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DERIVATIONAL

MORPHOLOGY

Edited by
ROCHELLE LIEBER
and
PAVOL ŠTEKAUER

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2001) and (with Raphael A. Finkel) of *Morphological Typology* (CUP, 2013); he also serves as co-editor of the journal *Word Structure*.

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LIST OF ABBREVIATIONS

1	first person
2	second person
3	third person
ABL	ablative
ABS	absolutive
ACC	accusative
ACT	active
Adj	adjective
Adv	adverb
AFF	affirmative
AG	agent
AGR	agreement
AI	animate intransitive verb stem
AL	alienable possession
ALL	allative
AN	Austronesian
AN	animate
ANTIP	antipassive
AOR	aorist
AP	antipassive
APPL	applicative
ART	article
AS	Aslian
ATTR	attributive
AUG	augment
AUG	augmentative
AUGM	augmentative
AUX	auxiliary
AV	actor voice
BN	Bahnaric
CAUS	causative
CEMP	Central-Eastern Malayo-Polynesian
CER	certainty
CF	centrifugal

CF	circumfix
Cho	Chorote
CL	noun class marker
CL	classifier
CLX	noun class marker of class X
CM	conjugation marker
CMP	Central Malayo-Polynesian
COM	comitative
COMIT	comitative
COMP	comparative
COMPL	completive
COND	conditional
CONJ	conjunction
CONT	continuous aspect
CONV	converb
CP	centripedal
D	declarative
D.PAST	distant past
DAT	dative
DEF	definite
DEM	demonstrative
DETR	detransitive
DETRANS	detransitive
DIM	diminutive
DIR	directional
DIRV	directive
DIST	distal
DIST	distributive
DM	discourse marker
DN	deverbal noun
DU	dual
DUB	dubitative
DUR	durative
EMP	Eastern Malayo-Polynesian
EMPH	emphatic
ep	epenthetic
ER	evaluative rule
ERG	ergative
EUPH	euphonious
EXCL	exclusive
F	feminine
F	Formosan

FCT	factitive
FEM	feminine
FOC	focalization
FOC	focus
FUT	future
FV	final vowel
GEN	genitive
GO	goal
GP	generic person
H	head-marking
HAB	habitual
HTR	high transitivity
IC	incorporation closer
IDEO	ideophone
IDN	identifier
IMP	imperative
IMPV	imperfective
INACC	inaccusatif (unaccustative)
INAN	inanimate
INC	inceptive
INCH	inchoative
INCL	inclusive
IND	indicative
INDEF	indefinite
INDIC	indicative
INF	infinitive
INFL	inflection
INS	instrumental
INST	instrumental
INSTR	instrument
INTERR	interrogative
INTR	intransitive
INTRANS	Intransitive
INV	inverse
IT	itive
KR	Khmeric
KS	Khasic
KT	Katuic
KU	Khmuic
LIG	ligature
LNK	attributive linker
LNK	linking element

LOC	locative
LTR	low transitivity
LV	locative voice
M	masculine
Ma	Maka
MAN	manner
MAS/MASC	masculine
ME	Middle English
MED	meditative evidential
MG	Mangic
MI	middle voice
MID	middle
MN	Monic
MP	Malayo-Polynesian
N	noun
NC	Nicobarese
NCM	noun class marker
ND	Nyangumarta dictionary
NEG	negation
NEUT	neuter
NFUT	non-future
NHG	New High German
Ni	Nivacle
NMLZ	nominalizer
NOM	nominalizer
NOM	nominative
NOMZ	nominalizer
NPAST	non-past
OBJ	object
OBL	oblique
OC	Oceanic
OE	Old English
OF	Old French
PART	participle
PASS	passive
PDE	Present-day English
PERF	perfect
PFV	perfective
PL	plural/pluractional
PL	Palaungic
POS/POSS	possessive
POSS	possessor

POT	potential
PRED	predicate
PREP	preposition
PRES	present (indicative)
PRF	perfect
PRIV	privative
PRO	pronominal
PROG	progressive
PROPR	propriative
PROX	proximal
PRS	present
PST	past
PTCP	participial
PTCP	participle
PURP	purposive
PV	patient voice
PV.PERF	patient voice perfective
QUOT	quotative
RAPPR	rapproachant (approaching)
R.PAST	recent past
RDP	reduplication
RECP	reciprocal
RED	reduplication
REDUP	reduplication
REFL	reflexive
REL	relativizer
REV	reversive
RFL	reflexive
RL	relational noun
S	subject
S	singular
SA	unglossable particle
SBJ	subject
SG	singular
SHWNG	South Halmahera-West New Guinea
SING	singular
SOC	sociative
Sp	Spanish
SPON	spontaneous
SUB	subordinator
SUB	subject
SUBJ	subjunctive

SUBS	subsecutive
SUFF	suffix
THEM	thematic morpheme
TOP	topic
TR	transitivizer
TRANS	transitive
TRN	transnumeral
TRS	transitivizer
UNDF	undefined
V	verb
VLZ	verbalizer
VBZ	verbalizer
VEN	ventive
VN	Vietnamese
VT	Vietic
VWF	word-formation value
Wi	Wichi
WMP	Western Malayo-Polynesian
YY	Yir Yoront

PART I

CHAPTER 1

INTRODUCTION

The Scope of the Handbook

ROCHELLE LIEBER AND PAVOL ŠTEKAUER

1.1 WHY DERIVATION ON ITS OWN?

THIS handbook is intended as a companion to our earlier *Oxford Handbook of Compounding* (2009), as well as to the *Oxford Handbook of Inflection* (Baerman in press), and the *Oxford Handbook of Morphological Theory* (Audring and Masini forthcoming). We might justify it simply on the basis of symmetry, as part of an effort to cover all areas of the study of morphology thoroughly in this series. Nevertheless, we ought to have a better reason in mind for compiling a book of this sort. In this Handbook we hope to look at derivational morphology on its own terms to see what is distinctive about it, what defines it as a phenomenon, and how it is manifested in the languages of the world.

