Part I The Phenomena

1 Inflection

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1 The logic of inflection

The notion of inflection rests on the more basic notion of lexeme. A *lexeme* is a unit of linguistic analysis which belongs to a particular syntactic category, has a particular meaning or grammatical function, and ordinarily enters into syntactic combinations as a single word; in many instances, the identity of the word which realizes a particular lexeme varies systematically according to the syntactic context in which it is to be used. Thus, English has a verbal lexeme meaning 'cantāre' which enters into syntactic combinations as either *sing*, *sings*, *sang*, *sung*, or *singing*, depending on its syntactic context; this lexeme might be given the arbitrary label SING.[1] The words realizing a given lexeme can be conceived of both as units of form (i.e. as *phonological words*, such as /sæŋ/) and as units of grammatical analysis (i.e. as *grammatical words*, such as 'the past tense of SING'); the full set of words realizing a particular lexeme constitutes its *paradigm*.

The structure of paradigms in a given language is determined by the inventory of morphosyntactic properties available in that language. Given a lexeme L of category C, the structure of L's paradigm is determined by the set S of morphosyntactic properties appropriate to C and by the co-occurrence restrictions on these properties: for each maximal consistent subset of S, there is a corresponding *cell* in the paradigm of L. For instance, in a language in which the set S of morphosyntactic properties appropriate to category C is the set {PER:1, PER:2, PER:3, NUM:sg, NUM:pl, TNS:pres, TNS:past} and in which distinct specifications of the same feature are forbidden to co-occur, the maximal consistent subsets of S are those in (1). Accordingly, a lexeme L of category C has (in this language) a paradigm with twelve cells, one for each of the sets in (1); each of these cells is occupied by a particular word realizing L.

(1) {PER:1, NUM:sg, TNS:pres} {PER:1, NUM:sg, TNS:past}
{PER:2, NUM:sg, TNS:pres} {PER:2, NUM:sg, TNS:past}

{PER:3, NUM:sg, TNS:pres}	{PER:3, NUM:sg, TNS:past}
{PER:1, NUM:pl, TNS:pres}	{PER:1, NUM:pl, TNS:past}
{PER:2, NUM:pl, TNS:pres}	{PER:2, NUM:pl, TNS:past}
{PER:3, NUM:pl, TNS:pres}	{PER:3, NUM:pl, TNS:past}

A lexeme's *root* is that unit of form from which its paradigm of phonological words is deduced (e.g. the phonological words /sɪŋ/, /sɪŋz/, /sæŋ/, /sʌŋ/, and /sɪŋɪŋ/ are all deduced from the root /sɪŋ/ by principles of English morphology). Some lexemes have more than one root: French ALLER, for example, has the root *all-* in *allons* 'we go', but the root *i-* in *irons* 'we will go'. A root also qualifies as a *stem*, as does any form which is morphologically intermediate between a root and a full word (such as the perfect stem *dūk-s-* in Latin *dūk-s-ī* 'I led').

Once the existence of lexemes is assumed, two different uses of morphology can be distinguished. On the one hand, morphological devices can be used to deduce the words constituting a lexeme's paradigm from that lexeme's root(s); for instance, a very general rule of English morphology entails that the verbal lexeme SING (root /sɪŋ/) has a third-person singular present indicative form /sɪŋz/ in its paradigm. On the other hand, morphological devices can be used to deduce new lexemes from existing lexemes; thus, another rule of English morphology deduces an agentive nominal lexeme SINGER (root /sɪŋr/) from the verbal lexeme SING. Morphology put to the former, paradigm-deducing use is *inflection*; morphology put to the latter, lexeme-deducing use has traditionally carried the (potentially misleading) label of *word formation*, which encompasses both derivation and compounding (see Beard, DERIVATION; Fabb, COMPOUNDING).

2 Empirical criteria for distinguishing inflection from other things

However clear the logic of this distinction might be, it can be difficult, in practice, to distinguish inflection from word formation, particularly from derivation; by the same token, inflection – a morphological phenomenon – is not always easily distinguished from cliticization – a syntactic phenomenon. Various empirical criteria have been invoked in drawing these distinctions.

2.1 Inflection vs derivation

At least five criteria are commonly used to distinguish inflection from derivation. These criteria are, to a considerable extent, logically independent of one another; a priori, one wouldn't necessarily expect each of the five criteria to divide morphological phenomena into the same two groups. The boundaries

which these criteria actually entail coincide to a remarkable degree, but not perfectly, as we shall see.

Consider first the criterion of *change in lexical meaning or part of speech*:

(2) Two expressions related by principles of derivation may differ in their lexical meaning, their part-of-speech membership, or both; but two expressions belonging to the same inflectional paradigm will share both their lexical meaning and their part of speech – that is, any differences in their grammatical behavior will stem purely from the morphosyntactic properties that distinguish the cells of a paradigm.

By this criterion, the rule of agentive nominalization which produces SINGER from SING must be derivational, while the rule of pluralization which produces *singers* from *singer* need not be.

The diagnostic utility of criterion (2) obviously depends on the precision with which one can articulate the principles for determining an expression's part of speech (for which see e.g. Schachter 1985) and the principles for distinguishing lexicosemantic properties from morphosyntactic ones (see section 3). But even if such principles are clearly delineated, the usefulness of criterion (2) is inherently limited, for two reasons. First, a change in lexical meaning is not always accompanied by a change in part of speech – that is, some derivation is category-preserving, e.g. the derivation of REREAD from READ; thus, category change is not a necessary property of derivation, but is at most a sufficient property. Second, synonymous pairs such as *cyclic*/*cyclical* suggest that derivational morphology need not change lexical meaning; that is, change of lexical meaning is at most a sufficient property distinguishing derivational morphology from inflection.

To complicate matters even further, criterion (2) is not fully consistent with the other criteria, since there are morphological phenomena which are otherwise arguably inflectional but which involve a change in part of speech; for instance, a verbal lexeme's past participle is traditionally seen as an integral part of its paradigm, yet past participles are, in many languages, unmistakably adjectival in character.

Now consider the criterion of *syntactic determination*:

(3) A lexeme's syntactic context may require that it be realized by a particular word in its paradigm, but never requires that the lexeme itself belong to a particular class of derivatives.

Thus, if the lexeme SING is to head the complement of the auxiliary verb HAVE, it must assume its past participial form: *They have *sing*/**sings*/**sang*/*sung*/**singing several sea shanties*. By contrast, there is no syntactic context which requires agentive nominalizations such as SINGER and therefore excludes simplex (synchronically underived) lexemes such as FAN: *a singer*/*fan of sea shanties*. This criterion is the intended content of the slogan "inflectional

morphology is what is relevant to the syntax" (Anderson 1982: 587), but of course not all inflectional morphology is directly relevant to syntax; for instance, inflectional expressions of conjugation- or declension-class membership (e.g. the distinct theme vowels of Latin *laud-ā-mus* 'we praise' and *mon-ē-mus* 'we remind') need not be – that is, they may be *morphomic* (Aronoff 1994). Nevertheless, the logic of inflection entails that distinct members of a lexeme's paradigm carry distinct sets of morphosyntactic properties; in the context of a fully articulated theory of syntax in which such properties are by definition syntactically relevant, it follows that inflectional morphology must itself be syntactically relevant in the indirect sense that it spells out a paradigm's syntactically contrasting word-forms. Here again, the diagnostic utility of the criterion depends on the precision of one's principles for distinguishing lexicosemantic properties from morphosyntactic ones (cf. section 3).

A third criterion is that of *productivity*:

(4) Inflection is generally more productive than derivation.

In English, for instance, an arbitrarily chosen count noun virtually always allows an inflected plural form; by contrast, an arbitrarily chosen adjective may or may not give rise to a related causative verb (e.g. *harden*, *deafen*, but **colden*, **braven*). Thus, inflectional paradigms tend to be complete, while derivational relations are often quite sporadic.

Criterion (4) is sometimes inconsistent with the others. On the one hand, there are highly productive morphological phenomena which (by the other criteria) are derivational; in English, for example, virtually every nonmodal verb has a gerund (a nominal derivative identical in form to the present participle). On the other hand, one occasionally encounters groups of forms which (by the other criteria) constitute inflectional paradigms, but which are *defective* in that some of their cells are left empty; for instance, the paradigm of the French verb *frire* 'to fry' lacks a number of expected forms, including those of the subjunctive, the imperfect, the simple past, the plural of the present indicative, and the present participle.

Not all defective paradigms need be seen as instances of unproductive inflection, however. Defective paradigms are often systematically complemented by sets of *periphrastic* forms; in classical Sanskrit, for example, many vowel-initial roots consisting of a metrically heavy syllable lack an inflected perfect, but a periphrastic perfect formation (comprising the accusative singular form of the verb's nominal derivative in *-ā́* and a perfect form of the auxiliary verb KṚ 'make' or AS 'be') makes up for this (Whitney 1889: §1071). If the cells of an inflectional paradigm admit periphrastic formations as well as individual inflected words (as Börjars et al. 1997 argue), then defectiveness is not as widespread a phenomenon as it might first appear to be. Nevertheless, once periphrastic formations are admitted into inflectional paradigms, criteria must be established for distinguishing systematically complementary periphrasis from mere coincidence of meaning; for instance, should *more alert* (cf. **alerter*)

be assumed to figure in the paradigm of ALERT, given the coexistence of *more muddy* and *muddier*?

