

Dressler & al. eds. → Contemporary Morphology (de Gruyter, 1990).

Inflectional morphology as a (sub)component of grammar

Arnold M. Zwicky

This is a report on a program of modular grammar (which I sometimes refer to as the Interface Program), incorporating morphology of several kinds, syntax, their accompanying semantics, and phonology. I pursue an enterprise of this scope in the belief that an understanding of any one of these domains depends crucially on appreciating how it fits with all of the others. The program is substantive rather than notational in character, and my goal is a framework that encompasses the full range of attested phenomena, so that at the moment at least I am willing to sacrifice theoretical parsimony for the sake of adequacy.

Here I touch on a few of the aspects of this framework that concern inflectional morphology, recasting and expanding material in Zwicky (1985, 1986, 1987a, 1988). The ultimate intellectual source of these ideas lies in Sapir's (1921) notion of "grammatical process"; the more recent inspiration comes from Matthews's explorations of the Greco-Roman "word and paradigm" tradition (1972); and in consequence my ideas have an obvious kinship with those of Anderson (1988a, b), especially insofar as both of us assign no fundamental theoretical significance to the morpheme.

1. Lexemes and morphological rules

Clarity will be served by making at least the distinction between the concepts of a lexeme (the Welsh lexeme CATH 'cat'), its (inflectional) forms (singular *cat*, plural *cathod*), and their (phonological) shapes (the mutation shapes *cat*, *gath*, *chath*, ..., *cathod*, *gathod*, *chathod*, ...). I will cite lexemes with capitalization throughout, forms and shapes in standard orthographies or phonemic transcriptions.

Lexemes are complexes of grammatically relevant information, including at least the following: semantics; a syntactic category; a set of syntactic subcategories, each encoding the ability of the lexeme to occur as the head word in a syntactic construction; morphological features, including paradigm classes; a list of forms, each form being a pairing of a set of grammatical category features with one or more phonological shapes, as in the example below; and a list of stems, each stem being a complex of phonological properties, with one stem distinguished as the primary stem.

A fragment of the form list for the english lexeme RHYME:

{<{PRS, 1, SG}, /raym/}, <{PRS, 2, SG}, /raym/}, <{PRS, 3, SG}, /raymz/}, ...}

I assume that derivational morphology and inflectional morphology are separate subcomponents of grammar, limited in their interactions with one another in a way that rules within either of these components are not; the framework I have been exploring thus opts for something like the subcomponent divisions of traditional grammar, rather than the levels or strata of "lexical morphology" (Kiparsky 1982). Morphological rules, of either sort, describe relations between two types of morphological entities, which I will refer to as the "input" and the "output". The temporal metaphor is dispensable, but it is nevertheless useful, since it suggests that the relations are in fact functions (in the mathematical sense), and I want to hold as much as possible to the position that outputs are unique.

Derivational rules embody generalizations about the whole stock of lexemes; they predict phonological, morphological, syntactic, or semantic properties of output lexemes on the basis of properties of input lexemes. Inflectional rules embody generalizations about the forms of lexemes; they predict, on the basis of phonological properties assembled in a stem for a lexeme, phonological properties associated with combinations of grammatical categories. It follows that there must be a third set of rules, call them "shape rules", that embody generalizations about shapes. Finally, there are other generalizations, beyond those in inflectional and shape rules, about the properties of individual lexemes; these "lexical redundancy rules" (as they are most commonly called) relate phonological properties to morphological properties (predicting, say, the paradigm class of a lexeme from the number of syllables in its primary stem), semantic properties to morphological properties (predicting, say, the paradigm class of a lexeme from the fact that it denotes a female human being), morphological properties to other morphological properties (pre-

dicting, say, the applicability of one inflectional rule from the applicability of another, and thus describing the clustering of inflectional rules that goes under the name of "paradigm class"), syntactic properties to syntactic properties (predicting, say, one subcategory of a lexeme from another), and so on. These can be systematized as in Table 1.

Table 1. Types of rules and their corresponding input and output entities

Type of rule	Type of input entity	Type of output entity
Derivational	Lexeme	Lexeme
Inflectional	(Stem of) lexeme	Form
Shape	Form	Shape
Redundancy	Lexeme property	Lexeme property

Derivational and inflectional rules have a special status in this framework. Like syntactic constructions, they pair semantic content (for derivational rules, this is embodied in a function deriving the semantics of the output lexeme from the semantics of the input; for inflectional rules, this is the set of grammatical categories expressed, or realized, by the mapping from stem to form) with a set of formal conditions, which in the case of morphological rules are embodied in functions mapping one phonological entity into another (for derivational rules, mapping one primary stem into another; for inflectional rules, mapping a stipulated stem into the phonological information associated with a form).