What do we mean by “derivation on its own terms”? To determine this, we must start first with defining what we mean by word formation. The term “word formation” refers to the creation of new lexemes in a language and is generally said to be composed of compounding and derivation. By “derivation” we therefore mean to refer to those parts of word formation other than compounding, a definition that is also used by Aikhenvald (2007: 1). Although the definition of “compounding” is by no means straightforward, we have dealt with it extensively in our Introduction to the *Oxford Handbook of Compounding*. For our purposes here, it is sufficient to make use of Bauer’s (2003: 40) definition of a compound as “the formation of a new lexeme by adjoining two or more lexemes.”¹ What we are left with when we subtract compounding from word formation are ways of creating new lexemes other than putting two or more lexemes together. In formal terms, this encompasses various kinds of affixation (prefixation, suffixation, infixation, circumfixation), but also

¹ We remain neutral on whether noun-incorporation is to be treated as a sort of compounding or as a matter of syntax. We assume, however, that it is not to be included as a part of derivation.

reduplication, templatic or root and pattern word formation, subtractive word formation, conversion, and miscellaneous tone and stress changing operations, specifically when they are not used for the purposes of inflection.

Approached from the perspective of function or semantics, we might define the core of derivation as including, but not limited to the creation of:

- event, process, and result lexemes;
- personals, including agent and patient;
- lexemes expressing non-inflectional gender (e.g. *actress*);
- lexemes expressing location in time and space;
- instruments;
- collectives and abstracts;
- evaluatives (including both size and attitude);
- negatives and privatives;
- lexemes relating to non-evaluative size and quantity;
- causatives, anti-causatives, applicatives, factitives, inchoatives, duratives, and the like.

Derivation may be either category-changing, or non-category-changing; for example, personal nouns may be formed from verbs (*writer*, *accountant*) but also from other nouns (*Londoner*, *pianist*). Verbs can be created from nouns or adjectives (*unionize*, *civilize*), or can be formed from other verbs, such as the causatives and applicatives that are typical of the Niger-Congo languages (Creissels, this volume). There are no doubt many other semantic categories into which derivation can fall, especially if we take into account the sort of lexical derivation that is to be found in polysynthetic languages, such as those of the Athabaskan (Rice, this volume) or Eskimo-Aleut languages (Johns, this volume). Indeed, some semantic categories can be quite idiosyncratic, as is the case with the suffix *-ier* in French, which creates names of trees from names of the respective fruit (*poire* ‘pear’ ~ *poirier* ‘pear tree’).

It would be convenient, of course, if we could take the intersection of these formal and functional categories and be left with a clearly delineated domain of derivation as the subject of this handbook. But language is rarely so obliging and we must acknowledge that on all sides we are faced with fuzzy boundaries. In some cases there is difficulty separating derivation from compounding. As Olsen (this volume) points out, identifying the point at which an independent lexeme becomes an affix is almost impossible to do. Or consider the case of reduplication. Some authors (e.g. Štekauer et al. 2012) treat full reduplication as a form of compounding, apart from partial reduplication; there is something to be said for this choice, as full reduplication certainly does fulfill the main criterion of compounding as being the composition of two lexemes. Still, others (Inkelas, this volume) find the most salient characteristic of reduplication—repetition—sufficient to treat full reduplication as a phenomenon distinct from compounding. On the other side, there are cases where the boundaries between derivation and inflection are indistinct, as with evaluatives in languages that have extensive noun class systems,

with certain classes being reserved for diminutives or augmentatives (see Creissels, this volume). Indeed, the puzzling nature of evaluatives has led some researchers to treat it as distinct from either derivation or inflection (see Körtvélyessy, this volume).

In spite of difficulties of this sort, the present volume is predicated on the assumption that there is something in the intersection between the formal means and the functional/semantic territory covered by derivation that defines a coherent field of study. Is this the case? Oddly, this is a question that does not seem to have been asked. One reason for this is that derivation has only rarely been treated apart from other sorts of morphology—compounding on the one hand and inflection on the other.

1.2 A BRIEF FORAY INTO HISTORY

We do not mean to dwell on the historical development of the field of morphology, as this is a subject that has already been covered in our *Handbook of Word Formation* (2005) and is to be the subject of *The Oxford Handbook of Morphological Theory* (Audring and Masini forthcoming). But at least a brief mention of the treatment of derivation in morphological theory seems justified here. Seminal works in the American structuralist tradition, such as Harris (1946) or Hockett (1947, 1954) were preoccupied with methods of analyzing morphemes, and do not seem to provide separate treatments of inflection and derivation.² Nor do some of the key works in morphology from the middle of the 20th century single out derivation as a distinct matter for study. Lees' *The Grammar of English Nominalizations* (1960) represents early work characteristic of the generative tradition in North America. Lees focuses primarily on noun-noun compounds, but also assumes that transformations of various sorts can introduce category-changing derivational morphology, in particular affixes that nominalize verbs in English. Marchand's *The Categories and Types of Present-day English Word-Formation* (1960/9) is representative of the mid-century view on word formation in Western Europe. The scope of Marchand's work, drawing mainly on the structuralist tradition of the Geneva School and the ideas of Coseriu (1952), is much broader, covering a wide range of word-formation processes in English derivation and compounding. Dokulil's *Tvoření slov v češtině I. Teorie odvozování slov* [Word-Formation in Czech. A Theory of Word Derivation] (1962) is representative of the field in Central Europe. His is the most comprehensive theory from among the authors of the 1960s.³ Dokulil discusses and foreshadows a number of topics which have become central to the field of derivational morphology, including a general onomasiological theory of word formation, individual word-formation processes and cognitive foundations of these processes, productivity,

² Bloomfield (1933: 237) indeed implies that the distinction between inflection and what we would call derivation does not necessarily apply in all languages.

³ Unfortunately, his publications were not written in English, so they have had limited influence in North America or Western Europe.

derivational paradigms, and lexicalization, among others. His work continues to be of influence among morphologists in Central Europe.