A fourth criterion is that of *semantic regularity*:

(5) Inflection is semantically more regular than derivation.

Thus, the third-person singular present-tense suffix *-s* in *sings* has precisely the same semantic effect from one verb to the next, while the precise semantic effect of the verb-forming suffix *-ize* is somewhat variable (*winterize* 'prepare (something) for winter', *hospitalize* 'put (someone) into a hospital', *vaporize* '(cause to) become vapor'). This difference might be attributed to a difference in lexical listing:

(6) Assumption: The lexicon lists derivative lexemes, but not inflected words.

On this assumption, the fact that derived lexemes are listed in the lexicon frees their meanings to "drift" idiosyncratically, while the fact that regularly inflected forms are not listed requires their meanings to remain rule-regulated. The semantic "drift" typical of derivation need not be understood in diachronic terms: it is not clear, for example, that the meaning of *winterize* has, through time, been drifting away from an original, less idiosyncratic meaning. Rather, it seems that, in this case and many others, the meaning of a derived form is not fully determined by the grammar, but depends on the intentions and inferences of language users at the moment of its first use (the moment at which the form and meaning are first "stored"); that is, the semantic idiosyncrasy of many derived lexemes follows not from the fact that their meanings are lexically listed, but from the fact that their meanings are inevitably shaped by pragmatic inferences at the very outset of their existence (and are therefore in immediate need of lexical listing). The opposite is true in instances of inflection: given the meaning of a lexeme L, the meaning associated with each cell in L's paradigm is in general fully determinate. This is not to say, of course, that it is the *form* of an inflected word that determines its meaning. On the contrary, an inflected word's form frequently underdetermines its morphosyntactic properties (i.e. its membership in a particular cell), hence its meaning; indeed, there are often blatant mismatches between an inflected word's morphology and its semantics (as e.g. in the case of Latin deponent verbs). An inflected word's meaning is instead generally a function of the lexeme which it realizes and the cell which it occupies in that lexeme's paradigm (Stump 1991).

Criterion (5) is occasionally inconsistent with the other criteria. On the one hand, there are (rare) instances of semantic idiosyncrasy involving forms which (by the other criteria) are inflectional (cf. the discussion of (8d) below); on the other hand, classes of derived lexemes are sometimes quite regular in meaning (e.g. English verbal derivatives in *re-*). Facts such as these suggest that, contrary to assumption (6), listedness is neither a necessary nor a sufficient correlate of the inflection/derivation distinction (a conclusion that is in any

event necessitated by the existence of highly productive classes of derived forms and irregular or defective paradigms of inflected forms).

A final, widely assumed criterion for distinguishing inflection from derivation is that of *closure*:

(7) Inflection closes words to further derivation, while derivation does not.

In English, for example, a privative adjective cannot be derived from a noun's inflected plural form (**socksless*), but can be derived from a noun's uninflected root, whether or not this is itself derived (*sockless*, *driverless*). A corollary of this criterion is that in words containing both inflectional and derivational affixes, the inflectional affixes will always be further from the root than the derivational affixes (except in cases of infixation). This criterion has been used to motivate a principle of grammatical organization known as the Split Morphology Hypothesis (Perlmutter 1988; cf. Anderson 1982; Thomas-Flinders (ed.) 1981), according to which all derivation takes place in the lexicon, prior to lexical insertion, while all regular inflection is postsyntactic.

Evidence from a variety of languages, however, suggests that neither criterion (7) nor the Split Morphology Hypothesis can be maintained. To begin with, it is actually quite common for category-preserving derivational morphology to appear "outside of" inflectional morphology: for instance, Russian *stučát'-sja* 'to knock purposefully' (a derivative of *stučát'* 'to knock') inflects internally (*stučím-sja* 'we knock purposefully', *stučát-sja* 'they knock purposefully', etc.); the plural of the Breton diminutive noun *bagig* 'little boat' is *bagoùigoù*, in which one plural suffix *-où* appears before the diminutive suffix *-ig* while the other appears after it; and so on. Moreover, it is even possible for category-changing derivation to appear "outside of" inflection: in Breton, for example, plural nouns can be converted to verbs from which a variety of derivatives are then possible (e.g. *pesk-ed* 'fish-PL' gives rise to *pesketa* 'to fish', whence the agentive nominalization *pesketer* 'fisherman'); they can give rise to privative adjectives (*ler-où* 'sock-PL', *dileroù* 'without socks'); and so on. For discussion of the evidence against the Split Morphology Hypothesis, see Bochner 1984; Rice 1985; Booij 1993; and Stump 1990a, 1993a, 1995b.

2.2 *Is the distinction between inflection and derivation illusory?*

In its simplest form (unadorned by such supplementary assumptions as (6) or the Split Morphology Hypothesis), the logic of inflection does not entail that the five criteria discussed in section 2.1 should partition morphological phenomena along the same boundary; the extent to which the criteria do coincide therefore suggests that a number of independent morpholexical principles are sensitive to (if not categorically constrained by) the distinction between inflection and derivation. This conclusion has, however, been questioned: it

has sometimes been asserted (Lieber 1980: 70; Di Sciullo and Williams 1987: 69ff; Bochner 1992: 12ff) that the distinction between inflection and derivation has no real empirical motivation, and therefore has no place in morphological theory. According to Bochner (1992: 14),

> The basic argument in any theory for treating inflection and derivation in a unified fashion is that they involve the same sorts of formal operations. Operations such as prefixation, suffixation, reduplication and infixation all have both inflectional and derivational uses in the world's languages.

But nothing in the logic of inflection excludes the possibility that inflection might involve the same sorts of formal operations as derivation; indeed, nothing excludes the possibility that the very same operation might serve a derivational function in some instances and an inflectional function in others. Breton furnishes an example of just this sort (Stump 1990b: 219ff): in Breton, the suffixation of *-enn* yields feminine nouns. In many cases, this operation serves a transparently derivational function: *bas* 'shallow (adj.)', *basenn* 'shoal'; *koant* 'pretty', *koantenn* 'pretty girl'; *lagad* 'eye', *lagadenn* 'eyelet', *c'hoant* 'want (n.)', *c'hoantenn* 'birthmark' (cf. French *envie*). But when *-enn* is suffixed to a collective noun, it yields the corresponding singulative: *buzug* 'worms', *buzugenn* 'worm'; *sivi* 'strawberries', *sivienn* 'strawberry'. Such singulative/collective pairs are syntactically indistinguishable from ordinary singular/plural pairs. Thus, *-enn* suffixation allows the root of one lexeme to be deduced from that of another, but it likewise fills the singular cell in a collective noun's inflectional paradigm; and this fact is in no way incompatible with the logic of inflection. As Aronoff (1994: 126) observes, "derivation and inflection are not kinds of morphology but rather uses of morphology: inflection is the morphological realization of syntax, while derivation is the morphological realization of lexeme formation." (See Beard 1995, where the implications of this fact are explored in detail.)

The theoretical appropriateness of the inflection/derivation distinction will be definitively established only through the comparison of carefully constructed formal analyses of ambitious scope for a typologically diverse range of grammatical systems. Only by this means can the fundamental question be addressed: Does a theory that incorporates this distinction furnish simpler (more learnable) grammars than one that doesn't? A theory must naturally provide some means of accommodating such exceptional morphological phenomena as category-changing inflection and defective paradigms, but it is the unexceptional phenomena – which are vastly more numerous – whose properties will likely weigh most heavily in the resolution of this issue.

2.3 Inflections vs clitics

Because of their syntactic relevance, inflectional affixes are sometimes difficult to distinguish from *clitics*, elements which exhibit an affix-like phonological

dependency on a neighboring word but whose syntax is word-like. Zwicky and Pullum (1983a: 503f) propose the following six criteria for distinguishing affixes from clitics:

(8) (a) "Clitics exhibit a low degree of selection with respect to their hosts while affixes exhibit a high degree of selection with respect to their stems."
(b) "Arbitrary gaps in the set of combinations are more characteristic of affixed words than of clitic groups."
(c) "Morphophonological idiosyncrasies are more characteristic of affixed words than of clitic groups."
(d) "Semantic idiosyncrasies are more characteristic of affixed words than of clitic groups."
(e) "Syntactic rules can affect words, but cannot affect clitic groups."
(f) "Clitics can attach to material already containing clitics, but affixes cannot."

Consider, for example, the Breton preposition *da* 'to'. On the one hand, *da* may inflect for agreement with a pronominal object, as in (9); on the other hand, it may host the first-person singular clitic *-m* and the second-person singular clitic *-z*, as in (10).

(9)

din	'to me'
dit	'to thee'
dezañ	'to him'
dezi	'to her'
deom	'to us'
deoc'h	'to you'
dezo	'to them'

(10)

dam zad	'to my father'
dam gweloud	'to see me'
daz tad	'to thy father'
daz kweloud	'to see thee'

This difference in status between the person/number markers in (9) and (10) is revealed quite clearly by the criteria in (8). Although *-m* and *-z* impose a rather severe prosodic requirement on their host (it must be a codaless monosyllable), they are otherwise quite indifferent to its category (criterion (8a)): it may be a preposition (as in (10)), a preverbal particle (e.g. *ne-m selaouez ket* 'you (sg.) aren't listening to me'), a subordinating conjunction (*pa-m magit* 'because you feed me'), or a coordinating conjunction (*ma c'hoar ha-m breur* 'my sister and my brother'). By contrast, object-agreement paradigms comparable to (9) are found with only a subclass of prepositions in Breton (e.g. *araog* 'before' inflects, but *kent* 'before' does not); exactly which prepositions inflect is apparently a matter of arbitrary lexical stipulation.

