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Introduction

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1 Canonical Morphology

To many people, the term "morphology" immediately evokes certain canonical properties of word structure in natural language. These include the following:

- morphology involves assembling complex word-forms from stems and affixes (i.e., morphology is **concatenative**);
- rules of morphology apply to whole classes of stems in an extremely general way, if not exceptionlessly (i.e., morphology is both **regular** and **productive**);
- the semantic and grammatical content of a complex word-form is calculable from the stem and affix(es) from which it is assembled (i.e., a word-form's morphological structure is semantically and grammatically **compositional**); and
- the semantic and grammatical units that word-forms express stand in a one-to-one correspondence to the particular stems and affixes from which those forms are assembled (i.e., morphological form and morphological content are **isomorphic**).

Introductory linguistics textbooks suggest that the traditional notion of the morpheme is ideally suited to the representation of morphological systems possessing these canonical properties.

The term "morphology" does, however, evoke a rather different picture in the minds of a good many linguists (certainly in the minds of most morphologists, if we may take ourselves as representative), for whom a language's morphology is not simply a collection of canonical patterns, but rather a system involving varying degrees of adherence to and deviation from such canonical patterns. Some deviations can be dismissed as instances of gross irregularity; for instance, the suppletive portmanteau *worse* shares the combined content of the adjective *bad* and the comparative

suffix *-er*, but does not share any aspect of their form. But there are also highly methodical deviations from canonical morphology, and, cross-linguistically, these are both surprisingly common and surprisingly varied in their characteristics.

The canonical correspondence between content and form, for example, is overridden by a range of widely observable phenomena:

- In instances of **cumulative exponence**, a word exhibits a one-to-many relation between units of morphological form and units of content (as in the case of the *-s* in *sings*, which is an exponent person, number, tense and mood).
- In instances of **overlapping exponence**, a word has distinct morphological markings that express overlapping content (as in the case of Sanskrit *yuñj-yā-m* 'I would join,' in which *-yā* realizes the optative active and *-m* realizes the first-person singular active.
- In instances of **extended exponence**, a single semantic property receives more than one morphological expression in the same word (as in the case of the word *a-n-lokk-a-c^{h}i-n* 'we did not run' in Chhatthare Limbu [Kiranti; Nepal], whose morphology [1.INCL-NEG-RUN-PST-DU.SBJ-NEG] includes two expressions of negation; Tumbahang 2007: 228).
- In instances of **allomorphy**, the same content is realized by distinct morphological markings in distinct contexts (as the past tense is expressed by /d/ in *leaned* /lind/ but by /t/ plus stem ablaut in *meant* /mɛnt/).
- In instances of **homophony**, the same morphological marking expresses different content in different contexts (as the /d/ in *leaned* expresses past tense in *They leaned on it* but past participial content in *They've leaned on it*).
- In instances of **homomorphy**, distinct lexemes not only share the same stem(s), but are alike in every detail of their inflection (as in the case of WEAR$_1$ 'have [clothing] on' and WEAR$_2$ 'abrade').
- In instances of **underdetermination**, a word's morphology does not fully determine its content (as in the Sanskrit injunctive *gacchat* [*mā gacchat!* 's/he must not go!'], whose morphology has no overt expression of injunctive mood: *gaccha-* is a present-system stem and *-t* is the default exponent of the third-person singular active, both of which also appear in the third-person singular imperfect indicative active form *a-gaccha-t* 's/he went').
- One use of the label **morphomic** (Aronoff 1994) is to categorize formal patterns that are incoherent in their grammatical content (as in Hua [Trans-New-Guinea], where the second-person singular and the first-person plural recurrently employ the same verb agreement marking, despite the fact that they are alike in neither person nor number; Haiman 1980).
- Similarly, **syncretism** is the systematic identity of word-forms expressing distinct content (as in the inflection of English *put*, whose infinitive, default present indicative, past, irrealis [*if he put it away*

tomorrow], subjunctive [*require that he put it away tomorrow*], and past participial forms are all alike).

- In instances of **deponency**, the same morphological marking has a default content in the inflection of one class of stems but a contrasting content in the inflection of some complementary class of stems (as the default passive morphology of Latin *parātur* 'is being prepared' doubles as the active morphology of the deponent verb form *cōnātur* 'is trying').
- In instances of **defectiveness**, the morphological expression of some specific content is unexpectedly lacking (as in the inflection of French *frire* 'fry,' which simply lacks plural forms in the present indicative).
- In instances of **"empty" morphology**, a morphological marking expresses no semantic or grammatical content (as in Sanskrit, where the empty "linking vowel" *-i-* appears in the infinitive form of some verbs but not others, e.g. *car-i-tum* 'to move' but *kar-tum* 'to do').