Subsequent work has only rarely singled out derivation from compounding and inflection. Indeed, Aronoff's *Word Formation in Generative Grammar* (1976) seems to be the lone example.⁴ Aronoff is careful to distinguish derivation from inflection, the latter being a matter of syntax: he mentions in passing that unlike derivational morphemes, inflectional morphemes may be attached higher in a tree than the X^0 node (1976: 2). He does not treat compounding, but interestingly does not comment on the decision to exclude compounding from the scope of his monograph. In other words, Aronoff's decision to discuss derivation apart from inflection and compounding does not seem to be a principled one or to have any particular theoretical significance.

Subsequent work on morphology has generally been inclusive, encompassing derivation and either compounding or inflection or both. Important dissertations such as Siegel's (1974) *Topics in English Morphology*, Allen's (1978) *Morphological Investigations*, and Lieber's (1980) *On the Organization of the Lexicon* all cover parts of the territory of morphology beyond derivation, as does subsequent influential work in word structure (Williams 1981b, Selkirk 1982, Lieber 1992), in Lexical Phonology and Morphology (Kiparsky 1982b, Halle and Mohanan 1985, Giegerich 1999), in realizational frameworks (Anderson 1992, Stump 2001), in Lexeme Morpheme Base Morphology (Beard 1995), in the onomasiological tradition (Štekauer 1998, 2005), or in the framework of lexical semantics (Lieber 2004).

Those works over the last thirty or so years that have treated derivation have tended to be focused on specific theoretical issues, for example the formal nature of rules (Aronoff 1976, Lieber 1980, 1992, Selkirk 1982, Beard 1995, Booij 2010, to name just a few), productivity (Aronoff 1976, van Marle 1985, Baayen 1989, Plag 1999, Bauer 2001), affix ordering (Fabb 1988, Hay 2000, Plag and Baayen 2009), lexicalization (Kastovsky 1982, Bauer 1983, Lipka et al. 2004), the nature of evaluative affixation (Scalise 1984, Stump 1993, Bauer 1996, 1997a, Jurafsky 1996, Grandi and Körtvelyessy forthcoming), the analysis of root-and-pattern word formation (McCarthy 1979), reduplication (Moravcsik 1978, Marantz 1982, Hurch 2005, Inkelas and Zoll 2005), and infixation (Ultan 1975, Yu 2007a). But no one seems to have taken a broad view of the subject.

1.3 A COMPREHENSIVE OVERVIEW

The chapters of this handbook thus give us a chance to ask what is distinctive about derivation. Our idea is to fill in a picture that is fragmented and currently missing key pieces. Although we have theoretical treatments of derivation, we lack a comprehensive overview that encompasses both concatenative and non-concatenative formal processes on the one

⁴ Halle (1973) draws most of his examples from derivation in English, but he briefly touches on inflection as well.

hand, and various semantic categories of derivation on the other. Further, there are surprisingly few substantial descriptive accounts of derivation in the languages of the world that allow us to make cross-linguistic comparisons; grammars of specific languages often do not have more than a few pages on derivation, and language families are almost never treated as a whole. Štekauer et al. (2012) is a step in the direction of filling in descriptive gaps, but they present isolated facts about many languages rather than focused snapshots of languages and language families. The present handbook seeks to fill this descriptive gap.

We also believe that a cross-linguistic perspective on derivation has been hampered by a view that might be too heavily Eurocentric. We give two examples. Consider the term “conversion.” This term for category change with no concomitant change in form makes sense in the context of languages like English; but it becomes increasingly problematic when we consider languages that are heavily inflected and even more so with languages that do not exhibit clear distinctions between syntactic categories (see Valera, this volume). A second example of a Eurocentric perspective might be the common notion that the formation of ideophones is not to be treated as part of derivation; current English-language textbooks on morphology (Spencer 1991, Haspelmath 2002, Booij 2007, Lieber 2010a, Aronoff and Fudeman 2011) do not even mention ideophones in the context of derivation. But the chapters in this volume on derivation in Uralic, Niger-Congo, Nilo-Saharan, and Sino-Tibetan all suggest that our view has been too narrow. In each of these families ideophones have a role to play in derivation.

Interestingly, one thing that has emerged from Štekauer et al.’s (2012) recent typological work is that it seems to be an absolute universal that languages have some sort of derivation, and this alone would justify our focus on this phenomenon. Štekauer et al. cite one language (Vietnamese) in their sample of fifty-five languages that lacks affixation, but significantly Vietnamese does not lack derivation entirely, as new lexemes in that language may be formed by various sorts of reduplication (see also Inkelas, this volume). In contrast, they cite five languages that lack compounding (Dangaléat, Diola-Fogny, Karao, Kwakw’ala, and West Greenlandic (Kalaallisut)), but that do have various formal mechanisms of derivation. The literature also suggests that some languages (Thai, Burmese, Yoruba, Vietnamese) lack inflection (Lehmann and Moravcsik 2000: 745), which would leave derivation as the only sort of morphology that all languages may be said to have.⁵ Of course this makes sense from a functional perspective: all languages need to add to their lexical stock somehow, and relying exclusively on coinage and borrowing to increase lexical stock seems implausible at best.⁶

Looking more closely at derivation, several researchers have concluded that suffixation is the most common means of derivation in the languages of the world (Hawkins and Gilligan 1988, Štekauer et al. 2012); only one affixing language in the Štekauer et al.

⁵ Greenberg (1963a) proposed the universal that “If a language has inflection, it always has derivation” (Universals Archive U506). It appears that this universal can be strengthened in light of the results we cite here: if we are correct, all languages have some sort of derivation whether or not they have inflection.

⁶ Adding to the lexical stock exclusively by borrowing may be a feature of dying languages, but is not a feature of any living language to our knowledge.

sample, Yoruba, lacks suffixation as a derivational device. Prefixation is somewhat less well-attested, although still widespread (70.91% in the Štekauer et al. sample), as are reduplication (80% in Štekauer et al., but closer to 75% in the WALS sample) and conversion (61.82% of languages in Štekauer et al.). Other forms of derivation are not nearly so widespread: Štekauer et al. say that 25.45% of the languages in their sample exhibit infixation, 21.82% circumfixation, and 23.64% stem vowel alternation (which for them includes both ablaut and root and pattern derivation). Other sorts of derivation appear in an even smaller percentage of the languages they sampled.