2. Inflectional rules

An inflectional rule has three parts: a context, which can be viewed as a set of conditions on the input, including stipulations of the relevant category and the affected stem; the realized feature, which can be viewed as a set of conditions on the output; and the realization itself, which can be viewed as a set of conditions on the association between input and output, stipulating a set of mapping rules (which I called "allomorphy rules" in Zwicky 1985), each mapping rule involving a phonological operation and a slot in which this operation applies, plus possibly one or more conditions on the operation itself. Note that despite the dynamic metaphor in the word "realization", such rules can be – and I propose

that they should be – conceived of as a set of necessary and sufficient conditions on certain properties of lexemes.

The general scheme must have a place for several stems for a lexeme; for operations that predict alterations within stems as well as the affixing of material to them; and for a number of affixal slots, giving the essentially flat structure that is typical of inflection. The scheme is summarized below, along with two examples from English.

A scheme for inflectional rules

Necessary conditions:

Context	Input conditions, each stipulating: category; affected stem
---------	---

Sufficient conditions:

Realisata	Output conditions
Realization	Association conditions (mapping rules), each stipulating: operation; slot; conditions

Example I of an inflectional rule: English genitives

Context	∅; ∅
Realisata	genitive
Realization	affix /z/; slot B; unless slot A = /z/

Example II of an inflectional rule: English noun plurals

Context	noun; ∅
Realisata	plural
Realization	affix /z/; slot A; ∅

Example I concerns the genitive in *my children's ideas*, *the chairman of the department's proposals*, *the person I talked to's objections*, and *the person I saw's hat*. The rule realizes “genitive” on any category whatsoever (hence, there are no conditions on the relevant category) and without any conditions on the affected stem, and it says that “genitive” is realized by affixing /z/ in a particular slot (identified here arbitrarily as “B”) so long as another specified slot (“A”) is not filled with the phonological content /z/. Given independent stipulations that slots A and B are suffixal, and that A precedes B, this rule describes forms like *child-ren-'s*, and its condition on realization correctly “suppresses the Z” (Zwicky 1987b) in examples like *my kids' ideas*. Example II concerns the somewhat simpler case of the plural in *my kids*, *the two cats*, and *those remarkable churches*, the allomorphy in these examples being a matter of automatic phonological rules rather than morphological rules.

3. Some details

3.1. Defaults and overrides

Inflectional rules specify conditions all of which must be met by forms. But sometimes the application of a rule will be blocked, either because some more specific rule is applicable (as when /n/-suffixation for the English past participle, which is available only for a particular paradigm class of verbs, overrides the default rule calling for past participle identical to the past form), or because contradictory features are stipulated for individual lexemes (as when the stipulation of the past *thought* for the lexeme THINK overrides the default /d/-suffixation for past).

Overrides are predicted only when there are conflicts in the specification of phonological properties for forms; here my assumptions differ from those of Anderson (1986). When a more general rule is formally compatible with a more specific one, then both apply, as in the German form *Kind-er-n*, with both plural *-er* and dative plural *-n*; or the Swahili form *ha-wa-ku-soma* ‘they didn’t study’, with both negative *ha-* and negative past *ku-* (vs. affirmative past *li-*) (Hinnebusch 1979: 256); or the Hua form *bau-ne* ‘we (plural) stay’, with both *bau* (in which first person is realized by backing the front vowel of *bai*) and the first person plural (and second singular) declarative *-ne* (vs. *-e*) (Haiman 1980: 47–50).

3.2. Slot competition

In some other instances where two inflectional rules are in competition with one another – in particular, because they call for the affixation of different phonological material in the same slot, even though the grammatical categories they realize are compatible – it seems that universal principles governing the overriding of defaults cannot be appealed to, and the interaction between the two rules must simply be stipulated as a language-particular fact. As Anderson (1986: 8) says of Georgian, “the formal markers *v-* [marking 1 SUBJ] and *g-* [marking 2 OBJ] are mutually exclusive by virtue of their “competition” for the same formal position”; as it happens, the *v-* prefix wins this particular contest.

3.3. Multiple mapping rules

The scheme permits multiple operations within a rule, as when umlaut and suffixation combine to realize plural in German forms like *Stühle*. Indeed, such multiple operations can compete with one another, with the

more general operation taking precedence. This is the type of analysis I would give to (some of) Carstairs's (1990) examples of "phonologically conditioned suppletion", for instance, the realization of second person singular indefinite present indicative in Hungarian as *-(a)sz* in general, but *-ol* after sibilants and affricates; the two suffixations — the first without constraints and the second with a phonological constraint on it, but both filling the same slot — belong to the same inflectional rule.

3.4. "Zero morphs"

What happens when a condition in the realization portion of a rule is not satisfied — when, for instance, we check to see how the English genitive rule above applies to the lexeme *KID* with the feature "plural" as well as "genitive" and discover that the plural rule requires a /z/ in slot A — is that the operation simply fails to apply, and the input is unaltered (by that operation, at any rate). The rule applies, and it predicts a "zero morph", but without any explicit stipulation to this effect.

