

INFLECTIONAL MORPHOLOGY

A Theory of Paradigm Structure

GREGORY T. STUMP

University of Kentucky



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I *Inferential–realizational morphology*

1.1 Theories of inflectional morphology

In any language exhibiting inflection, each inflected word in a sentence carries a set of morphosyntactic properties; in English, for instance, the verb form *am* in the sentence *I am sure* carries the properties ‘first-person singular (1sg) subject agreement’, ‘present tense’, and ‘indicative mood’. In very many cases, an inflected word’s morphosyntactic properties are associated with specific aspects of its morphology; for instance, the properties of subject agreement, tense, and mood carried by the verb form *likes* in the sentence *She likes reading* are associated with the presence of the suffix *-s*. In recent years, grammatical theorists have devoted considerable attention to the nature of these associations between an inflected word’s morphosyntactic properties and its morphology. Nevertheless, these efforts haven’t yet led to anything like a consensus in current theories of inflection.

According to LEXICAL theories of inflection, these associations are listed in the lexicon; the affix *-s*, for example, has a lexical entry which specifies its association with the morphosyntactic properties ‘3sg subject agreement’, ‘present tense’, and ‘indicative mood’. Theories of this sort portray the association between an inflectional marking and the set of morphosyntactic properties which it represents as being very much like the association between a lexeme’s¹ root and its grammatical and semantic properties. This conception is rejected by INFERENCEAL² theories, in which the systematic formal relations between a lexeme’s root and the fully inflected word forms constituting its paradigm are expressed by rules or formulas. In theories of this sort, the associations between a word’s morphosyntactic properties and its morphology are expressed by the morphological rules which relate that word to its root: the existence of the word *likes*, for instance, is inferred from that of the root *like* by means of a rule associating the appearance of the suffix *-s* with the presence of the properties ‘3sg subject agreement’, ‘present tense’, and ‘indicative mood’.

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Crosscutting this distinction between lexical and inferential theories is a second distinction. According to INCREMENTAL theories, inflectional morphology is information-increasing; that is, words acquire morphosyntactic properties only as a concomitant of acquiring the inflectional exponents of those properties. On this view, *likes* acquires the properties ‘3sg subject agreement’, ‘present tense’, and ‘indicative mood’ only through the addition of *-s* (whether this is inserted from the lexicon or is introduced by rule). According to REALIZATIONAL theories, by contrast, a word’s association with a particular set of morphosyntactic properties licenses the introduction of those properties’ inflectional exponents; on this view, the association of the root *like* with the properties ‘3sg subject agreement’, ‘present tense’, and ‘indicative mood’ licenses the attachment of the suffix *-s* (whether this attachment is effected by lexical insertion or by the application of a morphological rule).

One can therefore imagine four types of theories of inflectional morphology: lexical–incremental theories, lexical–realizational theories, inferential–incremental theories, and inferential–realizational theories. At present, each of these four types of theories has its proponents.

Lieber (1992) advocates a lexical–incremental theory. In Lieber’s theory, an affix’s lexical entry is assumed to supply a subcategorization restriction limiting the kinds of contexts into which that affix might be inserted; for instance, the lexical entry of *-s* might be assumed to supply the restriction ‘[V_{stem} ____]’ (= ‘combines with a preceding verb stem’). As an affix joins with a stem, the morphosyntactic properties of the resulting whole are computed from those of its parts by a percolation mechanism; thus, *likes* acquires its syntactic category from its stem *like* and acquires the properties ‘3sg subject agreement’, ‘present tense’, and ‘indicative mood’ from the suffix *-s*.

The theory of Distributed Morphology proposed by Halle and Marantz (1993) is of the lexical–realizational type. Halle and Marantz assume that rules of syntax construct hierarchical combinations of abstract ‘morphemes’ (sets of morphosyntactic properties) into which concrete formatives are inserted from the lexicon; in order for a lexically listed formative X to be inserted into a morpheme Y, the set of morphosyntactic properties associated with X must be a subset of those constituting Y. On this view, the syntax is assumed to supply an abstract structure [V Y] (where Y comprises the properties ‘3sg subject agreement’, ‘present tense’, and ‘indicative mood’); *-s* is then insertable into Y because the morphosyntactic properties specified in its lexical entry aren’t distinct from those constituting Y.

Steele (1995) advocates an inferential–incremental theory (‘Articulated

Morphology’), according to which morphological rules effect changes in both the form and the content of the expressions to which they apply. For instance, *likes* arises by means of a rule applying to verb stems which are unspecified for subject agreement, tense, and mood; the application of this rule to a verb stem *X* results in (a) the addition of the suffix *-s* to *X* and (b) the addition of the morphosyntactic properties ‘3sg subject agreement’, ‘present tense’, and ‘indicative mood’ to *X*’s property set.

Finally, Word-and-Paradigm theories of inflection (e.g. those proposed by Matthews (1972), Zwicky (1985a), and Anderson (1992)) are of the inferential–realizational type. In inferential–realizational theories, an inflected word’s association with a particular set of morphosyntactic properties licenses the application of rules determining the word’s inflectional form; *likes*, for example, arises by means of a rule appending *-s* to any verb stem associated with the properties ‘3sg subject agreement’, ‘present tense’, and ‘indicative mood’.