We therefore have some very basic knowledge of the formal, functional, and typological characteristics of derivation, but this is a bare skeleton. We intend with this Handbook to begin to fill in details in all these areas. It is our intention that the chapters gathered in this volume will be of use not only to morphologists, but also to psycholinguists, historical linguists, syntacticians, and phonologists, as well as to students and scholars in related fields that need to know about how languages add to their lexical stocks.

1.4 THE ORGANIZATION OF THE HANDBOOK

In the first part of this Handbook, we look at derivation from several perspectives. We begin with boundary issues—where to draw the line between derivation and inflection (Chapter 2) and between derivation and compounding (Chapter 3). Not surprisingly, this brings to the fore the difficulty of delineating our subject matter with perfect clarity. We next take up several “big-picture” issues including the theoretical treatment of derivation (Chapter 4), the issue of productivity and lexicalization (Chapter 5), methodologies used in obtaining data on derivation (Chapter 6), and experimental and psycholinguistic approaches to derivation (Chapter 7). Chapters 8–12 look at particular formal means of derivation (affixation, infixation, conversion, reduplication, and other non-concatenative processes). Chapter 13 looks at issues concerning allomorphy in derivation. Next, we take up derivation of nouns (Chapter 14), verbs (Chapter 15), adjectives and adverbs (Chapter 16), evaluative derivation (Chapter 17), and derivation of functional categories (Chapter 18). We also consider a number of themes that are particularly salient in the study of derivation: homophony versus polysemy in affixes (Chapter 19), paradigmatic organization in derivation (Chapter 20), and the ordering of derivational affixes (Chapter 21). Part I ends with three chapters situating derivation with respect to the wider fields of sociolinguistics, language change, and child language acquisition (Chapters 22–4).

In the second part of this volume (Chapters 25–39) we have made an attempt to fill a descriptive gap in the literature by looking at derivation across a wide range of languages. Instead of focusing on individual languages as we did in the *Oxford Handbook of Compounding*, however, we decided here to look more broadly at language families with the aim of exploring the extent of variation both within and across families. As is usually

the case in surveys of this kind, we aimed for a broad distribution of families in terms of areal and typological characteristics. Inevitably, of course, we were limited to families for which we could find willing authors. We were extraordinarily fortunate, however, in finding authors able to cover fifteen language families, ranging geographically across Europe, Eurasia, East and South Asia, Australia, the Pacific, Africa, North and South America. The reader will note that these chapters are not uniform in composition; this was inevitable, given a very wide range in the size of the language families and in the availability of data. Some chapters range broadly over many languages in the family; others give a brief overview of the family and then concentrate on one or two specific languages in the family. Chapter 34 is unique in that we could find no single author to take on all of Sino-Tibetan; this chapter is therefore divided into three sections, each covering a major branch of Sino-Tibetan. We hope that in spite of their differences in composition, these chapters nevertheless give a usefully broad overview of the range of derivation that occurs in the languages of the world.

In the last two chapters we return to broader themes. The penultimate chapter of the handbook takes an areal rather than genetic view of derivation, looking both at the mechanisms of areal spread and specific examples of areal tendencies in derivation. And in the final chapter we return to the theme of universals, assessing what the chapters of Part II of this volume can tell us about various cross-linguistic generalizations that have appeared in the literature.

We close with a word on what we have not provided in this Handbook, namely a comprehensive overview of the theoretical frameworks in which derivation has been treated. This omission was a deliberate decision on our part. On the one hand, we have already published a *Handbook of Word Formation* (2005) that covers a number of theoretical approaches to word formation. On the other, the *Oxford Handbook of Morphological Theory* (Audring and Masini forthcoming) will cover recent theoretical developments. What we hope to provide in what follows is a rich picture of how word formation works, what sorts of meanings it tends to express, how it may be studied, and how it is manifested in the languages of the world. Inevitably there will be many facets of derivation we have failed to cover adequately. Nevertheless, we hope to have provided a broad enough overview of the state-of-the-art to aid further research in the field.

CHAPTER 2

DELINEATING DERIVATION AND INFLECTION

PIUS TEN HACKEN

THE distinction between derivation and inflection is one of the traditional problems of linguistic morphology. Although the concepts are intuitively clear, the boundary between them is elusive when borderline cases are considered. Here, I will start by presenting the intuitive core of the opposition (Section 2.1). Then some general considerations from the theory of terminology are discussed, which determine the framework of discussion (Section 2.2). Within this framework, there are two main positions that have been taken, one that there is a categorical opposition, the other that any attempt to define the two categorically is futile (Section 2.3). Against this background, I will then discuss some criteria that have been proposed (Section 2.4) and some problem cases for the classification (Section 2.5).

2.1 THE CORE OPPOSITION

Both inflection and derivation are concerned with morphologically related forms. A clear example of inflection is the set of case and number forms of Polish *kobieta* (“woman”) in (1).

(1)	<i>Singular</i>	<i>Plural</i>
<i>Nominative</i>	kobieta	kobiety
<i>Genitive</i>	kobiety	kobiet
<i>Dative</i>	kobietcie	kobietom
<i>Accusative</i>	kobietę	kobiety
<i>Instrumental</i>	kobietą	kobietami
<i>Locative</i>	kobietcie	kobietach
<i>Vocative</i>	kobieto	kobiety

In (1), there are ten different forms occupying fourteen case-number slots. Most nouns in Polish have the same set of fourteen slots illustrated in (1). Together, the forms in (1) are called the *paradigm* of *kobieta*. The paradigm together with the citation form is called the *lexeme*, e.g. by Matthews (1974: 21–2).

A clear example of derivation is the English pair in (2).