There can be paradigm classes defined in part by the inapplicability of particular mapping rules: e.g., the English noun class *QUAIL*, *PHEASANT*, *ELK*, *MOOSE*, ..., for which the affixation of /z/ in slot A is inapplicable. A redundancy rule presumably relates (at least as a default) the semantics of these noun lexemes, involving reference to creatures hunted for sport, to this morphological property of them; but there are also individual nouns like *SHEEP* that idiosyncratically have the property.

3.5. Gaps

What happens when one of the conditions in the context portion of a rule is not satisfied — when, for instance, we check to see how the English plural rule above applies to a preposition — is that the rule simply fails to apply, predicting in this example that prepositions have no plural forms. The nonapplication of a rule thus predicts systematic gaps in the lists of forms. (There are also idiosyncratic gaps, of course: combinations of grammatical categories for which no phonological shape is listed for some lexeme.)

Gaps will be predicted when a lexeme lacks the stem that is called for by an inflectional rule. The Latin verb lexeme *COEP* 'begin', for instance, has a Stem 2 (which is used for perfect forms like *coepi* 'I have begun')

but in the Classical language it lacks a Stem 1 (which is used for present forms: **coepio* 'I begin') (Hale — Buck 1903: sec. 199.2).

And there can be paradigm classes defined in part by the inapplicability of particular inflectional rules: e.g., the English adjective class *FATHERLY* (vs. *WORLDLY*), *VISIBLE* (vs. *ABLE*), *CROTCHETY* (vs. *DUSTY*) ..., for which inflectional rules realizing comparative and superlative are inapplicable: **fatherlier* vs. *worldlier*, etc. A redundancy rule presumably relates (at least as a default) the phonology of these adjective lexemes, involving stems with more than two syllables, to this morphological property of them; but there are also individual adjectives like *ILL* that idiosyncratically have the property.

3.6. Systematic identity

One side effect of the set of inflectional rules for a language is to group together forms that are systematically rather than accidentally identical in phonological shape: English first person singular present and second person singular present *rhyme*, singular and plural *moose*, past participle and past *bought*, for instance, vs. present *run* and past participle *run*, where the identity is fortuitous. (See also Carstairs 1987: Section 4.2.2).

I take the default situation to be that all forms of a lexeme are identical to the primary stem; this is the situation that actually obtains in languages without inflectional morphology, like Mandarin Chinese. When rules do not alter this state of affairs — either because none is applicable, as for first person singular present and second person singular present *rhyme*, or because an applicable rule's mapping rule is blocked, as for singular and plural *moose* — we have systematic identity. But motivated identities also result from the character of rules themselves: some rules apply to a disjunction of grammatical-category features, as when a rule realizes nominative or accusative singular for German weak adjectives by suffixing *-e*; other rules explicitly refer the realizations for one set of features to those for another, as when past participle is referred to past for English verbs (in regular verbs like *jumped* as well as in many irregulars) or third to first person for German verbs (for modals like *kann*, in imperfect singulars like *sah* and *machte*, in plurals like present *sehen* and imperfect *machten*, etc.). There is then a place for both directional relationships (described by referral rules) and nondirectional ones (described by rules realizing feature disjunctions).

I must observe that the term "form" is ambiguous in the common usage of linguists, since it can refer either to an individual pairing of

grammatical categories with a phonological shape or to a "form set", a set of systematically identical forms. Talk of the "form *see*", embracing the base form and five of the six present forms (all except the third person singular) of the verb lexeme *SEE*, is really a reference to a form set, not a form.

3.7. Alternative shapes for a given feature set

The description of lexemes in Section 1 above allows, and correctly so, for more than one phonological shape within a form: a regular-conjugation past *dreamed* and a special-conjugation past *dreamt* for the lexeme *DREAM*, for instance. Among the morphological properties of such a lexeme, then, is a disjunction of paradigm class information.

3.8. Paradigm classes

The primary units of paradigm information are inflectional rule features, which can be thought of as pointing to individual inflectional rules via arbitrary indices: +Rule 26, -Rule 77. These features can be grouped into sets in two different ways.

First, there are features for rules that are in exclusionary relationships with one another (because they realize the same grammatical categories in formally incompatible ways). Within any such set there can be an ultimate default (for the English past, suffixation of /d/; for past participle, referral to past) and "subdefaults" at one or more further levels (for the English past, suffixation of /t/; for past participle, suffixation of /n/). The applicability of one rule within such a set for a particular lexeme ordinarily excludes the applicability of all the rest for that lexeme. This blocking effect is not invariable, of course, since alternative shapes are possible.

Second, there are rule features that define paradigm classes, each class being a cluster of rule features that together ordinarily predict a full set of forms for a lexeme. (Individual lexemes, or subregular sets of lexemes, can of course diverge from this pattern by exhibiting gaps, idiosyncratic forms, or exceptional rule features.) The redundancy provided by a system of paradigm classes supplements the redundancy provided by inflectional rules realizing disjunctions of features, by rules of referral, and by default settings to yield the sort of usefully impoverished inventory of paradigms that Carstairs (1987) has made so much of.