The expected combinations of *-m* or *-z* with a (prosodically appropriate) host are uniformly possible (criterion (8b)), but some inflecting prepositions (including *da*) have defective paradigms lacking the so-called indefinite form; contrast *dirag* 'in front of', whose indefinite form is *dirazer* 'in front of one'.

The result of concatenating *-m* or *-z* with its host exhibits no morphophonological peculiarities (criterion (8c)); by contrast, inflecting prepositions are often quite idiosyncratic in form (e.g. the first singular and third singular feminine forms of *ouz* 'against' are *ouzin* and *outi*, while those of *a* 'of' are *ac'hanon* and *anezi*).

Whereas inflected prepositions can be "stranded" by principles of anaphoric ellipsis (criterion (8e)), clitic groups with *-m* or *-z* cannot: *Da biou eo al levr-se? Din*. 'To whom is this book? To me.' *Da beseurt mestr eo al levr-se? *Dam*. 'To which teacher is this book? To mine.'

The person/number inflections in (9) cannot attach to prepositions that are already marked with *-m* or *-z* to express meanings such as that of *aux miens* 'to my ones'; nevertheless, criterion (8f) is not particularly revealing here, since Breton happens not to have any clitics which attach before or after the clitics *-m* and *-z* (but cf. English *I'd've*). Criterion (8d) is likewise relatively unhelpful, for although the clitics *-m* and *-z* are regularly interpreted (as possessive pronouns in prenominal contexts and as object pronouns in preverbal contexts), the inflected prepositions are also regular in their interpretation. Nevertheless, inflected forms occasionally have unexpected meanings. For instance, Breton nouns with suffixal plurals sometimes also allow "double plural" forms with two plural suffixes; but the exact nuance expressed by a double plural varies idiosyncratically from noun to noun: while the simple plural *preñv-ed* 'worm-s' and its double plural counterpart *preñv-ed-où* differ in that the former refers to an undifferentiated mass of worms and the latter to a number of individually distinguishable worms, the simple plural *merc'h-ed* 'girl-s' differs from its double plural *merc'h-ed-où* in that the latter conveys a sense of affectionate scorn (Trépos 1957: 264).

Notwithstanding the ease with which the criteria in (8) allow the inflections in (9) to be distinguished from the clitics in (10), there are many cases which are much less clear. A well-known example is that of bound pronouns in French: criteria (8a, e) imply that they are affixes (cf. Auger and Janda 1994), while criteria (8b–d) are compatible with the (traditional) assumption that they are clitics (see Halpern, Clitics).

3 The functions of inflection

As was seen above (section 2.1), the distinction between inflection and derivation presupposes a well-delineated distinction between morphosyntactic properties (such as 'plural' and 'nonfinite' in English) and lexicosemantic properties (such as 'agentive' and 'stative' in English). Fundamentally, the latter distinction is one of function: morphosyntactic properties are phrase-level properties to which syntactic relations such as agreement and government (in the traditional sense) are sensitive; a word's lexicosemantic properties, by contrast, simply determine the manner in which it enters into the semantic composition

of larger constituents. 'Plural' is a morphosyntactic property in English because (e.g.) the subject and the predicate of a finite clause in English agree with respect to this property; 'nonfinite' is a morphosyntactic property because verbs such as *condescend* require that their clausal complement assume a nonfinite form. By contrast, English expressions are never required to agree with respect to agentivity, nor to assume a 'stative form' in a particular syntactic context. Thus, the distinction between inflection and derivation is first and foremost one of function: while derivation serves to encode lexicosemantic relations within the lexicon, the function of inflection is to encode phrase-level properties and relations. Typically, a phrase's morphosyntactic properties are inflectionally encoded on its head (but see section 5.2).

3.1 Agreement properties

Agreement is asymmetrical in the sense that one member of an agreement relation can be seen as depending on the other member for some or all of its morphosyntactic properties. This asymmetry is particularly clear in cases involving a property which is invariably associated with one member of the relation; in French, for instance, adjectives and nouns covary in number (*petit animal*, pl. *petits animaux*) but not in gender – rather, the adjective must be seen as conforming to the invariant gender of the noun it modifies. Even where there is covariation, there is evidence of asymmetry. Thus, even though French adjectives and nouns covary in number, the adjective is clearly the dependent member of the relation of number agreement: whereas adjectives exhibit number inflection purely as an effect of their participation in this sort of relation, nouns exhibit number inflection wherever they appear, whether or not there is an agreeing expression. A word's *agreement properties* are those morphosyntactic properties which it possesses by virtue of being the dependent member of an agreement relation.

Languages vary widely with respect to the range of syntactic relations they encode by means of agreement morphology. Some familiar relations include the agreement of a modifier or specifier with the head of the encompassing phrase (as the article and the adjective agree in number and gender with the nominal head in *la petite souris*, or as certain Maori adverbs agree in voice with the verb they modify (K. Hale 1973a: 417)); the agreement of a predicate with one or more of its arguments (as an English verb agrees in person and number with its subject, or as many Welsh prepositions agree with their object in person, number, and (in the third person) gender – *yno i* 'in me', *ynot ti* 'in thee', *ynddo fe* 'in him', *ynddi hi* 'in her', etc.); the agreement of an anaphoric expression with its antecedent (as *kile* 'that one' agrees in noun class with its antecedent *kisu* 'knife' in the Swahili example in (11)); and the agreement of a complementizer with the subject of its complement (as West Flemish *dat* agrees in person and number with the subject of the finite clause which it introduces (Haegeman 1992: 47ff)).

(11) Wataka ki-su ki-pi? Nataka ki-le.
you.want NOUN.CL-*knife* NOUN.CL-*which I.want* NOUN.CL-*that.one*
'Which knife do you want? I want that one.'

Among languages that exhibit verb–argument agreement, a range of patterns is found. In an *accusative* agreement system, subjects are encoded differently from direct objects. In Swahili verbs, for instance, third-person singular personal subject agreement is encoded by a prefix *a-* (which precedes the tense prefix, as in *a-li-soma* 's/he read', *a-li-ni-ona* 's/he saw me'), while third-person singular personal object agreement is expressed by a prefix *m(w)-* (which follows the tense prefix, as in *ni-li-mw-ona* 'I saw her/him'). In an *ergative* agreement system, by contrast, subjects of transitive verbs are encoded differently from direct objects and subjects of intransitive verbs, which are themselves encoded alike. In vernacular Hindustani, for example, perfective/preterite verb forms are marked identically for agreement with direct objects and intransitive subjects, and are not overtly marked for agreement with transitive subjects:

(12) (a) 'aurat chal-ī.
*woman went-*FEM.SG
'The woman went.'

(b) mard chal-ā.
*man went-*MASC.SG
'The man went.'

(13) (a) 'aurat-nē ghōṛī mār-ī.
*woman-*ERG *mare struck-*FEM.SG
'The woman struck the mare.'

(b) 'aurat-nē ghōṛā mār-ā.
*woman-*ERG *horse struck-*MASC.SG
'The woman struck the horse.'

These two sorts of system may appear side by side; in Hindustani, for example, verbs outside of the perfective/preterite exhibit an accusative pattern of agreement. In some languages, moreover, it is an intransitive verb's lexicosemantic properties that determine whether its subject is encoded in the same way as a direct object or a transitive subject. Thus, in an *active* agreement system, the subject of an active intransitive verb is encoded in the same way as the subject of a transitive verb, while the subject of a stative intransitive verb is encoded in the same way as the object of a transitive verb; the Choctaw verb forms in (14) and (15) (from Davies 1986) illustrate this.

(14) (a) Hilha-li-tok.
*dance-1*SG-*PAST*
'I danced.'

(b) Sa-hohchafo-h.
*1*SG-*hungry-*PREDICATIVE
'I am hungry.'

(15) (a) Chi-bashli-li-tok.
2SG-*cut-1*SG-*PAST*
'I cut you.'

(b) Ano is-sa-hottopali-tok.
*I 2*SG-*1*SG-*hurt-*PAST
'You hurt me.'

Agreement relations vary widely with respect to the set of morphosyntactic properties that agreeing constituents are required to share. This is true of distinct agreement relations in the same language; in French, for instance, adjective–noun agreement is sensitive to number and gender, while subject–verb agreement is sensitive to number and person. It is likewise true of comparable agreement relations in distinct languages: in Swahili, for example, the relation of verb–object agreement is sensitive to properties of person, number, and gender (which receive simultaneous expression in the Swahili system of noun-class inflections); in Maithili, verbs agree with their objects in person and honorific grade but not number; in Lardil, nonimperative verbs and their objects agree in tense (K. Hale 1973a: 421ff); in Hungarian, verbs agree with their objects in definiteness; and so on. The diversity of agreement relations in natural language presents an imposing challenge for syntactic theory: besides providing a means of representing such relations, an adequate theory must furnish a principled delimitation of the range of possible agreement relations (see Corbett, Morphology and Agreement).

3.2 Governed properties

Although an asymmetrical dependency exists between the members of an agreement relation, agreement is nevertheless symmetrical in the sense that the members of an agreement relation share the properties to which the relation is sensitive. It is this latter sort of symmetry that distinguishes agreement from government: in a relation of government, the governing member imposes specific restrictions on the morphosyntactic properties of the governed member, but does so without (necessarily) sharing any of its properties. A word's *governed properties* are those morphosyntactic properties which are constrained by a governing expression in this way.