- (2) a. read
b. readable

The pair in (2) has a number of properties that make it a typical example of derivation. Whereas *read* in (2a) is a verb, *readable* in (2b) is an adjective. There are various ways in which this pair differs from the paradigm in (1). Perhaps the most significant one is that the pair in (2) is not a paradigm of a single lexeme, but represents the incidental formation of a new lexeme.

The contrast between (1) and (2) can be taken to be prototypical for the distinction between inflection and derivation. In this case, many properties can be used to classify (1) as inflection and (2) as derivation. However, there are many instances in which the contrast is less obvious. The cluster of properties that distinguish (1) and (2) tends to disintegrate when we consider borderline cases. The discussion of whether and how to delineate inflection and derivation concentrates on such cases, using them either as an illustration of where the boundary should be drawn or as an argument against drawing a categorical boundary and see the contrast as a continuum instead.

2.2 TERMINOLOGICAL CONSIDERATIONS

The problem of determining the precise extent of the categories of inflection and derivation is an instantiation of a general terminological problem. Natural concepts are prototypes. Here the expression *natural concept* refers to a concept as it emerges in a speaker's mind on the basis of usage and exemplification. Terminological concepts, that is concepts with what Bessé (1997) calls a "terminological definition," are unnatural in their categorical delimitation.

Labov (1973) demonstrated that a natural concept such as *cup* has fuzzy boundaries by studying the categorization judgments for objects ranging from clear cups to clear bowls. As Jackendoff (1983: 86) observes, such judgments must be based on the application of rules, because we do not learn the category of each object separately. These rules are unconscious and they constitute an important part of the meaning of the relevant concept. In the case of *cup* and *bowl*, Labov (1973) identifies two types of condition that are responsible for the gradual transition between them. First there are scalar conditions such as the height–width relation. Secondly, there are what Jackendoff (1983: 137) calls *preference rules*, such as the property of having a handle. Preference rules are neither necessary nor sufficient, but they interact with scalar conditions so that, for instance, an

object that because of its height–width relation is rather a bowl may be judged rather a cup when it is given a handle.

The idea that natural concepts are prototypes is elaborated by Rosch (1978) for general language, but Temmerman (2000) argues that it also applies to terminology. Her examples are from the domain of the life sciences, but the insights can be applied to the concepts of inflection and derivation as well. Discussing legal terminology, ten Hacken (2010a) argues that the questions this situation raises are whether or not it is worth formulating a terminological definition in the sense of Bessé (1997) and if yes, how to do so. These questions are equally relevant to the linguistic concepts of inflection and derivation.

As explained by ten Hacken (2010a, b), formulating a terminological definition is equivalent to creating an abstract concept. In the case of legal concepts, such definitions are necessary for the enforcement of laws. Without a proper definition of *parking* in traffic law, constraints on parking cannot be enforced. In scientific terminology, discussed by ten Hacken (2010b), the question is whether the concept contributes to the explanatory power of the theory it is used in. A linguistic example illustrating the relevance of this question is the notion of *subject* in relation to German (3).

- (3) Mir ist kalt.
 Me_{DAT} is cold
 i.e. ‘I am cold’

It is not immediately obvious whether *mir* in (3) is a subject. The question is whether this is a problem. In Lexical-Functional Grammar (Bresnan 2001), with its separate level of *f*-structure in which grammatical functions such as *subject* are primitives, it is essential to define *subject* exactly. We need to know whether *mir* in (3) is a subject or not in order to produce a correct *f*-structure. In Head-Driven Phrase Structure Grammar, at least in the version presented in the first eight chapters of Pollard and Sag (1994), subjects are not formally distinguished from other complements, so that there is no need to define *subject* as an abstract object. In the representation of (3), *mir* is on the subcategorization list, but it need not be specified whether it is the subject or not. This does not mean, of course, that Pollard and Sag (1994) claim that there are no differences at all between subjects and other complements. The contrast between Bresnan (2001) and Pollard and Sag (1994) in this matter only concerns the theoretical significance of these differences. As we will see in Section 2.3, the same type of discussion can be found in the context of inflection and derivation.

If we decide to set up a terminological concept, the next question is how we select the conditions in the definition. For scientific terminology such as *inflection* and *derivation*, terms are part of a network of abstract concepts imposed on reality. Links in the network are references to a term in the definition of another term. A good definition of a concept is one that contributes to making the network of concepts a good basis for an explanatory theory.

Given the aim of increasing depth and scope of explanation by scientific theories, it is inherent in the history of scientific concepts that they have to adapt to extensions in the empirical and theoretical basis. This can be illustrated by the history of the term *planet* in astronomy (cf. Schilling 2007). In 17th- and 18th-century astronomy, it was sufficient to define a planet as a body in orbit around the Sun that does not emit but only reflects light. Equivalently, at least until Uranus was discovered in 1781, the six planets could be simply listed. The discovery of increasing numbers of small planets in the 19th century led to the creation of a new concept *asteroid*, distinct from *planet*. It is important to see the relation between the empirical basis, the theoretical basis, and the terms here. The extension of the empirical basis was in principle easily accommodated by means of the existing terms, but it triggered a theoretical need to distinguish a new concept. Similarly, Schilling describes how the discovery of Pluto in 1930 was at first accommodated by classifying it as a planet, but when further discoveries were made this decision was revised, leading in 2006 to the International Astronomic Union (IAU) definition of *planet* in terms of necessary and sufficient conditions.

In general, we cannot assume that the definition of a term will persist over time. It is natural that changes in theory and knowledge lead to different, more advanced definitions. In the field of terminology, the need for regular updates of definitions of terms is recognized (cf. Arntz et al. 2009: 69). In the case of terms such as *inflection* and *derivation*, we are dealing with concepts that have clearly distinct prototypes, as (1) and (2) illustrate, but are at the same time placed in a continuum of more or less typical cases. When delineating the concepts, the best we can do is to draw the borderline so that it runs through a (relatively) sparsely populated area of the continuum and uses theoretically significant properties. However, extensions of the empirical basis can increase the number of borderline cases and theoretical developments can shift the emphasis away from properties once thought to be significant.