Such deviations from canonical morphology uncover a variety of apparent dichotomies, and these are the loci of theoretical dispute: morphological theories vary according to the importance they place on particular dichotomies, and indeed according to whether they treat a particular dichotomy as real or false.

2 Morphological Dichotomies

Morphological dichotomies fall into a range of cross-cutting domains. These include dichotomies of form (§2.1), expressiveness (§2.2), and function (§2.3); typological dichotomies (§2.4); and dichotomous differences of theoretical architecture (§2.5). Theorizing about morphology makes it necessary to commit oneself with respect to a variety of dichotomous questions. Is a given opposition theoretically essential; real but theoretically insignificant; or simply illusory? Should a theory be guided by one assumption, or by its opposite?

2.1 Dichotomies of Morphological Form

At the level of morphological form, there is debate about basic units. Should morphemes be taken as the fundamental units of morphological analysis, or are words the fundamental units? In principle, both are units that might enter into the definition of a language's morphology, and the centrality of one by no means excludes the centrality of the other from a conceptual point of view. But the debate is tangled by the history behind the morpheme. What is a morpheme? A minimal pairing of form and content (according to which *foxes* and *oxen* do not share any morphemes; Bloomfield 1933) or a minimal contentive unit of morpholexical

factorization (according to which *foxes* and *oxen* share the plural morpheme; Harris 1942; Hockett 1947)? However one chooses to define it, the morpheme has, over the years, accumulated a good deal of theoretical baggage, including the controversial hypotheses (1) and (2).

(1) A word-form's content is fully determined by its component morphemes.
(2) Morphemes are the only source of a word-form's content.

According to hypothesis (1), morphemes have a central role in both the formation and the interpretation of word-forms: just as a word's form can be exhaustively factored into a sequence of morphemes, so its content is a function of that of its component morphemes. The phenomenon of underdetermination (see again the Sanskrit injunctive *gacchat* in §1) constitutes prima facie counterevidence to this hypothesis; advocates of the morpheme have therefore sometimes resorted to postulating empty morphemes, which contribute to a word-form's content without contributing to its form. Skeptics object that this way of buttressing (1) simply renders it unfalsifiable.

According to hypothesis (2), a word-form gets its content purely from the morphemes into which it is segmented. On this view, the status of *written* as a past participle stems primarily from the morpheme *-en*, which triggers the ablaut modification /aɪ/ → /ɪ/ as a secondary effect. This hypothesis seems to run afoul of instances like *sung*, whose status as a past participle is signaled by ablaut alone; one can counter this kind of evidence by appealing to zero morphemes that trigger ablaut, again raising the issue of falsifiability.

Those who regard the morpheme as the central unit of morphological analysis tend to view the dichotomy of concatenative and nonconcatenative morphology as a stark one: on this view, morphology is primarily concatenative, and nonconcatenative effects are associated with (overt or zero) morphemes purely as a secondary phenomenon. Seen in this way, morphology is very much like syntax in that it primarily involves complex combinations of discrete segmentable units.

But not all morphologists place this kind of importance on the distinction between concatenative and nonconcatenative morphology. Many see the concatenative/nonconcatenative dichotomy as trivial, assuming that affixes and ablaut are but two of the many functionally equivalent means by which a particular piece of content might be expressed. Under this point of view, the notion "morpheme" has less theoretical importance than the notion "exponent," which covers any sort of minimal morphological expression of content, including instances of ablaut, accentual or tonal modification, consonant gradation, metathesis, subtraction, and reduplication as well as affixation. Once the morpheme is deprived of its theoretical centrality, hypotheses (1) and (2) give way to other options, such as (3).

(3) A word-form's content determines its morphological form.

The realizational view of morphology implied by this hypothesis has been energetically pursued in recent years (Matthews 1972; Anderson 1992; Stump 2001, 2016).

If the notion "morpheme" is contentious, so is the notion "word." Morphologists differ widely on how to represent the internal morphological structure of a complex word-form. Some (Selkirk 1982; Lieber 1992; Halle and Marantz 1993) hold that the internal morphological structure of a word-form is a constituent structure having morphemes as its terminal nodes; others (Crysmann and Bonami 2016) hold that it is an ordered sequence of discrete morphs; and still others (Janda 1983; Anderson 1992; Stump 2001) maintain that a complex word-form has no internal morphological structure distinct from its internal phonological structure.