A wide range of government relations can be found; typically, the governing member is the head of a phrase, and the governed member is its complement or specifier. A verb or preposition may govern the case of its nominal object (as German *helfen* 'to help' and *mit* 'with' govern the dative case, while *sehen* 'to see' and *ohne* 'without' govern the accusative); a verb or complementizer may govern the mood or finiteness of its clausal complement (as French *craindre* requires a subjunctive complement, or as English *that* requires a finite complement); a numeral may govern the case and number of the enumerated noun (as nominative and accusative forms of Russian *tri* 'three' require the enumerated noun to appear in the genitive singular); an auxiliary may determine the inflection of its associated verb (as the English progressive auxiliary *be* requires that its associated verb appear as a present participle); and so on.

Languages with case systems vary in their patterns of case government. In an *accusative* system of case marking, the subject of a finite verb has the same (nominative) case whether the verb is transitive or intransitive, and the object

of a transitive verb has a distinct (accusative) case; in an *ergative* system, by contrast, the subject of an intransitive verb and the object of a transitive verb exhibit the same (absolutive) case, while the subject of a transitive verb exhibits a distinct (ergative) case.[2] Systems of the two sorts may serve complementary functions in a single language; in the Australian language Pitjantjatjara, for instance, nouns exhibit ergative case marking, while pronouns show the accusative pattern, as the examples in (16) (from Bowe 1990: 10f) show.

(16) (a) Tjitji a-nu.
child(ABS) go-PAST
'The child went.'

(b) Ngayu-lu a-nu.
1SG-NOM go-PAST
'I went.'

(c) Tjitji-ngku ngayu-nya nya-ngu.
child-ERG 1SG-ACC see-PAST
'The child saw me.'

(d) Ngayu-lu tjitji nya-ngu.
1SG-NOM child(ABS) see-PAST
'I saw the child.'

Languages with case systems also show considerable variation in the number of cases they distinguish: English has only three, while Sanskrit has eight, Finnish fifteen, and so on.

A government relation and an agreement relation may be sensitive to the same morphosyntactic property. In German, for instance, the government relation between preposition and object and the agreement relation between determiner and noun are both sensitive to properties of case; thus, in the expression *gemäß den Vorschriften* 'according to the rules', the dative case is a governed property of the object noun phrase (hence also of its head *Vorschriften*) as well as an agreement property of the determiner *den*.

3.3 Inherent properties

Morphosyntactic properties which are neither agreement properties nor governed properties are said to be *inherent* (cf. Anderson 1985a: 172). From a morpholexical perspective, inherent properties are of two types. On the one hand, an inherent property may be associated with some but not all words in a lexeme's paradigm. In German, for example, plural number is associated with some words in a nominal lexeme's paradigm but not others; plural number might therefore be characterized as a *word property* in nominal paradigms. On the other hand, a property may be invariably associated with the words in a lexeme's paradigm; thus, feminine gender might be characterized as a *lexeme property* in the paradigms of feminine nouns in German.

The properties to which an agreement relation is sensitive are, in general, either governed properties or inherent properties of its controlling member. Inherent properties do not always figure in agreement relations, however. In Amharic, for example, definiteness is an inherent property of noun phrases.

The inflection is situated on the head of the first constituent of the noun phrase (Halpern 1992: 204ff):

(17) (a) məSıhaf-u
book-DEF
'the book'

(b) tınnıš-u məSıhaf
small-DEF book
'the small book'

In Amharic, definiteness is irrelevant to the expression of agreement (a verb e.g. agrees with its subject in person, number, and sometimes gender, but not in definiteness) and is not imposed by a governing head. Nevertheless, the exponence of case is sensitive to definiteness: as the examples in (18) show, definite objects carry the suffix *-(ı)n* while indefinite objects do not.

(18) (a) and məSıhaf yasayyu-ñ.
one book show-me
'Show me one book.'

(b) məSıhaf-u-n yasayyu-ñ.
book-DEF-OBJ show-me
'Show me the book.'

The boundary between inherent properties and governed properties is in some instances rather cloudy, since the same property can sometimes seemingly be either inherent or governed according to its syntactic context. In French, for instance, the indicative mood is to all appearances an inherent property of verbs in main clauses; yet, it is a governed property of verbs in conditional clauses introduced by *si* 'if'. Properties of mood (section 4.2) are particularly prone to exhibit this sort of variability.

4 Inflectional categories

A language's *inflectional categories* are the categories of morphosyntactic properties which are expressed in its inflectional system. Languages vary considerably in their inflectional categories. An exhaustive enumeration of the inflectional categories found in human language is beyond the scope of the present discussion; nevertheless, some widely recurring categories can be noted.[3]

4.1 Some inflectional categories of nouns

Many languages exhibit gender and number as inherent inflectional categories of nouns. *Gender* is a category of morphosyntactic properties which distinguish classes of nominal lexemes: for each such class of lexemes, there is a distinct set of inflectional markings for agreeing words. In many languages, a noun's gender is overtly expressed only through the inflection of agreeing words; in French, for example, the feminine head noun of *la petite souris* 'the little mouse' does not carry any overt inflection for feminine gender, but the agreeing article and adjective both do. Often, however, a noun's membership in a particular

declension class implies that it belongs to a particular gender; in Sanskrit, for example, nouns in the *ā* declension (e.g. SENĀ 'army') are virtually always feminine. Moreover, in languages with noun-class systems, nouns ordinarily carry an overt inflectional marking simultaneously expressing gender and number; thus, in the Kikuyu noun phrase *mũ-ndũ mũ-kũrũ* 'old person' (pl. *a-ndũ a-kũrũ*), both the noun and its agreeing modifier carry an overt gender/number marker. Languages vary widely in the number of genders they encode: French, for example, has two genders (masculine and feminine), while Kikuyu has ten (A. R. Barlow 1960: 14A). Correlations may exist between the meanings of nouns and the genders to which they belong (thus, in French, nouns which refer exclusively to females are generally feminine); such correlations need not involve the sex of a noun's referent (in Plains Cree e.g. the genders instead correlate with an animate/inanimate distinction). Correlations of this sort are, however, virtually never perfect; that is, membership in a particular gender is most often a matter of arbitrary stipulation. In French, for instance, *bête* 'beast' is feminine, while *animal* 'animal' is masculine; Plains Cree *nitās* is animate with the meaning 'my pants', but inanimate with the meaning 'my gaiter' (Wolfart 1973: 22); and so on.

Number is a category of morphosyntactic properties used to distinguish the quantity to which a noun phrase refers. Many languages distinguish only two number properties (singular and plural); others additionally distinguish a dual and (rarely) a trial. In Sanskrit, for example, nouns have three distinct nominative forms, a singular, a dual, and a plural: *aśvas* 'horse', *aśvāu* '(two) horses', *aśvās* '(more than two) horses'.

Another inherent inflectional category of nouns in many languages is that of *(in)definiteness* – a category of morphosyntactic properties distinguishing noun phrases according to whether their reference in a given context is presumed to be uniquely identifiable. In the Syrian Arabic noun phrase *l-madīne l-ʾkbīre* 'the large city', for example, the definite prefix *l-* on the head and its agreeing modifier implies that the city in question is uniquely identifiable – an implication absent from the indefinite noun phrase *madīne kbīre* 'a large city'.

Case is a category of morphosyntactic properties which distinguish the various relations that a noun phrase may bear to a governing head. Some such relations are fundamentally syntactic in nature – for example, the subject, direct object, indirect object, and genitive relations; cases used to encode relations of this sort (the so-called *direct* cases) include the nominative, the accusative, the ergative, the absolutive, the dative, and the genitive. Other cases – the *oblique* cases – encode relations which are instead fundamentally semantic; these include the instrumental case (e.g. Sanskrit *tena aśvena* 'by/with that horse'), the ablative (*tasmāt aśvāt* 'from that horse'), and the locative (*tasmin aśve* 'at that horse'), among many others.

A noun may also inflect as the dependent member of an agreement relation with a possessor noun phrase. In Uyghur, for example, a noun agrees in person (and number, in the nonthird persons) with a possessor noun phrase – *Nuriyi-niŋ yoldiš-i* 'Nuriyä's husband' [Nuriyä-GEN husband-3RD.PERSON.POSSESSOR];

unsurprisingly, possessor agreement allows pronominal possessors to be omitted (*u-niŋ yoldiš-i* ~ *yoldiš-i* 'her husband').

It is sometimes claimed (e.g. by Anderson 1982: 586; 1985a: 177) that evaluative properties such as 'diminutive' and 'augmentative' constitute an inflectional category of nouns in some languages. Consider, for instance, the situation in Kikuyu. Every Kikuyu noun belongs to a particular gender. A noun's gender and number are cumulatively realized as a noun-class inflection, so a gender can be thought of as a pairing of a singular noun class with a plural noun class; for instance, *-raatũ* 'shoe' belongs to gender 7/8, exhibiting the class 7 prefix *kĩ-* in the singular and the class 8 prefix *i-* in the plural. Rather than inflect for its proper gender, a noun may exhibit the class 12 prefix *ka-* in the singular and the class 13 prefix *tũ-* in the plural; when it does, it takes on a diminutive meaning (*ka-raatũ* 'little shoe', pl. *tũ-raatũ*) and requires agreeing constituents to exhibit the appropriate class 12/class 13 concords. Should "diminutivity" be regarded as an inherent inflectional category on a par with number and gender in a system of this sort? It is not clear that it should. Morphosyntactically, the pairing of classes 12 and 13 behaves like an ordinary gender, not like a morphosyntactic property of some separate category; moreover, there are members of gender 12/13 that are not diminutives of nouns from other genders (e.g. *ka-raagita* 'tractor', pl. *tũ-raagita*). One might just as well assume that the pairing 12/13 is simply a gender, and that the category of diminutives arises by means of a highly productive derivational rule whose effect is to shift nouns to this gender.