A careful evaluation of morphological evidence suggests that the most adequate theory of inflectional morphology must be inferential rather than lexical, and must be realizational rather than incremental. Numerous independent lines of reasoning converge on this conclusion. In section 1.2, I present two reasons for preferring realizational theories over incremental theories; in section 1.3, I discuss three poorly motivated theoretical distinctions none of which is entailed by inferential–realizational theories of inflection but which are, to varying degrees, inevitably resorted to by lexical theories and incremental theories. In section 1.4, I discuss the very limited interface between morphology and syntax implied by the assumptions of inferential–realizational theories of inflection; although this conception of the morphology–syntax interface is incompatible with the widely held conviction that inflectional affixes sometimes function as independent syntactic objects, it is nevertheless reconcilable with the phenomena that have been taken to justify this conviction, as I show in section 1.5. My conclusions are summarized in section 1.6, where, in anticipation of the next chapter, I outline the distinctive characteristics of the inferential–realizational theory that is the focus of this book: the theory of Paradigm Function Morphology.

1.2 Evidence favouring realizational theories over incremental theories

Two fundamental facts about inflectional morphology favour realizational theories over incremental theories. The first of these is (1):

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- (1) The morphosyntactic properties associated with an inflected word may exhibit EXTENDED EXPONENCE in that word's morphology.

That is, a given property may be expressed by more than one morphological marking in the same word. Examples are legion: in Breton, the productive pattern of pluralization for diminutive nouns involves double marking (*bagig* 'little boat', pl *bagoùigoù*); in Swahili negative past-tense verb forms, negation is expressed both by the use of the negative past-tense prefix *ku-* and by the negative prefix *ha-* (*tu-li-taka* 'we wanted', but *ha-tu-ku-taka* 'we did not want'); in French, the verb *aller* 'go' has a special suppletive stem *i-* appearing only in the future indicative and the present conditional – yet, *i-* doesn't resist the attachment of *-r(a)*, the suffixal exponent of the future indicative and the present conditional; German *gesprochen* is distinguished as a past participle both by its stem vocalism and by its affixes; and so on.

Realizational theories are fully compatible with the widespread incidence of extended exponence: in realizational theories, there is no expectation that a given morphosyntactic property will be realized by at most one marking per word; on the contrary, the possibility is left open that the same property may induce (or may participate in inducing) the introduction of a number of distinct markings.³ In incremental theories, by contrast, it is customarily assumed that a given morphosyntactic property has at most one affixal exponent: in the lexical–incremental frameworks of Lieber (1992:77ff.) and Selkirk (1982:74ff.), the percolation mechanism is defined in such a way that an inflected word's morphosyntactic properties are each traceable to at most one affixal exponent; similarly, Steele (1995:280) states that '[b]ecause operations are informationally additive, multiple additions of identical information are precluded' in Articulated Morphology. Thus, incremental theories deny that instances of extended exponence actually arise, and must therefore resort to extraordinary means to accommodate those that do.

Consider, for example, the phenomenon of adjectival preprefixation in Nyanja, a Bantu language of Malawi. In Nyanja, as elsewhere in Bantu, nouns inflect for gender and number by means of noun-class prefixes. Generally, a given gender is associated with a pair $\langle x, y \rangle$ of noun classes, such that members of that gender exhibit the class x prefix in the singular and the class y prefix in the plural. The inventory of these nominal prefixes is given in row A of table 1.1.

The qualifying and concordial prefixes in rows B and C serve to express gender/number agreement. Verbs, for example, inflect for subject agreement by means of the concordial prefixes:

Table 1.1 *Class, qualifying, and concordial prefixes in Nyanja (Price 1958:52f.)*

Class:	1	2	3	4	5	6	7	8	9	10	12	13	14	16	17	18
A. Class prefixes:	<i>mu^a</i>	<i>a</i>	<i>mu^a</i>	<i>mi</i>	<i>li^b</i>	<i>ma</i>	<i>ci</i>	<i>zi</i>	<i>n</i>	<i>n</i>	<i>ka</i>	<i>ti</i>	<i>u</i>	<i>pa</i>	<i>ku</i>	<i>mu</i>
B. Qualifying prefixes:	<i>wa</i>	<i>a</i>	<i>wa</i>	<i>ya</i>	<i>la</i>	<i>a</i>	<i>ca</i>	<i>za</i>	<i>ya</i>	<i>za</i>	<i>ka</i>	<i>ta</i>	<i>wa</i>	<i>pa</i>	<i>kwa</i>	<i>mwa</i>
C. Concordial prefixes:	<i>a</i>	<i>a</i>	<i>u</i>	<i>i</i>	<i>li</i>	<i>a</i>	<i>ci</i>	<i>zi</i>	<i>i</i>	<i>zi</i>	<i>ka</i>	<i>ti</i>	<i>u</i>	<i>pa</i>	<i>ku</i>	<i>mu</i>

Notes:

^a *mu-* appears as *m-* before polysyllabic, consonant-initial stems.

^b Many nouns belonging to gender 5/6 lack *li-* in their singular form.

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- (2) *ci-lombo* *ci-kula*.
 CLASS:7-weed CONCORDIAL:7-grow
 A weed grows.