Not surprisingly, this diversity of viewpoints engenders related disagreement on how complex word-forms are defined. Some hold that a complex word-form is assembled from its component morphemes by ordinary principles of syntax (e.g. by phrase structure rules and head movement); others, that a complex word-form is defined through the application of morphological rules to a more basic stem; and still others, that a complex word-form arises by analogy to existing lexical patterns. Assumptions about the structure and definition of word-forms naturally flow from more global assumptions about the position of morphology in the architecture of grammar (§2.5).

2.2 Dichotomies of Morphological Expressiveness

Some morphological dichotomies pertain to the expressiveness of a language's morphology. While morphology is canonically productive, a lot of morphology is unproductive. What is the status of unproductive morphology? Some maintain that it is purely vestigial, present in fossilized form in a language's lexicon but not part of the domain of its synchronic morphological system. But empirical measures (Baayen 1993, 2009; Baayen and Renouf 1996) show that productivity is in fact a cline which presents no sharp borderline between synchronic and vestigial morphology. Moreover, morphology serves both to define new words and to analyze redundancies among existing words, and even unproductive morphology such as the *-th* of *length*, *width*, *strength* is associated with analyzable redundancies in the lexicon. For this reason, many view differences in productivity as differences of degree rather than of kind in the definition of a language's morphology.

The regular/irregular dichotomy is similarly problematic. One can surely point to extreme cases (the canonical regularity of present-participial morphology in English vs. the utter irregularity of the suppletive portmanteau *worse*), but like productivity, regularity is a cline. The syncretism of past- and present-tense forms in the inflection of English verbs such as *shut* is irregular to the extent that it fails to conform to the regularity of the

default pattern of *gut*/*gutted*, but it is regular to the extent that the verbs exhibiting this pattern of syncretism are phonologically alike, ending in oral alveolar stops (*beat*, *bet*, *burst*, *cast*, *cost*, *cut*, *hit*, *hurt*, *let*, *put*, *quit*, *rid*, *set*, *shed*, *slit*, *split*, *spread*, *thrust*). Such facts again suggest a difference of degree rather than of kind in the definition of a language's morphology. Yet, experimental evidence has led many psycholinguists to conclude that regular morphology and irregular morphology are stored and processed differently by the human brain (Pinker and Prince 1988, 1991; Pinker 1991; Jaeger et al. 1996).

2.3 Dichotomies of Morphological Function

Dichotomies of morphological function are also central to motivating fundamental features of a language's grammatical architecture. Traditionally, morphology is assumed to serve two different kinds of functions in language. On one hand, some morphology serves to define the stems of newly created lexemes; such morphology is traditionally labeled "word formation" (a somewhat regrettable choice of terminology, given the ambiguity of "word"; Matthews 1991: 24ff.). On the other hand, some morphology serves to define the various word-forms by which a given lexeme may be realized in different syntactic contexts; such morphology is traditionally labeled "inflection." Morphologists disagree about the theoretical significance of this traditional dichotomy. Some hold that it has no real importance—that the characteristics ascribed to word formation and those attributed to inflection do not define a clearly delineated boundary in a language's morphology, but instead exist on a continuum. Others maintain the opposite view, that inflection and word formation are defined by distinct grammatical components. It is clear that at the level of morphological markings, there is no essential difference between word formation and inflection; for instance, *-en* can serve a derivational function (*ripen*, *woolen*) or an inflectional function (*oxen*, *eaten*); thus, if there is a distinction between word formation and inflection, it is a distinction not between kinds of markings, but between the kinds of uses to which those markings may be put.

Another important dichotomy in morphological function has attracted a good deal of interest in recent years: this is the distinction between morphosyntactic properties and morphomic properties. Morphosyntactic properties are grammatical properties to which morphology, syntax, and semantics are all potentially sensitive; in English, for instance, the association of *dogs* with the morphosyntactic property "plural" is expressed by its morphology (the suffix *-s*), determines its capacity to enter into particular syntactic combinations (*dogs were*/**was awake*, *all*/**each dogs*), and determines its plural semantics (which distinguishes the meaning of *I saw the dogs* from that of *I saw the dog*). By contrast, morphomic properties are grammatical properties to which morphology alone is sensitive (Aronoff 1994);

in modern English, for instance, the association of *helped* with the morphomic property "weak" is expressed by its morphology (the weak past-tense suffix *-ed*) but has no consequences whatever for either its syntax or its semantics. Inflection-class properties such as "weak" or "first declension" are familiar examples of morphomic properties, but, as Aronoff suggests, they only begin to hint at the much more extensive role that morphomic properties may play in the definition of a language's morphology; thus, Round 2013 demonstrates the need for extensive reference to morphomic properties in his analysis of Kayardild morphosyntax. Moreover, Maiden 2005 argues that such properties play a significant role in the evolution of inflectional systems. Many morphologists have come to regard the distinction between morphosyntactic and morphomic properties as clear evidence of an autonomous morphological component in the architecture of a language's grammar.