4.2 Some inflectional categories of verbs

Inherent inflectional categories of verbs include tense, aspect, polarity, voice, and (in some uses) mood.[4] *Tense* is a category of morphosyntactic properties distinguishing a finite verb's temporal reference. In Latin, for instance, verbs inflect for three tenses: past, present, and future (*laudābam* 'I praised', *laudō* 'I praise', *laudābō* 'I will praise'). Despite the conceptual naturalness of this three-way distinction, it is far from universal: inflectionally speaking, English has two tenses, past and nonpast (J. Lyons 1968: 306); Kikuyu has six (far past, yesterday past, today past, present, near future, far future – Bennett et al. 1985: 138f); and so on.

Aspect is a category of morphosyntactic properties distinguishing the various senses in which an event e can be situated at a particular time interval i. In Kikuyu, six such properties are distinguished in the present affirmative (Bennett et al. 1985: 139ff): the continuous aspect (e.g. *tũraagũra nyama* 'we are buying meat') indicates that e is in progress throughout i; the habitual aspect (*tũgũraga nyama* 'we buy meat') indicates that events of kind e are customary at i; the projected aspect (*tũũkũgũra nyama* 'we are going to buy meat') indicates an intention at i for e to take place; the completive aspect (*twagũra nyama*, roughly 'we have bought meat') indicates that e has just come to completion

at i; the initiative aspect (*tũgũrĩĩte nyama*, also roughly 'we have bought meat') indicates that the state resulting from the completion of e holds true at i; and the experiential (*twanagũra nyama* 'we have (at some point) bought meat') identifies e as having happened at some indefinite (and potentially remote) time interval prior to i. Often, there is a kind of conceptual overlap between the categories of aspect and tense; for instance, an event which is described in aspectual terms as having come to completion by a particular time can likewise be described in temporal terms as a past event relative to that time. In view of such cases, the boundary between aspect and tense is sometimes elusive.

Polarity is a category of morphosyntactic properties distinguishing affirmative sentences from negative sentences. In Kikuyu, for instance, a verb's affirmative form is unmarked for polarity, while a verb's negative form is marked by a prefix *ti-* (in subordinate clauses, *ta-*): *tũ-kaagwata* 'we will take hold', *tũ-ti-kaagwata* 'we will not take hold' (in subordinate clauses, *tũ-ta-kaagwata*). The expression of mood and polarity sometimes intersect; thus, Sanskrit verbs exhibit a special prohibitive (negative imperative) inflection (Whitney 1889: §579).

Voice is a category of morphosyntactic properties distinguishing the various thematic relations that may exist between a verb and its subject. In Sanskrit, for instance, a verb appears in the active voice if its subject is the agent but not the beneficiary of the action it describes (*odanam āpnoti* 's/he obtains porridge (for someone else)'), in the middle voice if its subject is both agent and beneficiary (*odanam āpnute* 's/he obtains porridge (for herself/himself)'), and in the passive voice if the subject is the theme rather the agent (*odana āpyate* 'porridge is obtained').

Mood is a category of morphosyntactic properties which, as inherent properties (section 3.3), distinguish the ways in which a proposition may relate to actuality (in the speaker's mind). In classical Sanskrit, for example, there are three principal moods: the indicative mood (e.g. *bhavāmi* 'I am') is used to assert a proposition as fact; the optative mood (*bhaveyam* 'would that I were') is used to express propositions whose reality is wished for; the imperative mood (*bhavāni* 'I will be!') is used to command that a proposition be realized. The boundaries between distinct moods can be quite fluid; for instance, the expression of a wish can have the illocutionary force of a command. Moreover, the boundary separating mood from tense and aspect is itself sometimes hazy; future tense, for example, is inherently nonactual. As noted earlier (section 3.3), properties of mood behave, in some uses, as governed rather than inherent properties; thus, certain English verbs (e.g. *require*) mandate that a finite complement be in the subjunctive mood.

Another category for which a verb may inflect under the influence of a governing head is that comprising the morphosyntactic properties 'finite' and 'nonfinite', which distinguish verbs according to whether they are inflected for tense; in French, for example, the verb *devoir* 'to have to' requires its clausal complement to be nonfinite, while *vouloir* 'to want to' allows either a finite or a nonfinite complement.[5] Similarly, verbs in many languages exhibit a special

set of forms for use in subordinate clauses: in Plains Cree, for example, the set of verbal affixes used to mark agreement (in person, number, gender, and obviation) in main clauses is distinct from that used in dependent clauses (Wolfart, 1973, p. 41); in Swahili, relative verb forms (i.e. those bearing an affix encoding the relativized argument) exhibit a smaller range of tense inflections than ordinary indicative verb forms, and inflect differently for negation; and so on.

A syntactic relation in some ways akin to government is encoded by verbal inflections in systems of *switch reference*. Choctaw furnishes an example of this sort of system: in coordinate clauses, the verb in the first clause inflects to indicate whether its subject is identical in reference to that of the second clause (Davies 1986: 9); in (19a), for instance, the first verb carries the same-subject suffix *-cha* (glossed 'ss'), while in (19b), the first verb carries the different-subject suffix *-na* (glossed 'ds').

(19) (a) Tobi apa-li-cha oka ishko-li-tok.
bean eat-1SG-SS water drink-1SG-PAST
'I ate beans and drank water.'

(b) Wa:k nipi ish-awashli-na oka ishko-li-tok.
cow flesh 2SG-fry-DS water drink-1SG-PAST
'You fried the beef, so I drank water.'

As the dependent member of an agreement relation, a verb may inflect for a number of categories; instances of verb agreement in person, number, gender, honorificity, and definiteness have been alluded to above. In many languages, verbs inflected for *person* exhibit special subsidiary distinctions (which likewise tend to be expressed in pronominal inflection). In Plains Cree, for example, verb forms marked for agreement with a nonthird-person plural argument show a three-way distinction (Wolfart 1973: 16): *exclusive* first-person agreement encodes an argument referring to a group which includes the speaker(s) but excludes the addressee(s); exclusive second-person agreement encodes an argument referring to a group which excludes the speaker(s) but includes the addressee(s); and *inclusive* agreement encodes an argument referring to a group which includes both the speaker(s) and the addressee(s). Moreover, Plains Cree verb forms marked for agreement with a third-person argument show a distinction in obviation: *proximate* agreement encodes an argument whose referent is "the topic of discourse, the person nearest the speaker's point of view, or the person earlier spoken of and already known" (Bloomfield 1962: 38, cited by Wolfart 1973: 17), while *obviative* agreement encodes an argument whose referent lacks these characteristics. The interpenetration of agreement categories in a language's system of verb inflection can be quite complex; for instance, a verb may exhibit more honorific grades in the second person than in the third (as in Maithili); a verb may inflect for gender in the second-person plural but not the second-person singular (as in Kabyle Berber); and so on.

4.3 Some inflectional categories of adjectives

Degree is an inherent inflectional category of adjectives; the morphosyntactic properties which it comprises serve to distinguish the extent to which a referent evinces some quality. The English adjective TALL, for instance, has three degrees. The positive degree *tall* specifies the quality of tallness without reference to the extent to which it is exhibited; the comparative degree *taller* specifies the extent of one referent's tallness relative to that of some other referent; and the superlative *tallest* specifies extreme tallness relative to some class of referents.

An adjective may exhibit distinct attributive and predicative forms, depending upon its syntactic relation to the controlling noun; in Russian, the feminine nominative singular of NOVYJ 'new' is *nóvaja* in attributive uses (*nóvaja kníga* 'new book') but *nová* in predicative uses (*kníga nová* 'the book is new').

As the dependent member of an agreement relation, an adjective may inflect for the properties possessed (either inherently or as an effect of government) by the controlling noun. In the Russian noun phrase *nóvaja kníga* 'new book', for instance, the dependent adjective is feminine, nominative, and singular, matching the controlling noun in gender, case, and number; contrast *nóvyj dom* 'new house' (where the gender is instead masculine), *nóvuju knígu* (where the case is instead accusative), and *nóvye knígi* (where the number is instead plural). Similarly, adjectives may agree in (in)definiteness (e.g. Syrian Arabic *l-madīne l-ʾkbīre*, lit. 'the-town the-large', cited above), and so on.

5 The realization of inflection

Languages show extraordinary variation in the morphological realization of their inflectional categories; two dimensions of variation are particularly salient.