Two types of adjectives can be distinguished according to the pattern of agreement marking they exhibit. In adjectives of the first type (*-bwino* ‘good’, *-cabe* ‘no good, useless, bad’, *-kale* ‘ancient, former, old’, *-makono* ‘modern, present-day’, *-mbili* ‘many, much’, *-pang’ono* ‘few’, *-tsopano* ‘new’; Price 1958:53), the qualifying prefixes are used to express agreement with a modified noun:

- (3) *ci-manga* *ca-bwino*
 CLASS:7-maize QUALIFYING:7-good
 good maize

In adjectives of the other type (*-fupi* ‘short, low’, *-kulu* ‘large, great, important’, *-ng’ono* ‘small, young, insignificant’, *-tali* ‘long, tall, high’, *-wisi* ‘fresh, sappy, green’; Price 1958:54), agreement with a modified noun is instead encoded by means of two prefixes. The outer prefix is the appropriate qualifying prefix; the inner prefix is the appropriate concordial prefix unless the modified noun belongs to class I, in which case the inner prefix is the class I nominal prefix. The examples in (4) illustrate this doubly prefixed pattern of agreement.

- (4) Examples of preprefixation in Nyanja (Bandawe et al. 1965:251f.)
- a. *mw-ana* *wa-m-kulu*
 CLASS:I-child QUALIFYING:I-CLASS:I-large
 a large child
 - b. *a-ana* *a-a-kulu* (→ *ana akulu*)
 CLASS:2-child QUALIFYING:2-CONCORDIAL:2-large
 large children
 - c. *m-sika* *wa-u-kulu*
 CLASS:3-market QUALIFYING:3-CONCORDIAL:3-large
 a large market
 - d. *mi-sika* *ya-i-kulu*
 CLASS:4-market QUALIFYING:4-CONCORDIAL:4-large
 large markets
 - e. *ci-pewa* *ca-ci-kulu*
 CLASS:7-hat QUALIFYING:7-CONCORDIAL:7-large
 a large hat
 - f. *zi-pewa* *za-zi-kulu*
 CLASS:8-hat QUALIFYING:8-CONCORDIAL:8-large
 large hats

The preprefixal pattern of adjectival inflection in (4) is easily accommodated by realizational theories: in an inferential–realizational theory, for example, one need only assume that a *-kulu*-type adjective’s properties of gender and number induce the application of two successive prefixation rules;⁴ in Distributed Morphology, one need only assume that a *-kulu*-type adjective’s properties of gender and number are shared by two prefixal morphemes. Incremental theories, by contrast, furnish no ready account of the preprefixal pattern in (4). In lexical–incremental theories, for example, it is not obvious how one might rig the lexical entries of the qualifying prefix *ca-* and the concordial prefix *ci-* so as to guarantee the appearance of both prefixes in *ca-ci-kulu* ‘large’ (cf. (4e)): given that the two prefixes encode exactly the same morphosyntactic properties, the presence of *ca-* cannot be motivated by the need to specify some morphosyntactic feature or other; and given that *ci-* appears independently of *ca-* in some contexts (e.g. (2)), one cannot account for the presence of *ca-* by assuming that *ci-*-prefixed forms are by stipulation bound. For analogous reasons, it is equally unclear how the appearance of both prefixes in *ca-ci-kulu* might be credibly guaranteed in inferential–incremental theories.⁵

A second fundamental fact about inflectional morphology which favours realizational theories over incremental theories is (5):

- (5) The morphosyntactic properties associated with an inflected word’s individual inflectional markings may underdetermine the properties associated with the word as a whole.

Realizational theories are inherently compatible with this fact. In a theory of this sort, it is a word’s association with a particular set of morphosyntactic properties that determines the manner in which that word is inflected (whether this inflection is effected by morphological rules or by lexical insertion); nothing excludes the possibility that the inflectional markings determined by a word’s set of morphosyntactic properties may simply fail to realize some of the properties in that set. Incremental theories, by contrast, rest on the presumption that as an inflected word’s form arises from that of its root (whether through the insertion of lexically listed affixes or through the application of morphological rules), the word’s morphosyntactic properties are, in a parallel fashion, assembled from those associated with its individual inflectional markings (whether this association is encoded lexically or in rules). On this assumption, an inflected word’s morphosyntactic properties are necessarily deducible from the properties

Table 1.2 *Imperfect and aorist forms of the Bulgarian verb KRAD 'steal'*

	IMPERFECT	AORIST
1SG	<i>krad-'á-x</i>	<i>krád-o-x</i>
2SG	<i>krad-é-š-e</i>	<i>krád-e</i>
3SG	<i>krad-é-š-e</i>	<i>krád-e</i>
1PL	<i>krad-'á-x-me</i>	<i>krád-o-x-me</i>
2PL	<i>krad-'á-x-te</i>	<i>krád-o-x-te</i>
3PL	<i>krad-'á-x-a</i>	<i>krád-o-x-a</i>

associated with its individual inflectional markings. Thus, incremental theories deny that a word's form might underdetermine its morphosyntactic properties, and must therefore resort to extraordinary means to cope with observed instances of underdetermination.

Consider, for example, the imperfect and aorist paradigms of the Bulgarian verb *krad-* 'steal' in table 1.2.