2.3 TWO APPROACHES

Approaches to the distinction between inflection and derivation can be divided into two types, each with a rather long tradition. I will call them here the *categorizing tradition* and the *skeptical tradition*. In the categorizing tradition, the position is that inflection and derivation should be treated as different categories and the boundary between them should therefore be clear. In the skeptical tradition, we find two patterns of reasoning that converge on the same result. In one, it is argued that a clear boundary between inflection and derivation cannot always be achieved, so that we should formulate our theories in such a way that it is not necessary. In the other, it is argued that the best theory does not depend on the distinction between inflection and derivation, so that there is no reason to try to define this distinction precisely. The two reasonings are often used to reinforce each other, both leading to abandoning the search for precise criteria to delineate inflection and derivation.

In traditional grammars, inflection is a central topic of the grammar, whereas derivation is not included and is taken to be covered by the dictionary. We find this in Hoffmann's (1777) grammar of Latin, Girauld Duvivier's (1822) grammar of French, but also in Bornemann and Risch's (1978) grammar of Ancient Greek. The dominance of inflection in this type of grammar is illustrated by the space devoted to different sections. Bornemann and Risch (1978) devote 25 pages to phonology, 136 pages to declension and conjugation, and 144 pages to what is called "Syntax," but the first 107 of these pages are about the choice of the correct inflected form of words in a particular context. Older grammars tend to discuss orthography instead of phonology, but the pattern is otherwise very similar. These grammars often include appendices. Thus, Hoffmann (1777) has an appendix on the Roman calendar. Bornemann and Risch (1978) include a 15-page appendix on Greek word formation, alongside one on the Homeric language and one on Greek meter. Significantly, Bornemann and Risch (1978) do not discuss the distinction between word formation and inflection at all, apparently taking it as given.

The approach to delineating inflection and derivation in traditional grammars can be compared to the approach to the concept of *planet* in 17th- and 18th-century astronomy. Inflectional categories, like planets, were defined by means of a list or some general descriptive properties and the two ways of defining them were taken to be equivalent. The listing approach requires that either the categories of one language (e.g. Latin) are taken to be universal, or that each language is considered as a separate universe. A grammar such as Guasch (1983) for Guaraní is an interesting mix between the two. Thus, Guasch (1983: 51–3) first states and exemplifies that nouns are not inflected for number and gender, before treating their inflection for tense. This approach can be explained (and justified) by the use of traditional grammars in language teaching.

The skeptical tradition emerged as a reaction against the position adopted in traditional grammars, that is that the boundary between inflection and derivation is obvious. Bloomfield (1933: 223–4) starts his overview of criteria by which inflection has been distinguished from derivation with the remark that "[t]his distinction cannot always be carried out." What Bloomfield means is that in some languages and for some morphological constructions, it is not possible to determine whether they are inflectional or derivational. A stronger formulation of this position is the one by Bloch and Trager (1942: 54), given in (4).

- (4) For some languages, it is useful to divide the morphological constructions of complex words into two kinds according to the grammatical function of the resulting form: DERIVATIONAL and INFLECTIONAL.

Whereas Bloomfield presents the question of whether inflection and derivation can or should be distinguished as a matter of debate, in (4) the scope of the distinction is restricted to "some languages." In interpreting these statements, it is important to keep in mind the nature of the text they appear in. Bloomfield's book is an overview of

linguistic analysis “intended for the general reader and for the student who is entering upon linguistic work” (1933: vii). We might call the book a textbook. This explains the implication of a debate. Bloch and Trager write in their introduction that their aim is “to present in brief summary the techniques of analysis which are necessary for learning a foreign language by the method of working with native speakers and arriving inductively at the grammatical system of their language” (1942: 4). It does not give a full overview of the state of the art in linguistics, but is intended as a guide for language learners. Therefore, (4) does not imply any debate, but just describes the usefulness of the distinction in “some languages.”

In early generative grammar, there was no obvious place for morphology. In Chomsky’s (1957) model, syntax is governed by rewrite rules and transformations that operate on morphemes. The phonetic realization of these morphemes is attributed to interpretation rules operating on Surface Structure, whereas semantic interpretation rules operate on Deep Structure to produce the representation of meaning. In such a model, there is no basis for any distinction between inflection and derivation. Nominalization transformations such as proposed by Lees (1960) are formally of the same type as Chomsky’s (1957: 39) transformation that produces the past tense of verbs. Inflection and derivation are at most pre-theoretical, descriptive terms in such a theory.

The analysis of nominalization was a crucial battleground in what Paul Postal called the “linguistic wars” (Newmeyer 1986: 117). In Generative Semantics, nominalization was accounted for by means of transformations. Nominalization was also taken in a much broader sense. Thus, Levi (1978: 168) classifies both *city planner* and *car thief* as agent nominalizations. The reason is that she assumes that *thief* includes the predicate also found in *steal* in its Deep Structure. In Generative Semantics, we can therefore observe a continuation of the early generative position that morphology is dealt with by means of syntactic rules, which does not give any reason to distinguish inflection and derivation.

The opponents of Generative Semantics made use of the lexicon, introduced by Chomsky (1965: 84–8) as a part of the base component, alongside the rewrite rules. The base component generates Deep Structure and the lexicon contains a specification of “all properties that are essentially idiosyncratic” (1965: 87). Chomsky (1970) argues for the “lexicalist hypothesis,” which implies “that derived nominals will correspond to base structures rather than transforms” (1970: 193), that is, they are in the lexicon rather than the result of syntactic rule application.

Obviously, Chomsky (1970) uses nominalization as an example, but it is not unequivocally clear how far this example should be extended. Whereas it is straightforward to extend the scope of the treatment proposed for nominalization to other types of derivation, the question of whether it should be extended to include inflection remains open. Scalise (1984: 101) uses the terms *Strong Lexicalist Hypothesis (SLH)* and *Weak Lexicalist Hypothesis (WLH)* to distinguish these options. The choice between them has implications for the distinction between inflection and derivation. In the WLH, only derivation is in the lexicon, whereas inflection is covered in syntax and/or phonology. Therefore, inflection and derivation *must* be distinguished in a categorical way. In the SLH, both

inflection and derivation are covered in the lexicon. They may be distinguished, but the status of the distinction is not determined by the grammatical framework.