The existence of a "molecular" level of paradigm-class features, in addition to the "atomic" level of inflectional rule features, is not a logical

necessity, and serious attempts have been made to do without it, as in Wurzel's (1990) proposal to rely entirely on "paradigm-structure conditions" (redundancy rules that relate inflectional rule features). For Wurzel, some of the work of paradigm class features is done by canonical "Kennformen", particular forms from which the other forms within a paradigm can be predicted via the redundancy rules. I make no commitment to the existence of "Kennformen" here; they obviously facilitate the learning of inflectional morphology, but I see no reason to suppose that the theory of grammar always makes them available.

3.9 Stem rules

In a very simple world, there would be a single assemblage of phonological information about each lexeme, a single stem (in the terminology I have been using here; for others, this is a "base", a "root", a "grade", a "basic" or "underlying" representation – or, alas, "form") which provided the phonological content for the inputs to both inflectional and derivational rules. But the world of morphology is often more complex than this, as is recognized in traditional references to constructs like the "perfect stem" (vs. the "present stem"), in the positing of "template" or "pattern" morphology in non-concatenative approaches to phonology, and in Spencer's (1988) revival of "morpholexical rules" applying at "level 0".

I assume, then, that several stems might be available for particular lexemes, and that individual inflectional or derivational rules can call for specific stems. These stems I will identify arbitrarily as "stem 1", "stem 2", and so on, since there is no guarantee that a particular stem can be identified with a unique set of grammatical categories. But how are the different stems related to one another phonologically? Apparently, in just the same ways that an input stem can be related to its output form – in every way from suppletion, at one extreme, to complete predictability by rule, at the other. What is needed is a set of stem rules, expressing default generalizations about stem-to-stem relationships and using the same set of operations (prefixations, suffixations, vowel shifts, consonant shifts, reduplications, metatheses, subtractions, and so on) as inflectional and derivational rules. The question then arises whether the same stem serves as input for all such rules, or whether, say, stem 2 is built on stem 1 for some lexemes and stem 1 on stem 2 for others; Stump (1984) has argued for the latter position.

3.10. Slot calculus

Slots cannot be identified (in general) with specific sets of fillers, though in simple systems of inflectional morphology it might be convenient to use a shorthand reference like “the plural slot” (instead of saying “slot A, which is filled only by material realizing the grammatical category plural”). Slots constitute another dimension of abstraction, independent to some degree of the dimension of grammatical categories.

Slots also cannot necessarily be identified with particular locations with respect to the stem. In English, for instance, when nothing happens to fill slot A, material in slot B will end up immediately after the stem (as in the genitive singular *child's*). Slots are only potential locations. If there is a slot that must be filled in some language, then this fact must be stated explicitly, as part of a tactics, or calculus, of slots.

Such a slot calculus is also needed to provide for the possibility that slots might occur in one order in the context of certain features (say, in non-finite forms) but in a different order in other contexts; slot-ordering conditions will do the descriptive work that might otherwise be attributed to “morph(eme) metathesis” rules. Thus, in the spirit of generalized phrase-structure grammar (Gazdar et al. 1985), I propose that the stipulations about what can fill particular slots be separated in principle from stipulations about the ordering of those slots.

3.11. Cross-lexeme referral

Finally, we need the ability to stipulate that the stems and forms of one lexeme are identical (either fully or by default) to those of some other lexeme — a sort of cross-lexeme referral. This is what it means to say that the English lexemes progressive-BE (*I am singing*), passive-BE (*I am attracted by penguins*), and obligative-BE (*I am to leave for Vienna soon*) are, for the purposes of morphology, default-identical to the lexeme copulative-BE (*I am happy*). The different BE lexemes have quite different syntax and semantics, but essentially the same morphology.

4. The lexicon

Here I would like to encourage a view of the lexicon of a language as the set of all relevant information about its words, hence as the domain of facts to be described by morphological rules for the language. The

domain of facts to be described by the syntax of a language is the set of all relevant information about its phrases and larger expressions; this has sometimes been (confusingly) referred to as the “language”, but I suggest the term “syntacticon”, as an evident parallel to “lexicon”.

Like the syntacticon, the lexicon in this sense is highly redundant, and is either not finite or at least astronomically large. The rules of syntax extract generalizations about the syntacticon, describe what is predictable or redundant in the contents of the syntacticon; the rules of morphology correspondingly extract generalizations about the lexicon, describe what is predictable or redundant in the contents of the lexicon. Both sets of rules must be supplemented by a list of stipulated eccentricities, which we might refer to as the “idiosyntacticon” and “idiolexicon”, respectively.