In the inflection of Bulgarian verbs, the preterite suffix *-x* appears by default in imperfect and aorist forms such as those in table 1.2. (Before a front vowel, *-x* is palatalized to *-š*, as in the 2sg and 3sg imperfect forms; the appearance of a front vowel in the following syllable likewise causes the imperfect suffix *-'á* to be realized as *-é* in these two forms.)⁶ In the 3sg aorist form, however, both the preterite suffix and the aorist suffix *-o* fail to appear; and since the 2sg forms in these paradigms are regularly syncretized with the corresponding 3sg forms, the preterite and aorist suffixes likewise fail to appear in the 2sg aorist form. The question here is: what guarantees the association between imperfect *krad'áx* or aorist *krádox* and the morphosyntactic property '1sg subject agreement', given that neither form has any overt exponent of 1sg subject agreement? Proponents of incremental theories might argue that first-person singular is the default person/number combination in Bulgarian, hence that *krad'áx* and *krádox* are associated with the property '1sg subject agreement' because there is nothing overriding that association; but this ad hoc assumption would not be obviously reconcilable with the unsurprising fact that the third person singular (neuter) functions as the default person/number(/gender) combination with respect to a range of syntactic phenomena (Scatton 1984:343ff.). The only way out of this dilemma for proponents of incremental theories is to assume that *krad'áx* and *krádox* acquire the property '1sg subject agreement' from a zero suffix (or, in inferential terms, from a rule effecting no

change in form). Realizational theories, by contrast, require nothing so exotic to account for these facts; one need only assume that the inflectional markings determined by the morphosyntactic properties of *krad'ax* and *krádox* happen not to include any realization of the property '1sg subject agreement'.

1.3 Minimizing unmotivated theoretical distinctions in inflectional morphology

A theory of inflectional morphology must be preferred to the extent that it minimizes any dependence on theoretical distinctions which are not empirically motivated. To varying degrees, lexical theories and incremental theories rest upon distinctions which cannot be convincingly motivated. Since inferential–realizational theories do not entail these distinctions, they must to that extent be preferred. Three such distinctions are at issue here.

The first of these is the distinction between concatenative and nonconcatenative inflection. In their theory of Distributed Morphology, Halle and Marantz maintain a strict separation between the means by which affixational markings are introduced (namely lexical insertion) and the means by which nonconcatenative markings are introduced (through the operation of a battery of 'readjustment rules'); but although concatenative and nonconcatenative inflection differ in their phonological expression, there is no convincing basis for assuming that they perform different functions or occupy different positions in the architecture of a language's morphology; there is, in other words, no empirical obstacle to the assumption in (6).⁷

- (6) There is no theoretically significant difference between concatenative and nonconcatenative inflection.

Thus, in inferential theories, the morphological rule associated with a given set of morphosyntactic properties may be either affixational or nonconcatenative; the difference between affixational rules and nonconcatenative rules has no theoretical importance. Lieber's lexical–incremental theory is likewise intended to incorporate assumption (6): Lieber's contention is that the principles of autosegmental phonology and prosodic morphology always make it possible to reduce apparently nonconcatenative inflection to affixal inflection (Lieber 1992:165ff.).

According to assumption (6), concatenative and nonconcatenative markings should be able to enter into direct competition. In an inferential–realizational theory, for example, the fact that the default rule of *-ed*

suffixation doesn't apply in past-tense forms such as *sang*, *drank*, and *swam* can be directly attributed to the existence of a rule of *ila* substitution, which is like the rule of *-ed* suffixation in expressing the property 'past tense': being the more narrowly applicable of the two rules, *ila* substitution overrides *-ed* suffixation, in accordance with Pāṇini's principle. Because they reject assumption (6), Halle and Marantz (1993) must resort to a very different account of the complementarity of *ila* substitution and *-ed* suffixation. They assume (pp.126ff.) that *sang* carries an empty past-tense suffix which competes with the default past-tense suffix *-ed* for insertion into the same abstract morpheme and which, in some verbs, triggers a rule of vowel readjustment; on the assumption that this empty suffix subcategorizes for a narrower class of verbs than *-ed*, Pāṇini's principle predicts that the former suffix should prevail in instances in which it competes with *-ed*. By this logic, though, one must likewise assume that *men* carries an empty plural suffix which overrides the default plural suffix *-s* and which, in some nouns, triggers a rule of vowel readjustment; that Breton *mein* 'stones' (sg *maen*) carries an empty plural suffix which overrides the default plural suffix *-où* and which triggers vowel readjustment; that German *darf* 'is permitted' (inf. *dürfen*) carries an empty 3sg present indicative suffix which overrides the default 3sg present indicative suffix *-t* and which triggers vowel readjustment; that Sanskrit *śatrāu* 'enemy (loc sg)' (stem *śatru-*) carries an empty locative singular suffix which overrides the default locative singular suffix *-i* and which triggers vowel readjustment; and so on. What emerges is a grand coincidence: again and again, both within and across languages, a default affix is overridden by an empty affix whose presence triggers a readjustment rule; this recurrent pattern is portrayed not as the consequence of any overarching principle, but as the accidental effect of innumerable piecemeal stipulations in the lexicon of one language after another. If one searched the languages of the world for a class of overt and phonologically identical affixes having the same sort of distribution that Halle and Marantz must logically attribute to their proposed class of empty affixes, one would inevitably come back empty-handed.

A second poorly motivated distinction in inflectional morphology is the distinction which is sometimes drawn between properties of content and properties of context. Lexical theories make it possible to associate an affix with a morphosyntactic property in two different ways: a given property may, on the one hand, serve as part of an affix's content; on the other hand, it may serve as part of an affix's subcategorization restriction, limiting the range of contexts into which that affix may be inserted. A similar distinction