5.1 Inflectional exponence

An *exponent*[6] of a morphosyntactic property in a given word is a morphological marking expressing that property in that word; thus, the property 'plural' has *-s* as its exponent in *girls* and a vowel modification (of [ʊ] to [ɪ]) as its exponent in *women*. Very frequently, a single marking serves simultaneously as an exponent of two or more morphosyntactic properties; in Latin, for instance, the suffix *-ibus* in Latin *rēgibus* 'to kings' is simultaneously an exponent of dative case and plural number. In this particular example, the simultaneous exponence of case and number is a reflection of a more general fact: namely, that in Latin declensional morphology, the exponents of case and number always coincide; that is, the categories of case and number exhibit *cumulative exponence* in Latin declension. Not all simultaneous exponence is cumulative, however. For instance, voice and subject agreement are simultaneously realized

in second-person plural verb forms (by *-tis* in *laudātis* 'you praise', by *-minī* in *laudāminī* 'you are praised') but not in third-person plural forms (e.g. *laudant* 'they praise', *laudantur* 'they are praised', where *-nt* expresses subject agreement while *-ur* expresses passive voice); thus, voice and subject agreement are merely said to exhibit *overlapping exponence* in Latin verb inflection. A morphosyntactic property may also exhibit *extended exponence*: that is, it may exhibit more than one exponent in a single word; thus, in Latin *laudāvī* 'I have praised', both *-v* and *-ī* are exponents of the perfect. (Because *-ī* additionally expresses first-person singular subject agreement and present tense, *laudāvī* is also another example of overlapping exponence.)

Inflectional systems employ a variety of different kinds of exponents. These include concatenative operations of suffixation (*girl*, pl. *girl-s*), prefixation (Kikuyu *mũ-rũũthi* 'lion', pl. *mĩ-rũũthi*), and infixation (Oaxaca Chontal *kwepoʔ* 'lizard', pl. *kwe-ɬ-poʔ*), quasi-concatenative operations of partial or total reduplication (Papago *bana* 'coyote', *kuna* 'husband', pl. *baabana*, *kuukuna*; Indonesian *babi* 'pig', pl. *babibabi*), and an array of nonconcatenative operations, from vowel modifications (*woman*, pl. *women*) and consonant gradation (Fula *yiite* 'fire', pl. *giite*) to modifications of accent (Russian *oknó* 'window (nom. sg.)', nom. pl. *ókna*) and tone (Somali *èy* 'dog' (with falling tone), pl. *éy* (with high tone)). One can even find instances in which subtraction serves an inflectional function; in Huichol, for example, a verb's completive form arises from its stem through the loss of its final syllable (*pïtiuneika* 'he danced', completive *pïtiunei*). Naturally, these different sorts of exponence are often intricately interwoven within a single paradigm.

In many languages, stem choice may serve as an exponent of some morphosyntactic property. In Latin, for example, there is a special stem (Aronoff (1994: 59) calls it the *b stem*) which is formed by suffixing *-b* to the present stem (with concomitant lengthening of its final vowel). The *b* stem is used to form the imperfect of verbs in all conjugations, as well as the future of verbs in the first and second conjugations. In view of this fact, the *-b* suffix in *laudāb-* (the *b* stem of the first-conjugation verb *laudāre* 'praise') cannot, in and of itself, be seen as an exponent of any morphosyntactic property; its (purely morphomic) status is simply that of a *b* stem-forming suffix. Nevertheless, the choice of *laudāb-* from among the range of available stems must count as one of the exponents of the imperfect in *laudābam* 'I praised' and as one of the exponents of the future in *laudābō* 'I will praise'.

In the simplest cases, stems are inflected without regard to their internal morphological structure. Nevertheless, category-preserving derivation gives rise to stems which are *headed*, and some such stems inflect through the inflection of their head. In Russian, for example, the verb *stučát'-sja* 'to knock purposefully' is headed by the verb *stučát'* 'to knock' and inflects on its head (*stučím-sja*, *stučát-sja*, etc., noted above); Sanskrit *ni-pat-* 'fly down' inflects on its head *pat-* 'fly' (*ni-patati* 's/he flies down', *ny-apatat* 's/he flew down', etc.); English *undergo* inflects on its head *go* (whose suppletive past-tense form is therefore faithfully preserved in *underwent*); and so on. The phenomenon

of head marking has numerous implications for morphological theory (see Hoeksema 1985, Stump 1995b, for discussion).

Quite separate from the (morphological) fact that some headed stems inflect on their head is the (syntactic) fact that a phrase's morphosyntactic properties are ordinarily realized through the inflection of its head. In English, for example, the plural number of the noun phrase *her favorite books* is manifested only in the inflection of the head noun. In some cases, however, a phrase's morphosyntactic properties are realized by inflectional markings situated on a constituent other than the head of the phrase. In many such cases, the inflected constituent is at the periphery of the phrase. In English, for example, a possessive noun phrase has the inflectional suffix *-'s* on its final constituent, whether or not this is the head of the phrase: *someone else's (hat)*, *the King of England's (hat)*; the possessive suffix has therefore been characterized as an *edge inflection* (Zwicky 1987; cf. also Lapointe 1990, Miller 1992, Halpern 1992). But inflections which aren't realized on a phrase's head aren't necessarily realized at its periphery. In Bulgarian, for example, noun phrases are inflected for definiteness on the head of their first constituent: the inflected word need not be the head of the noun phrase itself; nor does it have to be at any phrasal periphery (Halpern 1992: 193ff).

5.2 *Inflectional "templates"*

Many languages exhibit what has come to be known as *template morphology* – systems in which inflectional affixes are apparently organized into a number of *position classes* such that the members of any given class are mutually exclusive but occupy the same sequential position, or *slot*, relative to members of other classes within a given word form. For instance, Swahili verb inflections are (pretheoretically) organized according to the following template:

(20) The Swahili verb "template" (cf. Schadeberg 1984: 14ff)

Slot	Contents
1	negative affix *ha-* (nonrelative, indicative forms; optionally in the conditional)
2	subject agreement prefixes; infinitive affix *ku-*; habitual affix *hu-*
3	negative affix *si-* (relative, subjunctive, and imperative forms; optionally in the conditional)
4	tense and mood prefixes; negative infinitive affix *to-*
5	relative agreement prefixes (tensed or negative forms)
6	metrically motivated empty affix *ku-* (Ashton 1947: 142f, Schadeberg 1984: 14)
7	object agreement prefixes
Stem	(= verb root + theme vowel *-a*, *-i*, or *-e*)
8	affix *-ni* encoding a plural addressee; relative agreement suffixes (tenseless affirmative forms)

Systems of this sort raise an important question: how, if at all, does "template" morphology differ from ordinary inflection?

Simpson and Withgott (1986) propose the following criteria for distinguishing "template" morphology from what they call "layered" morphology:[7]

(i) The absence of any affix in a particular slot may, in a "templatic" system, contrast paradigmatically with the presence of any given affix in that slot; in Swahili, for example, the absence of any slot 2 prefix is what distinguishes the imperative form *si-pige* 'don't you (sg.) beat!' from the subjunctive form *u-si-pige* 'that you (sg.) may not beat'.

(ii) "Template" morphology yields a form whose morphosyntactic properties cannot all be attributed to a single one of its parts. For example, Swahili *tu-li-wa-ona* 'we saw you (pl.)' has the morphosyntactic properties 'first-person plural subject', 'past tense', and 'second-person plural object'; the first of these is associated with the prefix *tu-*, the second with *li-*, the third with *wa-*.

(iii) "Template" morphology presents cases in which the exponence of one property is sensitive to the presence of another property whose principal exponent is nonadjacent (in violation of the Adjacency Constraint – M. Allen 1978, Siegel 1978); thus, in Swahili verbs, the choice between the slot 3 negative prefix *si-* and the slot 1 negative prefix *ha-* is conditioned by the presence of the property 'subjunctive mood', whose principal exponent (the theme vowel *-e*) is not structurally adjacent to either slot.

(iv) "Template" morphology presents cases in which a property's exponence is sensitive to the presence of another property whose principal exponent is more peripheral (in violation of the so-called No Lookahead Constraint): in finite verb forms in Swahili, the principal exponents of negation are peripheral to those of tense, yet the exponence of past tense as *li-* or *ku-* is sensitive to negation (*tu-li-taka* 'we wanted', but *ha-tu-ku-taka* 'we didn't want').

(v) Finally, systems of "template" morphology typically allow a verb to agree with more than one of its arguments (as in the Swahili example in (ii)).

Simpson and Withgott (1986) assert that "layered" morphology possesses none of these characteristics. The clearest cases of "layered" morphology, however, are instances of category-changing derivation. The question therefore arises as to whether a distinction can be drawn between "templatic" inflection and "layered" inflection. Stump (1997) argues that such a distinction is unmotivated – that all inflection is in fact "templatic." Inflectional systems generally behave like "template" morphology with respect to criteria (i) and (ii), and although inflection does not behave uniformly with respect to criteria (iii)–(v), these are at most sufficient and not necessary properties of "template"

morphology. Stump nevertheless rejects the notion (implicit in the unfortunate template metaphor) that "template" morphology is regulated by positive morphological output conditions (whose postulation is otherwise unmotivated), arguing instead that "templates" take the form of paradigm function schemata (section 6.3), whose existence is independently motivated by the phenomena of head marking (Stump, 1995b).

6 Theoretical approaches to inflection

Although there is considerable consensus on which phenomena are inflectional and which are not, there is considerable disagreement about the theoretical status of inflection. Here, I will briefly discuss four contrasting points of view.