Two foundational texts elaborating the WLH are Aronoff (1976) and Anderson (1992). Both start from the assumption that derivation creates new lexemes, whereas inflection generates the paradigm of word forms of a lexeme. Both reject the morpheme as the basic unit of morphology. Aronoff (1976: 115) makes the claim in (5).

- (5) [M]orphology is word-based: new words are formed from already existing ones, rather than being mere concatenations of morphemes.

In interpreting (5) it should be taken into account that Aronoff uses *word* where Matthews (1974) would use *lexeme* (cf. Aronoff, 1976: xi). Anderson (1992) subscribes to the claim in (5) and develops a system of *A-Morphous Morphology*, that is one where morphemes do not play any role. In these systems, the lexeme (or word, in Aronoff's terminology) is the anglepoint between inflection and word formation, so that it is crucial to distinguish inflection and derivation precisely.

One approach that continues the skeptical tradition is Distributed Morphology (DM). Its foundational text is Halle and Marantz (1993). Harley and Noyer (2003) present a general overview and Harley (2009: 131–3) gives an update. The general idea of DM is that syntactic structure reaches all the way down to the level of the morpheme. As Harley and Noyer (2003: 474) state, the distinction between inflection and derivation “has no explicit status in DM,” but there is a distinction between functional and lexical morphemes (*f-morphemes* and *l-morphemes*) which expresses some of the difference between prototypical cases such as (1) and (2). In syntactic structure, all morphemes are feature bundles, but *f-morphemes* and *l-morphemes* operate differently in mapping them to phonological representations. In *f-morphemes*, all vocabulary items are in competition and rules are devised to select the right one, whereas for *l-morphemes*, the choice is between different lexical items with different encyclopedic content.

It is interesting to compare this approach to Lieber's (2004). Lieber also assumes that morphology is a theory of morphemes, but she quite explicitly distinguishes inflection and derivation. Lieber's morphemes are composed of a skeleton and a body (2004: 9), where the skeleton contains the more formalized features and the body the encyclopedic information. Lieber distinguishes inflectional and derivational affixes on the basis of the contribution they make to the meaning of the base they attach to (2004: 151). Derivational affixes are morphemes that have an argument in the skeleton, so that they change the referential meaning of the base, whereas inflectional affixes lack such an argument. It should be noted, of course, that this is intended as a way of representing the difference, not of making the distinction. As opposed to the situation in word-based and *a-morphous* morphology, the distinction is not itself crucial for Lieber's framework.

In presenting her framework for lexical semantics, Lieber refers to Jackendoff's Lexical Conceptual Structures as the basis for her formalism of the skeleton. However, in elaborating his Parallel Architecture, Jackendoff (2002: 152–62) argues for the complete abolition of the traditional distinction between inflection and derivation. As an example of what is

usually treated as inflection, he discusses the English past tense (2002: 160–2). The past tense ending *-ed* is for Jackendoff a lexical entry of its own, specifying in its phonological information that it is an affix, in its syntactic information that it attaches to a verb and makes it tensed, and in its conceptual information that it marks the past. Strong verbs such as *eat* have separate lexical entries for the stem and for the past tense. He mentions “massively affixing languages like Turkish” as an argument in favor of this approach (2002: 156).

Jackendoff’s theory not only rejects (5), but even abandons the notion of *lexeme*. This raises the question of how to express the regularity of the pattern in (1). Booij (2010) presents Construction Morphology as a morphological theory within Jackendoff’s general architecture. He proposes to represent inflectional paradigms as correspondence relations between constructional schemas (2010: 255–7). These relations can be encoded as redundancy rules (cf. Jackendoff 1975) so that the pattern in (1) is stored as one of the typical ways of generating the nominal paradigm in Polish. Redundancy rules cover emergent patterns and facilitate lexical storage and retrieval, but they are not crucial for generating correct expressions.

Instead of lexeme formation and lexeme realization, Jackendoff only distinguishes productive and semiproductive affixes. The latter cover all cases where limitations on the regular formation of expressions cannot be predicted on the basis of conditions that can be encoded in the relevant lexical entry. Jackendoff (2010: 34) identifies semiproductivity as “one of the central issues of linguistic theory for the coming years.” Semiproductivity is in principle independent of the distinction between inflection and derivation, as noted by Jackendoff (2002: 155).

In conclusion, the status of the distinction between inflection and derivation is a consequence of theoretical assumptions. There are two main approaches in this respect. One continues the traditional distinction made in school grammars and highlights the importance of lexemes and paradigms, but aims to give it a stronger terminological foundation. The other is skeptical about the possibility of doing so reliably. It tends to highlight the difficulties of classifying borderline cases. However, even if they do not require a precise distinction, most frameworks at least provide for a way to encode the general prototypes underlying the differences illustrated in (1) and (2).

2.4 CRITERIA FOR THE DISTINCTION

Given the terminological status of *inflection* and *derivation*, we can expect as the main sources for the discussion of the distinction between them texts of three types. First, sections of textbooks introducing students to the field of morphology. Secondly, sections of handbooks giving an overview of the field. Thirdly, argumentative articles or sections of monographs presenting or discussing frameworks in which the distinction plays a crucial role. The first two of these are generally the most prolific in the use of terms (cf. Pearson, 1998). They reflect communication types in which terminology is typically introduced and explained. The last one is a sign of the controversial nature of the distinction and is an important source of defining criteria.