2.4 Typological Dichotomies

The extreme diversity of morphological systems reflects a variety of typological contrasts, for which a number of different classificatory schemes have been proposed. Most familiar is the scheme (developed progressively by Schlegel 1808, Humboldt 1836, and Sapir 1921) in which individual word-forms are classified according to their degree of synthesis (with analyticity and polysynthesis as extremes) and their degree of segmentability (with agglutination and fusion as extremes).

More recently, canonical typology (Corbett 2005; Brown et al. 2013) has been applied in all kinds of classificatory dimensions, focusing on the logical extreme implied by the definition of a given phenomenon and on the degrees and directions of deviations from this extreme. Corbett (2009), for example, proposes a cluster of canonical characteristics for inflection-class systems; few languages actually embody the canonical ideal, but languages in general can be classified according to the manner and extent to which they approximate this ideal.

Currently, there is also a burgeoning interest in ways of classifying morphological systems according to their relative complexity (as part of a larger concern with the nature of linguistic complexity; Hawkins 2004, Miestamo et al. 2008; Sinnemäki 2011). Because the notion of complexity is itself complex, a number of complementary approaches to the measurement of morphological complexity have been investigated; some are enumerative (equating complexity with numerousness), and others integrative (assessing the complexity of the relations among a system's parts). The extent to which morphological systems vary within all of these typological dimensions is quite striking, but there are also apparent limits; for example, Ackerman and Malouf (2013) show that despite considerable cross-linguistic variability in enumerative complexity, morphological systems tend to vary much less widely with respect to

such measures of integrative complexity as that of an inflectional paradigm's average conditional entropy.

2.5 Theoretical Dichotomies

At the most general level, morphological theories must choose between a number of mutually exclusive premises. Incremental theories hold that a word-form's content is cumulative, arising through a kind of summing of the content of its parts; on this view, the past-tense form *walk-ed* acquires its content through the combination of the stem *walk-* (which contributes the lexical meaning "walk") with the suffix *-ed* (which contributes the property "past tense"). Realizational theories, by contrast, hold that a word-form's content logically precedes its form, which it in fact determines; on this view, it is the association of *walk* with the property "past tense" that licenses the affixation of *-ed*. Though the latter approach might seem to be the "top-down" equivalent of the former, the two approaches make different predictions. For instance, the realizational approach leaves open the possibility that a word-form may have content that simply goes unexpressed by its morphology, as in the case of the past-tense form *put*; it likewise leaves open the possibility that some part of a word-form's content may license more than one marking, as the property "plural" licenses both the stem choice and the suffix in *knive-s*.

Cross-cutting the choice between incremental and realizational approaches is the choice between lexical theories and inferential theories: the former presume that the word-form *walk-ed* is assembled from two lexical items, very much like the phrase *walk home*; inferential theories, by contrast, assume that the past-tense forms *sang* and *danced* are inferred from the stems *sing-* and *dance-* by rules that associate a particular morphological marking (e.g., $i \rightarrow a$ ablaut or *-ed* suffixation) with the property "past tense" (either as realizations of this property or as formal concomitants of its introduction into a word's property set).

Theories that are both inferential and realizational often attribute special importance to inflectional paradigms: if a paradigm is seen as a set of cells each of which pairs a stem or lexeme with a morphosyntactic property set, then a language's inflectional morphology may be seen as a system of rules for inferring the realization of cells: ⟨WALK, {past tense}⟩ → *walk-ed*. By contrast, theories that are both lexical and incremental often dispense with paradigms on the assumption that a word's form and content are an effect of the same principles of lexical insertion and feature percolation relevant for the formation and interpretation of phrases.