exists in Steele’s theory of Articulated Morphology, in that a given morphosyntactic property may serve to define either a rule’s input (the class of expressions to which the rule applies) or its output (the class of expressions resulting from its application). The problem is that there is no universally applicable criterion which determines whether a property belongs to an affix’s content or to the context for which it subcategorizes. Bulgarian provides a case in point. In Bulgarian, there is a class of verbs (specifically, the nontruncating vocalic verbs) which exhibit a special suffix *-m* in the first person singular of the present tense (e.g. *dávam* ‘I give’). The question is: Is *-m* a 1sg suffix which subcategorizes for a present-tense stem, or is it simply a 1sg present-tense suffix? That is, is it an exponent of present tense, or is it simply restricted to the context of forms that are present in tense? Lexical theories demand that a choice be made, but the choice is inevitably an arbitrary one. In lexical theories, the need to choose in such cases is an artifact of the assumption that affixes are inserted from the lexicon and may therefore subcategorize for particular types of contexts; in Articulated Morphology, the need to choose is an artifact of the assumption that inflectional morphology is information-increasing. In inferential–realizational theories, by contrast, an affix’s morphosyntactic properties are not artificially sorted into properties of content and properties of context; the purported choice cannot even arise. That is, inferential–realizational theories, unlike lexical theories and incremental theories, are compatible with assumption (7).⁸

- (7) Exponence is the only association between inflectional markings and morphosyntactic properties.

In the absence of any universal criterion distinguishing properties of content from properties of context, a theory which rejects assumption (7) in favour of the assumption that affixes may be associated with morphosyntactic properties in either of two ways affords no credible account of the learnability of inflectional systems.

A third poorly motivated distinction in inflectional morphology relates to the nature of morphological representations. Lexical theories entail that like the syntactic structure of a phrase, the morphological representation of an inflected word is a branching structure of hierarchically organized constituents. Lieber (1980:51), for example, proposes that *dīxerāmus*, the first-person plural pluperfect indicative active form of Latin *dīcere* ‘to say’, has the structure [[*dīx-erā*]-*mus*], whose terminal nodes are occupied by ‘three morphemes, *dix-*, the past stem of *dicere*, *erā* the perfect morpheme, and

mus the first person plural morpheme'. For most words, however, evidence favouring the postulation of internal hierarchical structure is weak to nonexistent, as Janda (1983) and Anderson (1992: chapter 10) have cogently argued. The principal exceptions to this generalization are compound words of various types; for instance, the fact that *dog breeders* and *cat breeders* can be conjoined as *dog and cat breeders* implies internal hierarchical structure. That said, it is methodologically preferable to adopt the maximally restrictive assumption in (8) – an assumption with which inferential theories are in general consistent.

- (8) An uncompounded word's morphological form is not distinct from its phonological form.

The foregoing considerations lead to the conclusion – adopted here – that the most adequate theory of inflectional morphology must be inferential rather than lexical, and must be realizational rather than incremental.

1.4 The interface between syntax and inflectional morphology

The assumptions of inferential–realizational morphology presuppose a very limited interface between inflectional morphology and syntax; indeed, they would be compatible with the hypothesis that this interface is the maximally simple one defined in (9).

- (9) An inflected word *X* of category *Y* associated with a set σ of morphosyntactic properties is inserted as head of a phrase *YP* whose morphosyntactic properties are not distinct from σ .

According to this hypothesis, the set of morphosyntactic properties with which a word form is associated by the rules of morphology is the only factor mediating its syntactic distribution.

The range of inflected words whose syntactic distribution implies an interface no more complicated than (9) is vast. Nevertheless, there are at least four phenomena that apparently do involve a more complicated interface. First, the lexical insertion of words inflected for 'edge' properties is subject to the special requirement in (10).

- (10) If *X* is associated with a right-edge (or left-edge) property *p*, *X* is inserted at the right (left) edge of a phrase carrying *p*.

Thus, because the property 'possessive' realized by *-s* is a right-edge property of noun phrases in English, the word *children's* must (by (10)) be inserted at the right edge of a possessive noun phrase – but must, at the

same time, be inserted as head of a plural noun phrase, in accordance with (9). Similarly, because the property ‘definite’ realized by word-final accent is a right-edge property of noun phrases in Tongan (Poser 1985), the word *lahi* ‘big’ must (by (10)) be inserted at the right edge of a definite noun phrase. There may, in fact, be instances in which the same property functions both as an ordinary head property (subject to (9)) and as an edge property (subject to (10)): in Sanskrit, a vocative noun phrase is marked as such on its head (which exhibits its vocative case form) and is unaccented unless it is sentence-initial, in which case it is accented at its left periphery (Whitney 1889: section 314); thus, in the vocative noun phrase in (11), the vocative singular case form *napāt* ‘son’ seemingly carries ‘vocative’ as a head property, while the genitive singular form *ūrjas* (sandhi form *ūrjo*) carries ‘vocative’ as a left-edge property (without which it would instead have final accent: *ūrjáslūrjó*).

- (11) *ūrjo* *napāt* *sahasvan* (*Rg Veda*)
 strength: GEN.SG son: VOC.SG mighty: VOC.SG
 O mighty son of strength! (Whitney 1889: section 314d)

See Lapointe (1990), Miller (1991), and Halpern (1992) for extensive discussion of edge properties.