Linguists sometimes talk as if there were a substantive issue as to whether the lexicon contains all relevant information about words or just what is idiosyncratic. Perhaps some confusion has resulted from different metaphors supporting references to “lists”, but there are simply two different concepts here. Given the demonstrations of Jackendoff (1975) that we cannot expect there to be a unique idiolexicon for any particular lexicon, however, I must admit that it is the (full) lexicon that must be the primary object of theoretical interest. And I must stress that the lexicon in this sense, like the syntacticon, is an abstract object; no claims are being made about what the “mental lexicon” is like, or what a computationally tractable model of a lexicon would be like, important though these questions are. Nor are any claims being made about the character of the sets of primitive signs that serve as the bases for constructing the lexicon and syntacticon — “the list of primes, which are the words in syntax and the morphemes in morphology”, as Di Sciullo — Williams (1987: 21) would have us believe. Nor are any claims being made about whether the theory of grammar should accord any special status to those subsets of the lexicon and syntacticon whose members have some idiosyncratic properties (the “listemes” of Di Sciullo — Williams).

5. Inflectional morphology in relation to derivational morphology and phonology

As in Zwicky (1988), I assume that derivation shares its operations with inflection (and stem rules), though without the slot organization characteristic of inflection. The phonological effect of a derivational rule is

to predict stems of one lexeme on the basis of information about other lexemes.

The simplest way to achieve this effect is to stipulate that the primary stem of the output is identical to the primary stem of the input; this is "zero derivation" or "conversion", and it is amply illustrated in languages of all morphological types. Slightly more complex is the conversion of a non-primary stem. The next simplest way is to stipulate that the primary stem of the output results from applying a set of operations to a specified stem (normally the primary stem) of the input, and this too is amply illustrated, especially in affixal derivation. There is at least one other possibility, namely derivation that uses a stipulated form of the input, say the feminine form of an adjective used in the derivation of an adverb (as in French FAUSSEMENT, built by suffixation on the feminine form *fausse* of the lexeme FAUX); derivation of this sort can produce the apparently paradoxical effect of inflection "inside" derivation.

As for phonology, I assume a component division between "morphology" and phonology proper, akin to the distinction in Dressler (1985) and ultimately based on the natural phonologists' differentiation between the "rules" of non-automatic phonology and the "processes" of automatic phonology (Donegan–Stampe 1979), the functions of morphology being primarily demarcative and culminative, while automatic phonology serves the more strictly phonological functions of pronounceability and perceptibility.

Automatic phonological rules describe shape adjustments with direct phonetic motivations, and they apply within "prosodic" (that is, purely phonological) domains, like the syllable, foot, phonological word, and phonological phrase. Morphological rules draw their operations from the same inventory as inflectional and derivational rules (and stem rules and shape rules) – these operations varying in phonetic naturalness, though their historical origins in automatic phonology are usually visible – and apply within morphosyntactic domains and across morpheme boundaries.

6. The syntax of inflectional morphology

I adopt here, without further argument, the Principle of Morphology-Free Syntax, also known as the Lexicalist Hypothesis (see Zwicky (in press) and Scalise (1984: 101–102, 191–196)) for discussion and refer-

ences), according to which syntactic rules placing conditions on syntactic representations are blind to the internal structures and derivational histories of the words occurring in those representations. A careful formulation of the principle must not, of course, outlaw all sorts of reference to matters morphological in syntactic rules; rather, it should confine such reference to (abstract) grammatical-category features, while forbidding mention of particular morphological rules or operations within syntactic rules. On this view, no syntactic rule can be sensitive to the application of the regular realization rule for plural in English, to the application of an inflectional rule suffixing /z/, or indeed to the paradigm class of a lexeme.

The syntactic component of a grammar, then, incorporates a number of conditions on the distribution of grammatical category features, via what are traditionally called "government" rules (saying, for example, that in German the default case of a direct object is accusative, and that the case of the direct object of HELFEN is dative) and "agreement" rules (saying, for instance, that adjectives must have person, number, and case values consistent with those of the nouns they modify). The usual situation is for grammatical-category features to be located on the head word of the relevant constituent (V in a VP composed of V + NP or V + VP, for instance), but we must apparently also allow for edge placement, in which features are located on the first (or last) word of the relevant constituent, whatever that word might be (see the discussion of Tongan in Zwicky 1987b). Except insofar as the values of grammatical category features are constrained by such rules, they can be freely instantiated.

As a general principle, material satisfying the conditions of syntax can be paired with material satisfying the conditions of morphology whenever these are compatible (and, as we shall see, in certain other instances as well). This principle allows for the matching of material that is more highly specified in morphological representations than in syntactic ones (as when a lexeme with various "purely morphological" features, such as paradigm-class features, can be paired with syntactic representations that are innocent of such features) and for the converse (as when a lexeme that lacks number specification, as I would claim the English expletive THERE does, can serve as subject both when syntactic conditions call for a singular subject and when they call for a plural, as in *There is no answer* and *There are no answers*).

An expression will then be ill-formed if it fails to satisfy either a syntactic condition (e.g., the condition that verbal complements of English

modal verbs must be in their base form: *We will be* / **being* / **been* / **are quiet*) or a morphological condition (e.g., the stipulation that obligatory-BE, like the English modal verbs, has only finite forms; compare **We will be to be quiet* with *We are to be quiet* and *We will have to be quiet*).