In inferential-realizational theories, the rules that infer the realization of a paradigm's cells may be of two kinds. On the one hand, a rule may deduce the realization of a cell ⟨L, σ⟩ directly, by reference to the lexical properties of the lexeme L and to the morphosyntactic property set σ; this might be termed an exponence-based approach. In this approach, the cell

⟨CAPERE, {1sg fut ipfv ind act}⟩ might be realized as *capiam* "I will take" by means of a rule realizing the lexeme CAPERE and the property set {1sg fut ipfv ind act} as the stem *capi-* suffixed with *-am*. On the other hand, a rule may deduce the realization of a cell ⟨L, σ⟩ indirectly, by reference to the realization of one or more other cells; this might be termed an implicative approach. In this approach, the cell ⟨CAPERE, {1sg fut ipfv ind act}⟩ might be realized as *capiam* by means of a rule specifying that if ⟨L, {1sg prs ipfv ind act}⟩ is realized as X*iō*, then ⟨L, {1sg fut ipfv ind act}⟩ is realized as X*iam*; this rule would in effect deduce the form of *capiam* from that of *capiō* 'I take.' The exponence-based and implicative approaches have different strengths; Blevins (2006), who distinguishes these approaches as "constructive" and "abstractive," portrays the choice between them as dichotomous, but in fact nothing prevents a morphological theory from employing both approaches side by side, and there are indeed good reasons for favoring such a theory (Stump 2016; Chapter 14).

The fundamental point of contrast among current theories of morphology concerns the relation of morphology to syntax. The issue is whether these constitute a single system defined by the same set of principles, or two distinct grammatical subsystems, defined by distinct sets of principles and interfacing in a restricted way. In other words, the issue is whether morphology constitutes an autonomous grammatical component or is instead reducible to syntax. At present, the competition among these contrasting perspectives is vigorous, and shows no sign of abating soon.

3 Outline of the Handbook

The chapters that follow elaborate on the complex of dichotomies described above as well as on numerous debates surrounding them.

3.1 Foundations of Morphological Theory

The first part of the book lays the foundations on which the balance of the book rests. It serves as an exposition of the basic issues that relate dichotomies of morphological function, morphological form, and morphological expressiveness, aspects of which reverberate throughout the book.

In Chapter 2 ("Two Morphologies or One? Inflection versus Word-formation"), Andrew Spencer examines the evidence for two distinct roles of morphology, the derivational role of creating new words and the inflectional role of defining the inventory of forms that a word may assume according to its syntactic context. He turns the question into an investigation into possible types of *lexical relatedness*, where prototypical inflection and derivation share the space of lexical relatedness possibilities with types that blur the distinction and threaten to dissolve the dichotomy. In instances of transposition, for example, the derived word, though different

from its base with respect to part of speech, nevertheless retains its fundamental meaning and very often its form. If the minimal sign is the lexeme rather than the morpheme, then relatedness among words may be manifested at several levels, a complication that raises potential doubts about the derivation-inflection distinction. Spencer poses the question: can you always determine whether two word-forms realize the same lexeme or different lexemes? His answer lies in the nature of morphological rules: rules that introduce a new lexeme index (derivation) and those that don't (inflection), where a lexeme's index is a crucial component of its representation on multiple levels. On this view, the boundary between inflection and derivation is real, if not always easily discerned.

In Chapter 3 ("The Minimal Sign"), James Blevins addresses a fundamental formal dichotomy: if language is a system of signs, is the morpheme or the lexeme the smallest unit in the grammar where form and function get associated? Which one of these should morphologists consider their basic unit of analysis? The answer, he argues, depends on one's analytical goal. A morpheme-based approach has greater a chance of wringing out all redundancy in the form-meaning association: the nominative singular for several classes of Latin nouns involves a formative /s/, so it should be isolated as a recurrent unit of form mapping onto a discrete unit of meaning. But morpheme-based analyses are sometimes too granular, failing to accommodate such familiar phenomena as underdetermination (§1); lexeme-based approaches afford a simpler and more explanatory account of such phenomena. Blevins distinguishes among lexeme-based approaches according to whether their definitions are exponence-based or implicative in character. The implicative approach is discussed at greater length in Chapter 12; two exponence-based theories are examined in Chapters 17 and 18.

In Chapter 4 ("Productivity"), Georgette Dal and Fiammetta Namer discuss the nature of morphological productivity. They distinguish qualitative conceptions of productivity from quantitative measures, which have the advantage of being both more objective and more replicable. Because the more productive parts of a morphological system inevitably enjoy more prominence in the analysis of a language's grammar, productivity is seen as a key variable in morphological theory and description. Quantitative measures, however, show that productivity is a scalar notion—that any attempt to bifurcate a language's morphology into productive and unproductive parts is bound to prove artificial. Dal and Namer discuss the ways in which studies on productivity have influenced morphological research. Such studies are partly responsible for a methodological shift from introspection to empirical investigation, as researchers have made increasing use of corpora, search tools, and statistical techniques. Productivity studies have also pointed the way to a more usage-based approach to word formation, through the preference of corpus investigation over dictionaries.