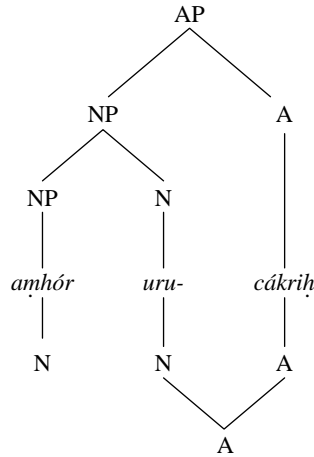
A second phenomenon involving a morphology–syntax interface more complicated than (9) is the phenomenon of shape alternations: if a word has more than one available ‘shape’, the shape chosen for insertion into a particular syntactic context is determined by a class of shape rules (Zwicky 1992). For instance, the choice between the two shapes *a* and *an* of the English indefinite article is determined by a rule licensing the preconsonantal insertion of *a* and the prevocalic insertion of *an*; in Parisian French, the choice between the two shapes /ø/ and /œf/ for *œufs* ‘eggs’ is determined by a rule licensing the insertion of /ø/ after /z/ and of /œf/ elsewhere (Grevisse 1993:791) – *deux œufs* /døz ø/ ‘two eggs’, but *quatre œufs* /katr œf/ ‘four eggs’; in Breton, the choice among the three shapes *tad*, *dad*, and *zad* for the noun ‘father’ is determined by a rule licensing the insertion of *zad* after a spirantization trigger (such as *va* ‘my’), the insertion of *dad* after a lenition trigger (such as *e* ‘his’), and of *tad* elsewhere – *va zad* ‘my father’, *e dad* ‘his father’, *ho tad* ‘your (pl) father’; and so on. A thoroughgoing elucidation of the formal characteristics of shape rules awaits future research.

A third, dramatic complication of the morphology–syntax interface involves what Zwicky (1992:364) calls SUPERLEXEMES. Whereas an ordinary word is inserted into a single terminal node in syntactic structure, a

superlexemic word is associated with two or more adjacent nodes. Superlexemic words are of various types, including portmanteau words (such as French *du*), compound words (such as *dog breeder*), and clitic groups of the bound-word type (such as *I'd*), among others. The nodes with which a superlexemic word is associated needn't form a syntactic constituent. Moreover, a compound's morphological structure needn't be isomorphic to its syntactic structure; in the Sanskrit expression (12), for example, the NP *aṃhór* 'distress (abl sg)' is syntactically dependent on *urú-* 'distance, relief' but is not itself part of the compound *uru-cákriḥ* 'causing relief (nom sg)'. An important task for morphosyntactic theory is that of identifying the limits on such mismatches; Sadock (1991) proposes substantive advances on this front.

(12) *aṃhór uru-cákriḥ* 'causing relief from distress'

Syntactic structure:



Morphological structure:

A final complication of the morphology–syntax interface is presented by the phenomenon of PERIPHRAISIS. Börjars, Vincent and Chapman (1997) argue that at least some periphrastic combinations function as part of a lexeme's inflectional paradigm. As a case in point, they cite the Latin perfective passive, which is expressed by means of a past participle (inflected for number, gender, and nominative case) in combination with an appropriately inflected form of *esse* 'to be'. The morphosyntactic properties 'perfective' and 'passive' are independently motivated in Latin inflectional morphology: because a verb's paradigm includes imperfective passive forms (e.g. *laudātur* 's/he is praised') and perfective active forms (*laudāvit* 's/he has praised') as well as imperfective active forms (*laudat* 's/he praises'),

‘perfective passive’ is a combination of morphosyntactic properties which is in principle available to Latin verbs; yet, the only expressions of this combination are periphrastic (e.g. *laudātus sum* ‘I have been praised’). Morphologists and syntacticians therefore have a choice to make. On the one hand, one might assume that Latin verbal paradigms are always defective, systematically lacking perfective passive forms whose existence would otherwise be expected and whose absence is compensated for by the use of a loosely equivalent syntactic combination. On the other hand, one could (following Börjars, Vincent and Chapman) assume that Latin verbal paradigms aren’t defective in this way at all, but actually contain periphrastic forms in their perfective passive cells. The former approach entails that the perfective passive meaning of a periphrastic combination such as *laudātus sum* is an effect of semantic compositionality; in the latter approach, by contrast, a periphrastic combination such as *laudātus sum* has a perfective passive meaning purely because that meaning is associated with the cell which it occupies within its paradigm. Unlike the former approach, the latter predicts that periphrastic combinations such as *laudātus sum* should tend to exhibit the same sorts of semantic idiosyncrasies as simple forms marked with passive morphology. This prediction is borne out: just as a deponent verb’s imperfective active forms have the appearance of inflected passives (e.g. *loquor* ‘I speak’), so do their perfective active forms have the periphrastic appearance of perfective passives (*locūtus sum* ‘I have spoken’). Börjars, Vincent and Chapman’s approach captures this generalization directly; in the defective-paradigm approach, by contrast, the mismatch of form and meaning exhibited by deponent verbs must be seen as the coincidence of two separate idiosyncrasies – one morphological (as in the case of *loquor*), the other syntactic (as in the case of *locūtus sum*).

In those instances in which a periphrastic combination functions as part of a lexeme’s inflectional paradigm, the morphology–syntax interface is more complicated than (9): the parts of the periphrastic combination must be inserted into two nodes (one heading the other’s complement), which may, of course, be linearly discontinuous.