6.1. Inflectional morphology and particle lexemes

It might seem that inflection is a topic of rather limited interest to the theory of grammar, given the fact that so many languages have little or no inflectional morphology. However, there are special relationships between inflection and a type of lexeme that is, so far as I know, exemplified in all the world's languages, so that inflectional morphology cannot be easily dismissed as a collection of exotica. These lexemes are variously (sometimes rather desperately) labeled as "grammatical words", "particle words", "nonlexical items", "little words" or "particles"; I will call them "particle lexemes".

Particle lexemes serve as marks of syntactic constructions in the same way that inflection does. What one language does with inflection, another does with particle lexemes. Within a single language, such lexemes can occur in alternation with inflection (*the discovery OF the city* vs. *the city'S discovery*, *MORE handsome* vs. *handsome-R*) or in combination with it (Swedish *DET store hus-ET* 'the big house', with both a definite article and a definite suffix on HUS, or English *a friend OF Robin'S*).

I have treated inflection as the realization of grammatical category features on individual lexemes, and I now propose that particle lexemes are also realizations of grammatical category features — pure combinations, in fact, of syntactic and grammatical category features, with no other semantics (see Zwicky (to appear) for further development of this proposal). Syntactically, they are simply words — that is, "word-rank", "lexical", or "zero-bar" syntactic categories — with grammatical category features, like other syntactic words. Morphologically, they are lexemes with all the properties of other lexemes except that they have defective semantics.

Particle lexemes vary enormously in their integration with the rest of the lexicon. At one end of the scale are those that have only a single form and also serve as unique bearers of a set of grammatical categories. In English, for instance, the infinitive marker TO is a particle lexeme — suppose it is lexeme # 26 in the English lexicon — belonging to the auxiliary subcategory of the verb category, but with only one form,

realizing the grammatical category infinitive, and it is the only verb lexeme having this form; this is what saying that TO is the mark of the infinitive amounts to. Similarly, the dative marker TO is a particle lexeme — lexeme # 253, say — belonging to the particle category, but with only one case form, realizing the grammatical category dative, and it is the only particle lexeme having this form; this is what saying that TO is the particle marking the dative case amounts to.

Other particle lexemes serve as representatives of (sub)categories and have more or less full form sets. Copulative-BE, for instance, is a particle lexeme — lexeme # 3, say — representing the copulative subcategory of the verb category (a subcategory with such other members as BECOME, STAY, GET, and SEEM), and it has a complete set of verb forms. Similarly, the English personal pronoun lexemes like WE and IT are particle-lexeme representatives of a subcategory of nouns, with no semantics beyond that associated with this subcategory and with the grammatical categories of person and number.

A property of expressions that is distributed via grammatical category features is a property — like constituency, linear ordering, and certain shape properties — that is available to serve as a mark of particular constructions. It is just one item in the tool kit that the grammar of a particular language makes available for this purpose. As Sadock — Zwicky (1985) observe, a yes-no question construction might be marked, in one language or another, by a constituent ordering, by an intonational contour, by a verbal inflection, by a particle lexeme, or by several of these in concert.

Such a mark might have a characteristic semantics of its own, but this is only a default and can be overridden by the semantics associated with the construction. As a result we cannot expect always to be able to find a "meaning" for such a mark in all of its occurrences. Grammatical categories, in particular, might serve a number of syntactic functions, as when the English present participle is used both in progressive VPs (*They were playing Mozart*) and in postnominal VP modifiers (*Anyone having a hat on will be arrested*), or when a past participle is used both in passive VPs (*They were praised by everyone*) and in perfect VPs (*They have been to Vienna many times*). The English base form has an extraordinarily wide range of uses, illustrated in *I made them be quiet*, *To be quiet is impossible*, *You can be quiet*, *Be nice to your guests!*, *Go be nice to your guests*, and *I watched you be nice to your guests*.

Saying that particle lexemes as well as inflection are realizations of grammatical categories then predicts that the same sort of diversity in

syntactic function is possible, and this prediction is correct. In English, for instance, we have the superlative particle lexeme MOST used not only in the true superlative construction (*You are the most worldly person I know*), where it is in alternation with an inflectional variant (*You are the worldliest person I know*), but also as the mark of an "absolute" construction (*You are most worldly*), where the inflectional variant is unavailable (**You are worldliest*). The English infinitive particle lexeme TO has an extraordinarily wide range of uses, illustrated in *It's too heavy to lift, I intend to talk, It's hard for us to hear the orchestra, The person for you to see is Kim, Oh to be in Vienna!*, and *To understand this you have to be able to read Hungarian*.

6.2. Clitics

The simple picture sketched so far is known to be inadequate. At least some of the items that have been labeled "clitics" require genuine complications in the scheme of component interfacing.

