's syntax could be interpreted in a way that involves coalescence (unification) of feature matrices to yield *Aspects*-style surface structures rather than adjunction of segments to yield *Syntactic Structures*

representations, so that moving [_V EAT] to an Agr position with 3Sg agreement features and then to a T position with the feature +Pres would yield a node labelled [_α EAT], where α = {+V, -N, +T, +Pres, +3P, -Pl}.

If Pollock-style syntax yields morpheme strings including abstract morphemes, then it meshes naturally with a Halle-style morphology and will be subject to the kinds of conceptual and empirical criticisms we have surveyed in this paper. If, on the other hand, it is taken to yield complex nonterminals incorporating the amalgamated features from the moved head and the various nodes through which it has moved, then it will require a realizational morphological module of the sort we advocate, and will count as evidence against Halle's approach; but in addition it will have much less to distinguish it from varieties of syntactic theory that make more thoroughgoing use of feature complexes (GPSG being the most obvious but by no means the only example), and its baroque movement derivations will be far harder to motivate. On either assumption, then, the thesis of this paper weakens Pollock-style syntactic proposals.

Our case against Halle's proposals weakens the overall support for Pollock's syntactic hypotheses from a different direction than works like Iatridou (1990) and Battistella (1987 [1991]). Iatridou and Battistella argue that there are mechanical defects in Pollock's syntactic system for generating the surface strings (of abstract and concrete morphemes) that the morphological module would operate on. We argue more indirectly: even if it worked, we claim, it would either generate strings of the wrong sort to be input to a morphological module of a theoretically and empirically optimal sort, or else would have to incorporate enough of the machinery of features and unification to cast serious doubt on whether its basic operation of head-to-head movement was doing any real work.

We have argued that there is no warrant for Halle's abandonment of the numerous advances in our understanding of morphology over the past 35 years, or for his inattention to the differences that set morphology apart from both syntax and phonology. There are, on the contrary, clear arguments against Halle's approach -- an approach which rejects the search for universal rule interaction principles, and abandons the insights of not only realizational frameworks like those of Anderson and Zwicky but also the concrete combinatory theories of morphologists like Aronoff, Booij, Churma, Kiparsky, Lieber, Marantz, McCarthy, Sadock, Scalise, Selkirk, Williams, and Wurzel (see Scalise 1984 for references), all of whom concern themselves with what are in Halle's terms concrete morphemes, and all of whom subscribe to the Strong Lexicalist Hypothesis in one form or another.

NOTE

*This paper has its origins in Zwicky & Pullum (1989), a prepared discussion of an unpublished conference paper by Sylvain Bromberger and Morris Halle entitled 'Conceptual issues in morphology', which we do not quote here because it was not published or distributed by its authors. Some sections of Zwicky

& Pullum (1989) are not relevant to the content of Halle (1990); other sections are relevant but are omitted for reasons of space. This paper was written at the Center for Advanced Study in the Behavioral Sciences (CASBS). Both authors express their gratitude to CASBS and its staff for providing unparalleled facilities for research. Pullum acknowledges financial support from a fellowship provided under National Science Foundation grant number BNS 87 00864 to CASBS and from sabbatical funds granted by the University of California, Santa Cruz. Zwicky's work was supported by a sabbatical leave from the Ohio State University.

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