6.1 The lexicalist approach to inflection

In one widely pursued approach to inflection (see e.g. Di Sciullo and Williams 1987, Lieber 1992, Selkirk 1982) an affix is assumed to have much the same status as a word: it has a lexical listing which specifies its phonological form, its semantic content (if any), its subcategorization restriction, and its morphosyntactic properties. On this view, the suffix *-s* in *sing-s* has a lexical entry something like (21):

(21)	(a)	Phonology:	/z/
	(b)	Semantics:	∅
	(c)	Subcategorization:	[$_{v}$V____]
	(d)	Morphosyntactic properties:	PER:3
			NUM:sg
			TNS:pres
			MOOD:indic

The subcategorization restriction (21c) allows *-s* to combine with the verbal stem *sing* to yield the third-person singular present indicative form *sing-s*; a mechanism of feature percolation guarantees that *sing-s* is (like *sing*) a verb and carries (like *-s*) the morphosyntactic properties in (21d).

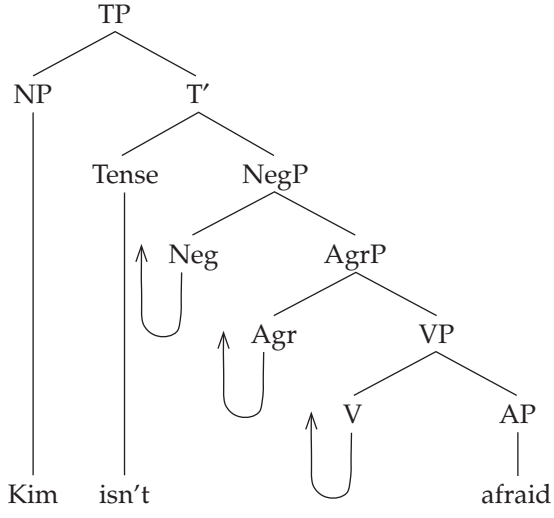
Whatever intuitive appeal it may have, this lexicalist approach is subject to a wide range of criticisms. Because it accords affixes the special status of lexical items, it entails a fundamental grammatical difference between affixal exponence and nonconcatenative varieties of inflectional exponence; for instance, it entails that the manner in which *played* comes from *play* is, in theoretical terms, quite separate from the manner in which *sang* comes from *sing*. This distinction, however, is poorly motivated; there is no clear empirical obstacle to assuming that the process of affixation by which *play* → *played* is on a theoretical par with the process of substitution by which *sing* → *sang*.[8] The assumption that

an inflected word's morphosyntactic properties are assembled from those of its component morphemes by a percolation mechanism is highly dubious, since a word's morphosyntactic properties are often underdetermined by its form; as Stump (1993e: 488f) shows, this fact can only be reconciled with the lexicalist approach through the postulation of zero affixes, a device whose theoretical legitimacy has rightly been questioned (Matthews 1972: 56ff). Moreover, the phenomena of overlapping and extended exponence pose an enormous technical obstacle to the formulation of a structure-based percolation mechanism (Stump 1993d). The assumption that an affix's distribution is regulated by a subcategorization restriction is similarly problematic: as Stump (1992, 1993c) shows, subcategorization frames are inherently incapable of capturing certain kinds of generalizations about the distribution of inflectional affixes.

6.2 The functional head approach to inflection

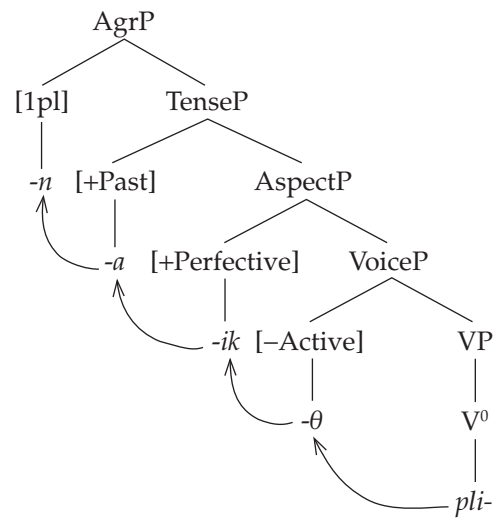
A second, more recent approach to inflectional morphology has its origins in the proposals of Pollock (1989). Assuming a version of the 'Principles and Parameters' approach to syntax, Pollock argues that INFL, the syntactic locus of tense, subject agreement, and negation in English and French, should be broken down into three distinct functional categories, each of which heads its own maximal projection. Pollock demonstrates that this idea affords a unified account of several subtle syntactic differences between French and English (relating, specifically, to the syntax of adverb placement, negation, verb fronting, quantifier floating, and quantification at a distance). At the core of Pollock's discussion is the assumption that verbs generally acquire their inflectional properties by moving from one head position to the next, as in the derivation of the sentence *Kim isn't afraid* in (22).

(22)



Developing this assumption, a number of researchers (e.g. Rivero 1990, Speas 1990, Mitchell 1991) have proposed that the order of inflectional formatives in a verb's morphology arises through a gradual accretion of affixes during a verb's movement from one functional head to the next; on this view, the order of inflectional markings follows the sequence in which functional categories are nested in syntactic structure. Thus, Rivero (1990: 137) proposes that the Modern Greek verb form *plí-θ-ik-a-n* 'they were washed/they washed themselves' arises by head movement, as in (23).

(23)



This approach to verb structure suggests that inflection is not a morphological phenomenon at all, but rather a syntactic one; indeed, it calls into question the very claim that morphology exists as an autonomous grammatical component in natural language.

Compelling reasons for rejecting this approach to inflectional morphology are abundant. Joseph and Smirniotopoulos (1993) demonstrate that the segmentation of morphemes presumed by Rivero's analysis of Modern Greek verb inflection is fundamentally incompatible with the surface morphology of the language – that here and elsewhere, the frequent incidence of overlapping and extended exponence relations simply excludes the possibility of reducing inflectional morphology to head movement. Janda and Kathman (1992) observe, in addition, that the head-movement approach requires the ordered nesting of functional categories to be stipulated on a language-specific basis (note e.g. the contrasting affix orderings in Latin *amā-ba-m* 'love-IMPF-1SG' and Welsh Romany *kamá-v-as* 'love-1SG-IMPF'), and that it affords no credible account of nonconcatenative morphology, nor of affix orderings which are sensitive to nonsyntactic properties (such as the fact that in Qafar, a stem's initial sound determines whether subject agreement is realized suffixally, as in *bah-t-é* 'bring-she-PERFECT', or prefixally, as in *t-okm-é* 'she-eat-PERFECT').

Moreover, Bresnan and Mchombo (1995) discuss five tests of lexical integrity and demonstrate that in the Bantu languages words exhibiting noun-class inflections generally pass these tests; as they show, a head-movement approach to Bantu noun-class inflections affords no explanation for this fact. None of these considerations militate against the postulation of abstract functional heads whose existence is syntactically motivated;[9] it does, however, cast serious doubt on the assumption that functional heads are concrete pieces of morphology whose combination with a given stem is effected by head movement. That is, they favor the lexicalist view of Chomsky (1995b: 195), according to which words are already fully inflected at the time of their insertion into syntactic structures (cf. Borer, MORPHOLOGY AND SYNTAX).[10]

Both the lexicalist approach and the functional head approach to inflection are based on the assumption that in the inflection of a stem X, a morphosyntactic property P is associated with X only through the addition of an exponent of P to X. This is not a necessary assumption, however; in particular, one might instead assume that in the inflection of a stem X, an exponent of P is added to X only if X is, by prior assumption, associated with P. This latter hypothesis has been pursued by proponents of two (otherwise very different) approaches to inflection: the Word-and-Paradigm approach and Distributed Morphology.

6.3 The Word-and-Paradigm approach to inflection

Under the Word-and-Paradigm approach to inflection (Robins 1959; Matthews 1972; Anderson 1977b, 1992; Zwicky 1985), a word's inflectional markings are determined by a set of inflectional rules. The markings introduced by these rules may be affixal or nonconcatenative; a rule's applicability to a stem X is conditioned by the set of morphosyntactic properties associated with X, by X's phonological form, by X's membership in a particular morphological class, or by some combination of such factors. For example, the suffix *-s* in *sing-s* is introduced by a rule such as (24); where /X/ is any verb stem carrying specifications for third person, singular number, present tense, and indicative mood, (24) applies to /X/ to yield /X-z/.

(24)
$$\begin{array}{l} \text{V} \\ \left[\begin{array}{l} \text{PER:3} \\ \text{NUM:sg} \\ \text{TNS:pres} \\ \text{MOOD:indic} \end{array}\right] \\ \text{/X/} \qquad \rightarrow \text{ /X-z/} \end{array}$$

In the Word-and-Paradigm approach, inflectional rules are assumed to be organized into blocks such that rules belonging to the same block are mutually exclusive in their application. A central question concerns the factors which

determine this mutual exclusivity: where one member of a rule block overrides another member, can this override relation always be predicted as the effect of universal principles, or are some such overrides a matter of sheer stipulation? Anderson (1992: 128ff) argues for the latter conclusion. A second question concerns the sequencing of rule blocks. Anderson (1992: 123ff) shows that this must be, at least in part, a matter of language-specific stipulation. But a language's rule blocks cannot be assumed to adhere to a fixed linear sequence, since the sequencing of rule blocks may vary according to the set of morphosyntactic properties being realized (Stump 1993c). This is one kind of evidence favoring the introduction of paradigm functions. Thus, suppose that σ is a cell in the paradigms of lexemes belonging to some class C, and that the *paradigm function* for cell σ is that function f_σ such that for each $L \in C$, f_σ applies to the root of L to yield the word form occupying σ; one can then say that the sequence of rule blocks in a language may vary according to the definition of its individual paradigm functions.