At the outset, I must discard a collection of "leaning" elements as being beside the current point. These are elements that are simply phonologically dependent on adjacent material, forming prosodic units — phonological words or phonological phrases, in particular — with them (see Kaisse — Zwicky 1987 for a compact discussion and references). The English complementizer particle lexeme THAT, for instance, can belong to the phonological phrase of material following it, so that *that Chris* can make a phonological phrase within the sentence *I know that Chris has gone*. So long as the syntax and morphology of these elements present no special features, they are not of interest in the present context, though they do require stipulations via principles of prosodic domain formation, principles describing the interface between morphosyntax and automatic phonology.

It is also true that "syntactic dependence" does not in itself necessarily cause difficulties for the description of the morphology-syntax interface. Syntactic rules must be able to locate certain classes of lexemes by reference to the contents of some host constituent, in particular by reference to the host's head or edge words — to stipulate, for instance, that some class of adverbs is limited to occurrence after the first word (that is, after the first unit of word rank) in a clause. In many cases this is all that need be said.

What then of "phrasal affixes"? (The contrast is with "bound words", the terminology being that of Nevis 1986 rather than of my own earlier

work on clitics.) Consider the English genitive. So far as its syntax goes it works in the same way as an affix; it realizes a grammatical category feature, here with edge location. The fact that the realization of genitivity interacts with the phonological shapes of ordinary inflection leads us to assign it to an outer layer of inflectional morphology. (This is not Nevis' treatment, but it is the one advanced by Kanerva 1987 for Finnish possessives and Zwicky 1987b for English genitives.) It appears that in general phrasal affixes are to be analyzed syntactically as grammatical category features distributed like other such features (though the usual situation is for phrasal affixes to be located at constituent edges, for ordinary inflection to be located on heads) and morphologically as constituting an outer layer of inflectional morphology.

We are left with bound words, like the English reduced auxiliary clitic (auxiliary reduction: *I'd be quiet, It's been noticed*). Each bound word instantiates a lexeme (WOULD, HAS) and so should be treated syntactically as a formative, as a word, rather than as features.

It is sometimes suggested that bound words are just phonologically dependent words, but several facts suggest otherwise: (a) The set of bound-word clitics is often lexically idiosyncratic, as when the forms *was* and *were* fail to participate in auxiliary reduction; (b) bound-word clitics are often subject to surface filters (the "surface-structure constraints" of Perlmutter 1971 and consequent literature) that limit their combination with one another and with their hosts, and constrain the ordering within these combinations; and (c) bound-word clitics often show special morphophonemics, as in the auxiliary-reduction shape alternations */wud/* vs. */d/* and */hæz/* vs. */z/*. Instead, we need to say that bound word clitics in combination with their hosts make a new sort of word-like unit — what I will call a "morphosyntactic word" — for the purposes of morphology while they are simply independent words for the purposes of syntax. (The idea that the words of syntax and the words of morphology need not be coextensive is now a familiar one, thanks to such works as Sadock 1980 and Di Sciullo — Williams 1987.)

The treatment of bound words as part of morphosyntactic words means that they too fill slots, and we can expect the principles of inflection to carry over to bound words. The sort of morphosyntactic word that deserves the label "clitic group" is then in effect an inflected word built on an inflected word as stem, and the surface filters that constrain the constituency of these clitic groups and the ordering of their parts are nothing more than a slot calculus at a new level.

I must point out that which lexemes are bound-word clitics, or have bound-word clitic alternants, in a language cannot necessarily be predicted on the basis of other properties of the lexemes. Bound words can be spread across the syntactic categories of a language; some particle lexemes are bound words, but then some (like dative TO and the personal pronouns in English) are not; some closed (sub)category lexemes are bound words, but then some (like the directional particle TO and the auxiliary SHOULD in English) are not; and some minor category lexemes are bound words, but then some (like the English quantifiers EACH, ANY, EVERY, ALL) are not.

Bound-word clitics are, of course, not the only phenomena that appear to require a divergence between the representations appropriate for syntax and those appropriate for morphology, and so to require that we formulate principles describing the interface between morphology and syntax, principles (whether parochial or universal) constraining the associations between morphosyntactic words and syntactic words. There is in fact a panoply of such phenomena, including portmanteaus (French *du*), compounds (English *apple eater*), serial verbs (English *go look*), clause unions (French *faire partir*), and incorporations (West Greenlandic *gamutegarvog* 'sled-have'). Bound-word clitics are also not the only instances of word-like units (whether in syntax or in morphology) that properly contain units of similar type; so do compounds, serial verbs, clause unions, and incorporations.

7. Conclusion

I have tried to give some of the flavor of the Interface Program as it concerns inflectional morphology. The program relies heavily on the assignment of rules to components or subcomponents, the interactions between which are largely determined by universal principles (but partly by language-specific conditions). Within the components of inflectional and derivational morphology, as well as within syntax, rules are viewed as pairings of semantic content with sets of formal features, and on the formal side, as static conditions on the well-formedness of the lexicon and the syntacticon. A logic of defaults and overrides plays a major role in determining the interactions between these conditions, and the separation of declarations about the combinability of material from decla-

rations about ordering that has been explored in the recent syntactic literature is carried through to morphology, where I have suggested that slot filling and slot ordering should be separated as well.