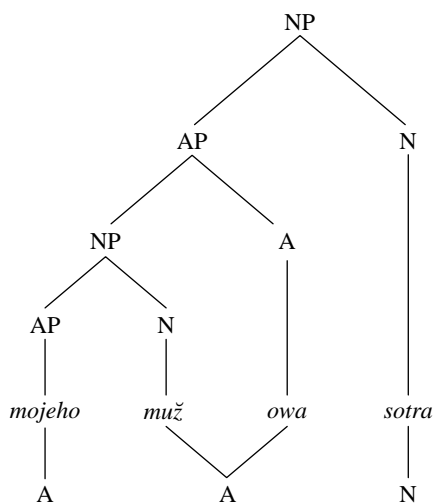
There is no sense in which these four complications of the morphology–syntax interface are logically incompatible with the assumptions of inferential–realizational morphology. Nevertheless, the apparently exceptional nature of these complications poses an important challenge for grammatical theory: that of identifying principled limits on departures from the maximally simple interface in (9). The task is a subtle one; whether a particular phenomenon is seen as involving an interface more complex than (9) necessarily depends on a range of more specific assumptions. Consider, for

example, the well-known problem of Upper Sorbian possessive adjectives (a problem definitively articulated by Corbett 1987; see also Spencer 1991:439ff.). In Upper Sorbian, animate nouns (principally those that are human in reference) give rise to possessive adjectives which are referentially singular and which agree in gender, number, and case with the noun they modify. A possessive adjective of this sort, however, may itself be modified by an adjective in the genitive case; in instances of this sort, the genitive adjective agrees in number and gender with the noun from which the modified possessive adjective arises. Thus, in the expression ‘my husband’s sister’ in (13), the possessive adjective *mužowa* ‘husband’s’ agrees in gender, number, and case with *sotra* ‘sister’, but the genitive adjective *mojeho* ‘my’ which modifies *mužowa* agrees in number and gender with the noun *muž* ‘husband’ from which *mužowa* arises. What sort of interface do such examples imply?

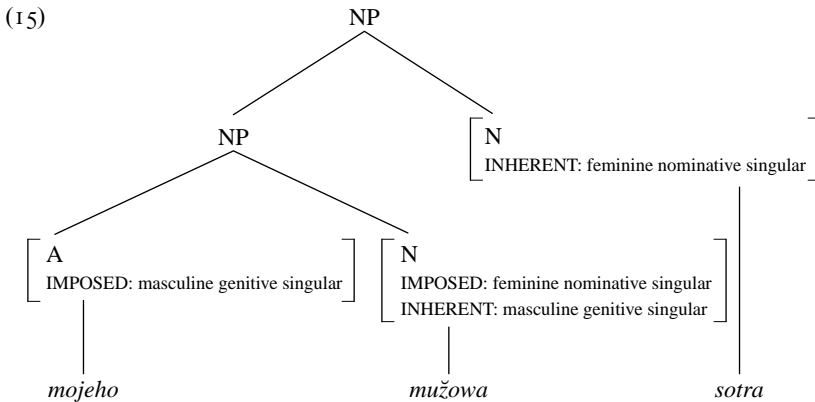
- (13) *mojeho* *mužowa* *sotra*
 my: GEN.SG.MASC husband’s: NOM.SG.FEM sister: NOM.SG.FEM
 ‘my husband’s sister’

One might hypothesize that *mužowa* is superlexemic – that although it is a single word morphologically, it is associated with two distinct terminal nodes in syntax: a nominal node N carrying the gender and number of *muž* and an adjectival node A; on this hypothesis (essentially that of Sadock (1985:416ff., 1991:159ff.)), N would determine the agreement properties of *mojeho* while those of A would be determined by *sotra*. This analysis entails that (13) embodies the morphosyntactic mismatch represented in (14).

- (14) Syntactic structure:



Zwicky (1986:98), however, proposes a very different account of the Upper Sorbian facts. In this account, the set of morphosyntactic properties carried by the possessive adjective *mužowa* is partitioned into two groups: an inherent group and an imposed group. The inherent group comprises genitive case and the properties of gender and number associated with *muž*; it is this group which determines the inflection of the agreeing modifier *mojeho* ‘my’. The imposed group, by contrast, comprises the properties of gender, number, and case which *mužowa* acquires as the dependent member of the agreement relation between it and *sotra*. This partitioning of properties makes it possible to regard the Upper Sorbian expression (13) as involving nothing more than the simple interface (9); on this view, (13) embodies no morphosyntactic mismatch, but has the syntactic structure in (15).



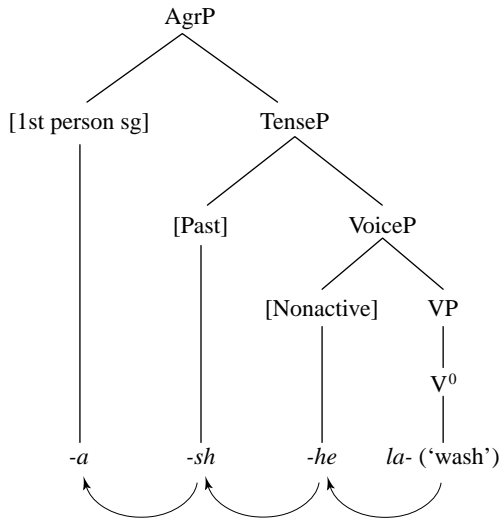
As this example shows, the range of phenomena involving a departure from the simple interface in (9) depends, in part, on the extent to which one can convincingly motivate a distinction between inherent and imposed property sets. Because the case which Zwicky (1986) makes for this distinction is compelling, Upper Sorbian possessive adjectives might well be assumed to fall within the compass of the simple interface in (9); but a principled delimitation of the range of phenomena falling outside its compass is, for the moment, wanting.