The Word-and-Paradigm approach to inflection has a number of virtues: it doesn't presume an unmotivated theoretical boundary between affixal and nonconcatenative exponence; it is fully compatible with the incidence of extended and overlapping exponence and with the fact that a word's form may underdetermine its morphosyntactic properties; and it does not entail nonoccurring interactions between morphology and syntax.

6.4 Distributed morphology

Halle and Marantz (1993) argue for an approach to inflection which they call Distributed Morphology. The salient properties of this theory are as follows:

(i) At the superficial level of syntactic structure known as S-structure (SS), morphemes exist as terminal nodes associated with bundles of morphosyntactic feature specifications but lacking any association with phonological feature specifications.

(ii) Intermediate between the levels of SS and Phonological Form (PF) is a level of Morphological Structure (MS) at which "vocabulary insertion" takes place; it is through the process of vocabulary insertion that the abstract morphemes supplied by the syntax acquire their phonological feature specifications.

(iii) In the mapping from SS to MS, the abstract morphemes may undergo various kinds of modifications: the relation of linear ordering is, for instance, introduced as a part of this mapping, which may also involve the addition of new morphemes (e.g. the introduction of agreement morphemes), the adjunction of one morpheme to another (e.g. the attachment of tensed INFL to an adjacent V), the merging of two morphemes into one, the splitting of one morpheme into two, and so on.

(iv) Vocabulary insertion is assumed to be constrained by the Elsewhere Condition, so that when two morphs are both insertable into a given morpheme, it is the more narrowly specified morph that wins.
(v) Once vocabulary insertion has taken place, the inserted morphs are subject to a battery of readjustment rules.

Under this approach, the past-tense form *play-ed* arises as follows: in the mapping from SS to MS, tensed INFL gets adjoined to an adjacent V node, producing M-structures of the form [$_v$ V INFL]; on the assumption that INFL carries the specification [+Past], the process of vocabulary insertion then inserts the suffix *-ed* into INFL from its vocabulary entry (25).

(25) *ed*, [+Past].

Numerous arguments against this approach to inflection have been raised (Pullum and Zwicky 1992, Spencer 1996). Consider, for instance, the following problem: why doesn't the suffix *-ed* in (25) appear in the past-tense form of SING? According to Halle and Marantz (1993), this is because there is a zero suffix whose vocabulary entry is as in (26):

(26) $\varnothing_1$, [+Past]. Contextual restriction: Y + ____, where Y = *sing*, *drive*, etc.

By virtue of its contextual restriction, -$\varnothing_1$ is more narrowly specified than *-ed*, and is therefore chosen for insertion into INFL in those instances in which the preceding verb stem is *sing*. As for the change from [ɪ] to [æ] in *sang*, this is effected by a readjustment rule:

(27) vowel → /æ/ in the context 'X____Y + [+Past]', where X-vowel-Y = *sing*, *sit*, etc.

By the very same reasoning, the failure of the default plural suffix *-s* in (28a) to appear in the plural of TOOTH would be attributed to the existence of the more narrowly specified zero suffix in (28b), and the change from [u] to [i] in *teeth* would be attributed to the readjustment rule in (28c); likewise, the failure of the Breton default plural suffix *-où* in (29a) to appear in the plural of DANT 'tooth' would be attributed to the more narrowly specified zero suffix in (29b), and the change from [a] to [ɛ] in *dent* 'teeth' would be attributed to the readjustment rule in (29c); and so on. Both within and across languages, instances of this same general character appear again and again.

(28) (a) *s*, [+Plural].
(b) $\varnothing_2$, [+Plural]. Contextual restriction: Y + ____, where Y = *tooth*, *man*, etc.
(c) vowel → /i/ in the context 'X____Y + [+Plural]', where X-vowel-Y = *tooth*, *foot*, etc.

(29) (a) *où*, [+Plural].
(b) $Ø_3$, [+Plural]. Contextual restriction: Y + ____, where Y = *dant*, *maout* 'sheep', etc.
(c) vowel → /ɛ/ in the context 'X____Y + [+Plural]', where X-vowel-Y = *dant*, *sant* 'saint', ect.

These facts highlight some of the problems with Halle and Marantz's approach. First, their approach forces them to assume that in a very large class of cases, a default inflectional affix is prevented from appearing by a more narrowly specified affix whose own appearance is never prevented by anything narrower and whose form is zero; yet they portray this state of affairs as an accident of piecemeal stipulation in the vocabulary entries of language after language. Zero affixes are purportedly just like other, overt affixes in their theory, but it is clear that they actually serve a special, homogenizing function by allowing words which are different in structure to be assigned structural representations which are alike; for instance, they allow both *play-ed* and *sang* to be treated as stem + suffix structures. (This special status can be seen especially clearly by imagining an overt phonetic sequence such as [ba] in place of the zeroes entailed by Halle and Marantz's assumptions: *sangba*, *sungba*, *teethba*, *worseba*, Breton *dentba*, etc. An overt affix with that sort of distribution – within and across languages – would be an unprecedented find.) Moreover, their theory portrays the frequent pairing of zero affixes with readjustment rules (such as (27), (28c), and (29c)) as still another coincidence.

The Word-and-Paradigm approach affords a much more natural account of such cases: that of dispensing with zero affixes and assuming that the "readjustment" rules with which they are paired are in fact simply morphological rules whose narrower specification causes them to override default rules of affixation (so that the past tense of SING lacks *-ed* because the rule replacing [ɪ] with [æ] belongs to the same rule block as the rule of *-ed* suffixation and overrides it, and so on).

A further problem with Distributed Morphology is that it unmotivatedly allows an inflectional affix to be associated with morphosyntactic properties in two different ways. Consider, for instance, the Kabyle Berber form *t-wala-ḍ* 'you (sg.) have seen', in which *t-* is an exponent of second-person agreement (cf. *t-wala-m* 'you (masc. pl.) have seen', *t-wala-m-t* 'you (fem. pl.) have seen') and *-ḍ* is an exponent of second-person singular agreement. How should the M-structure of *t-wala-ḍ* be represented, given the assumptions of Distributed Morphology? One might assume either the M-structure in (30a) (in which case the affixes *t-* and *-ḍ* would have the vocabulary entries in (31a, b)) or that in (30b) (in which case *ḍ-* would instead have the entry in (31c)).

(30) (a) [2nd person] V [2nd person, –Plural]
(b) [2nd person] V [–Plural]

(31) (a) *t*, [2nd person]. Contextual restriction: ____ + V.
(b) *ḍ*, [2nd person, –Plural]. Contextual restriction: V + ____.
(c) *ḍ*, [–Plural]. Contextual restriction: [2nd person] V + ____.

The choice between (30a) and (30b) is, in effect, a choice between treating the property [2nd person] as a part of *-ḍ*'s feature content and treating it as part of *-ḍ*'s contextual restriction. Considerations of pattern congruity are of no help for making this choice, since Berber person agreement is sometimes only marked prefixally (e.g. *i-wala* 'he has seen', *n-wala* 'we have seen') and sometimes only suffixally (*wala-γ* 'I have seen', *wala-n* 'they (masc.) have seen'). The choice here, however, is merely an artifact of Halle and Marantz's assumptions: in the Word-and-Paradigm approach to inflection, for instance, no such choice even arises, since the morphosyntactic properties associated with an affix (or rule of affixation) are not artificially partitioned into properties of content and properties of context.

As the foregoing discussion suggests, the theoretical status of inflectional morphology is hardly a matter of current consensus. Nevertheless, a unifying characteristic of much recent inflectional research has been its heightened attention to the properties of inflectional paradigms, including such properties as syncretism (Carstairs 1987: 87ff, Zwicky 1985, Stump 1993b, Noyer, in press, Spencer 1996), periphrasis (Börjars et al. 1997), defectiveness (Morin 1996), suppletion (Plank 1996), limits on the diversity of a language's paradigms (Carstairs-McCarthy 1994), the theoretical status of the notion of "principal parts" (Würzel 1989), and so on. It seems likely that work in this domain will turn up important new criteria for the comparative evaluation of theories of inflection (see Carstairs-McCarthy, Inflectional Paradigms and Morphological Classes).

NOTES

1 Throughout, I follow Matthews's (1972: 11, n. 3) practice of representing lexemes in small caps.
2 In many instances, a language's systems of case marking and verb agreement coincide in the sense that they are either both ergative or both accusative; there are, however, languages in which an ergative system of case marking coexists with an accusative system of verb agreement (Anderson 1985a: 182).
3 For more extensive discussion, see J. Lyons 1968: 270ff, Anderson 1985a, Bybee 1985: 20ff, and Beard 1995: 97ff.
4 For detailed discussion of the categories of tense, aspect, and mood, see Chung and Timberlake 1985.
5 Note the fundamental difference that exists between finiteness and tense: although finiteness is a governed property, properties of

tense are inherent (rather than governed) properties of finite verbs.

6 The terminology given in italics in this paragraph is that of Matthews (1972).

7 The Swahili illustrations in (i)–(v) are from Stump (1997).

8 Recent psycholinguistic findings (Bybee and Newman 1995) suggest that there is no significant difference in the ease with which the human brain processes affixal and nonconcatenative morphology.

9 But see Janda 1994 and E. Williams 1996 for syntactic arguments against "exploded INFL".

10 See Spencer 1992 for additional arguments against the functional head approach.