References

- Anderson, Stephen R.
 1986 "Disjunctive ordering in inflectional morphology", *Natural Language and Linguistic Theory* 4: 1–31.
 1988a "Inflection", in: M. Hammond—M. Noonan (eds.) *Theoretical morphology* (Orlando: Academic Press), 23–43.
 1988b "Morphological theory", in: F. J. Newmeyer (ed.) *Linguistics: The Cambridge survey* (Cambridge: Cambridge University Press), vol. 1, 146–191.
- Carstairs, Andrew
 1987 *Allomorphy in inflexion*. (London: Croom Helm).
 1990 "Phonologically conditioned suppletion", this volume, 17–23.
- Di Sciullo, Anna Maria—Edwin Williams
 1987 *On the definition of word* (Linguistic Inquiry Monograph no. 14) (Cambridge, MA: MIT Press).
- Donegah, Patricia J.—David Stampe
 1979 "The study of natural phonology", in: D. Dinnsen (ed.) *Current approaches to phonological theory* (Bloomington: Indiana University Press), 126–173.
- Dressler, Wolfgang U.
 1985 *Morphology: the dynamics of derivation* (Ann Arbor: Karoma).
- Gazdar, Gerald—Ewan Klein—Geoffrey Pullum—Ivan Sag
 1985 *Generalized phrase structure grammar*. (Oxford: Basil Blackwell).
- Haiman, John
 1980 *Hua: a Papuan language of the Eastern Highlands of New Guinea*. (Amsterdam: Benjamins).
- Hale, William G.—Carl D. Buck
 1903 *A Latin grammar* [reprinted 1966] (University of Alabama: University of Alabama Press).
- Hinnebusch, Thomas J.
 1979 "Swahili", in: T. Shopen (ed.) *Languages and their status* (Cambridge, Mass: Winthrop), 209–293.
- Jackendoff, Ray
 1975 "Morphological and semantic regularities in the lexicon", *Language* 51: 639–671.
- Kaisse, Ellen M.—Arnold M. Zwicky
 1987 "Introduction: syntactic influences on phonological rules", *Phonology Yearbook* 4: 3–11.
- Kanerva, Jonni M.
 1987 "Morphological integrity and syntax: the evidence from Finnish possessive suffixes", *Language* 63: 498–521.
- Kiparsky, Paul
 1982 "From cyclic phonology to lexical phonology", in: H. van der Hulst—F. Smith (eds.), *The structure of phonological representations*, part 1, (Dordrecht: Foris), 131–175.

- Matthews, Peter
1972 *Inflectional morphology: a theoretical study based on aspects of Latin verb conjugation*. (Cambridge: Cambridge University Press).
- Nevis, Joel A.
1986 *Finnish particle clitics and general clitic theory* [PhD dissertation, Ohio State University 1985] (*OSU Working Papers in Linguistics* 33).
- Perlmutter, David M.
1971 *Deep and surface structure constraints in syntax*. (New York: Holt, Rinehart & Winston).
- Sadock, Jerrold M.
1985 "Autolexical syntax: a theory of noun incorporation and similar phenomena", *Natural Language and Linguistic Theory* 3: 379–439.
- Sadock, Jerrold M. — Arnold M. Zwicky
1985 "Speech act distinctions in syntax", in: T. Shopen (ed.), *Language typology and syntactic description* (Cambridge: Cambridge University Press), vol. 1, 155–196.
- Sapir, Edward
1921 *Language: an introduction to the study of speech*. (New York: Harcourt, Brace).
- Scalise, Sergio
1984 *Generative morphology*. (Dordrecht: Foris).
- Spencer, Andrew
1988 "Arguments for morpholexical rules", *Journal of Linguistics* 24: 1–29.
- Stump, Gregory T.
1984 "Two approaches to predictive indeterminacy", *Linguistics* 22: 811–829.
- Wurzel, Wolfgang U.
1990 "The mechanism of inflection: lexicon representations, rules, and irregularities", this volume, 203–216.
- Zwicky, Arnold M.
1985 "How to describe inflection", *Proceedings of the Berkeley Linguistic Society* 11: 372–386.
1986 "The general case: basic form versus default form", *Proceedings of the Berkeley Linguistic Society* 12: 305–314.
1987a "Phonological and morphological rule interactions in highly modular grammars", *Proceedings of the Third Eastern States Conference on Linguistics* (Columbus: Ohio State University), 523–532.
1987b "Suppressing the Zs", *Journal of Linguistics* 23: 133–148.
1988 "Morphological rules, operations, and operation types", *Proceedings of the Fourth Eastern States Conference on Linguistics* (Columbus: Ohio State University), 318–334.
to appear "Jottings on adpositions, case inflections, government, and agreement", in: D. Brentari et al. (eds.), *The joy of grammar: A Festschrift for James D. McCawley*.
in press "The morphology-syntax interface", *Oxford International Encyclopedia of Linguistics*.