1.5 On certain properties that make some affixes SEEM like syntactic objects

Inferential–realizational morphology entails that inflectional morphology and syntax have, in Zwicky’s (1992:356) terms, a FEATURE INTERFACE

rather than a FORMATIVE INTERFACE; that is, the metalinguistic vocabulary shared by a language's system of morphological rules and its system of syntactic rules includes morphosyntactic properties such as 'plural number' and 'past tense', but excludes affixal formatives such as *-s* and *-ed*, and indeed the very notion of affix. This conception of the morphology–syntax interface is not compatible with what might be called the CONCRETE FUNCTIONAL HEAD HYPOTHESIS (CFHH), according to which inflectional affixes head phrasal projections in syntax, so that the combinations into which inflectional affixes enter are effected by head movement rather than by rules of morphology (Rivero 1990, Speas 1990, Mitchell 1991, et al.); it is, for example, incompatible with Rivero's (1990:138ff.) proposal that the Albanian verb form *lahesha* 'I was washed' arises as an effect of the three instances of head movement in (16).⁹

(16) *lahesha* 'I was washed'



This incompatibility might be seen as grounds for questioning the assumptions of inferential–realizational morphology, since inflectional markings sometimes seem to exhibit properties which do not obviously follow from those assumptions but which follow readily from the CFHH. The properties in question are listed in (17).

(17) a. From language to language, there is a disproportionate preference for inflection to be affixal.

- b. Affixes belonging to the same position class are often featurally coherent.
- c. From language to language, affixal exponents of the same morphosyntactic properties tend to appear in the same sequence.

Careful consideration reveals that each of these properties can, in fact, be explained without abandoning the assumptions of inferential–realizational morphology. Consider each of the three properties in turn.

1.5.1 The preference for affixal inflection

The disproportionate preference for affixation in inflectional systems (property (17a)) follows automatically from the CFHH: according to this hypothesis, inflection involves adjunction to a concrete functional head, and affixation is the most direct morphological analogue of adjunction. The assumptions of inferential–realizational morphology, by contrast, seem to leave open the possibility that nonconcatenative rules might be just as usual as rules of affixation in inflectional systems. How can the observed preference for affixation be reconciled with these assumptions?

Bybee and Newman (1995:635ff.) argue that the preference for affixal inflection has a purely historical basis. Inflectional markings tend to develop historically from full words or phrases by a gradual process of grammaticization. Affixal inflections can arise from free expressions comparatively easily. Nonaffixal inflections, by contrast, arise only by indirect means, and over a longer period of time. Typically, a nonaffixal inflection itself comes from a well-established affix, whose long and frequent association with a given stem causes stem and affix to become phonologically fused; ultimately, the (nonaffixal) stem modification associated with the affix may take on the affix's grammatical significance, allowing the affix itself to wither away. As Bybee and Newman emphasize, the inexorable processes of grammaticization may cause existing affixes to be crowded out by newly emerging affixes; consequently, 'most affixes do not last long enough to produce stem changes, and even if they do, they are usually replaced by some other affix, leaving the stem change only as residue in highly frequent items' (p.638). This reasoning suggests that property (17a) is purely an effect of diachronic forces, not (as the CFHH implies) an inevitable consequence of how grammars are organized.

Table 1.3 *Position–class analysis of six Swahili verb forms*

SLOT A	SLOT B	SLOT C	STEM	GLOSS
<i>tu-</i>	<i>ta-</i>	<i>ku-</i>	<i>ona</i>	‘we will see you (sg)’
<i>tu-</i>	<i>ta-</i>	<i>mw-</i>	<i>ona</i>	‘we will see her/him’
<i>m-</i>	<i>ta-</i>	<i>mw-</i>	<i>ona</i>	‘you (pl) will see her/him’
<i>tu-</i>	<i>li-</i>	<i>ku-</i>	<i>ona</i>	‘we saw you (sg)’
<i>tu-</i>	<i>li-</i>	<i>mw-</i>	<i>ona</i>	‘we saw her/him’
<i>m-</i>	<i>li-</i>	<i>mw-</i>	<i>ona</i>	‘you (pl) saw her/him’

1.5.2 *The featural coherence of affix position classes*

A group of affixes (or, in inferential–realizational terms, a group of inflectional rules) is **FEATURALLY COHERENT** if and only if every member of the group expresses one or another specification of exactly the same morphosyntactic feature or features. Consider, for example, the Swahili verb forms in table 1.3. Each of the three affix position classes in table 1.3 is featurally coherent: the Slot A affixes *tu-* and *m-* express subject agreement and nothing else; the Slot B affixes *ta-* and *li-* express tense and nothing else; and the Slot C affixes *ku-* and *mw-* express object agreement and nothing else. An inferential–realizational definition of the forms in table 1.3 would involve six prefixation rules organized into three featurally coherent ‘blocks’, as in (18):

(18)	Operation:	Applies to:	Realizes the property set:
	Block A		
	a. <i>tu</i> -prefixation	Verbs	{‘1pl subject agreement’}
	b. <i>m(w)</i> -prefixation	Verbs	{‘2pl subject agreement’}
	Block B		
	c. <i>ta</i> -prefixation	Verbs	{‘future tense’}
	d. <i>li</i> -prefixation	Verbs	{‘past tense’}
	Block C		
	e. <i>ku</i> -prefixation	Verbs	{‘2sg object agreement’}
	f. <i>m(w)</i> -prefixation	Verbs	{‘3sg (class 1) object agreement’}

Under the CFHH, the featural coherence of affix position classes (property (17b)) follows straightforwardly from the assumption that each affixal slot corresponds to a different functional head; the three affixal slots in table 1.3, for example, might be identified with a subject-agreement node, a tense node, and an object-agreement node. In inferential–realizational theories, by contrast, it’s not immediately obvious why such instances of feat-