Modern textbooks, for example Aronoff and Fudeman (2005) and Fábregas and Scalise (2012), typically devote only a few pages to the distinction. The textbook nature of the former is reflected in the division of the material between a short section introducing the intuitive notions with some examples as part of the introduction of the notion of *lexeme* (2005: 44–6) and an overview of the main distinguishing criteria as part of the discussion of inflection (2005: 160–3). Fábregas and Scalise (2012: 104–8) only give some examples suggesting that the distinction is problematic and the two concepts should be seen as prototypes. Earlier textbooks, for example Scalise (1984: 102–15) and Bauer (1988b: 73–87), present much more substantial overviews of the criteria used. Scalise and Bauer take explicit but opposing positions as to the status of the distinction. Scalise (1984: 103) announces at the outset that “we will argue in favor of the division,” whereas Bauer (1988b: 85) concludes that “[n]one of the criteria has appeared satisfactory.”

Handbooks are less pedagogically oriented, but give a more systematic overview of the field. The division of morphology into topics influences how the distinction between inflection and derivation is treated. Spencer and Zwicky (1998) include separate chapters on inflection and derivation, each of which addresses the distinction between them. Both Stump (1998: 14–19) and Beard (1998: 44–6) list criteria that have been used, give examples of problems for the classification, and address the issue of how the distinction should be interpreted in the light of these problems. Booij et al. (2000) devote chapters to the borderlines between the phenomena. Booij’s (2000) discussion of inflection and derivation follows the same pattern as Stump’s (1998) and Beard’s (1998), but goes into more detail. Müller et al. (forthcoming) concentrate only on word formation, so that the question is one of delimiting the scope of the volume. Compared to the other discussions, Štekauer’s (forthcoming a) stands out because it starts with an overview of the reasons why the boundary is hard to determine before giving an overview of criteria. All of them have a rather skeptical view of the feasibility of the distinction.

Stump (1998: 14) observes that the criteria he presents are logically independent and “one wouldn’t necessarily expect each of the five criteria to divide morphological phenomena into the same two groups.” This sums up very well the terminological problem of turning prototypes into precise concepts. The strength of the prototype is the result of converging criteria, but when these criteria are used in a definition, the differences between the sets of phenomena they identify are highlighted. As noted by Bessé (1997), in formulating a terminological definition, choices have to be made.

The final category of sources includes those in which a technical solution to the practical problem of distinguishing the two categories is presented. A well-known example is Anderson (1992), whose theory takes inflection to be in a different part of the grammar from derivation. Another example is ten Hacken (1994), who approaches the problem from the perspective of Word Manager (cf. ten Hacken, 2009), a system for electronic morphological dictionaries in which lexemes are the basic units of description. In both cases, a critical discussion of the criteria that have been used is followed by a solution. Anderson (1992: 82–5) summarizes what he calls the “substance of the notion of inflection.” Ten Hacken formulates independent terminological definitions for inflection (1994: 298) and derivation (1994: 303) on the basis of his discussion.

I will now turn to a number of commonly used criteria. For reasons of space, I cannot present all criteria referred to in the sources mentioned above. Given the large overlap between discussions, I will only give individual references where there is a reason to single out one approach from among the others.

A frequently used criterion is based on the relative order of affixes, formulated by Greenberg's (1963b: 93) as (6), number 28 of his universals.

- (6) If both the derivation and inflection follow the root, or they both precede the root, the derivation is always between the root and the inflection.

In (6), "derivation" and "inflection" refer to the relevant affixes. As a generalization about word forms that include both types of affixes, (6) is quite strong, but not without apparent exceptions. An example of a problem case is the formation of adverbs in French, illustrated in (7).

- (7) a. *lent* ('slow') base form and masculine singular
 b. *lente* ('slow') feminine singular
 c. *lentement* ('slowly')

The adverb (7c) seems to be derived from the feminine form (7b). Historically, such an analysis is indeed correct because Late Latin *mentem* ('character, manner') is a feminine noun. In order to reconcile the data in (7) with the generalization in (6), we would have to claim that *lente* in (7c) is not an inflected form of (7a), but the base form or a stem variant, or that French adverb formation is inflectional.

Apart from empirical problems, ten Hacken (1994: 155–6) also notes a technical problem with (6). If we have a word form with two affixes, for example Base-Affix₁-Affix₂, (6) can only be applied to determine the category of an affix if we already know that Affix₁ is inflectional or that Affix₂ is derivational. The inflectional status of Affix₁ or the derivational status of Affix₂ must be established on the basis of other criteria. Therefore, (6) can at most be an auxiliary criterion.

Another frequently used criterion is based on the syntactic category of the base and the output. Scalise (1984: 103) formulates it as (8).

- (8) I[nflection] R[ule]s never change the syntactic category of a word, while
 D[erivation] R[ule]s may change it.

The contrast between (1) and (2) provides a good example of (8). Obviously, (8) depends on an independent definition of *syntactic category*. In the context of (7), it is relevant that it has been argued that adverbs such as *slowly* are inflected adjectives, for example by Hockett (1958) and by Larson (1987). Another problem is the classification of participles (cf. Section 2.5). Technically, it is not a problem if one concept is dependent on another. The terminology of a particular field can often be seen as a network of terms

related to and referring to each other. More problematic is that (8) is formulated as only a sufficient condition for inflection. If adjectives and adverbs are separate syntactic categories, (8) tells us that the formation of (7c) is derivation. If they are not separate categories, (8) does not tell us anything. We have to admit that derivation sometimes does not change the syntactic category, for example in the prefixation in (9).

- (9) a. clear
b. unclear

It is obvious that *un-* changes the meaning of the base it attaches to in a way that is very similar to the typically derivational contrast in (2) and different from the typically inflectional contrasts in (1). However, the syntactic distribution of (9a and b) is so similar that it is almost impossible to argue that they belong to different syntactic categories. Although Scalise (1984: 103) suggests that “[t]here are reasons... for believing that a DR always changes the syntactic category of its base,” he only gives examples such as *avvocato* (‘lawyer’) and *avvocatura* (‘lawyership’), where countability and abstractness features change. Scalise (1984: 109–10) also gives inflection class, subcategorization, and selectional features, \pm animate and \pm common as relevant features. However, *un-* in (9b) does not change any of these. We can only observe that the meaning it contributes is rather different from the case affixes in (1). Therefore, the existence of many cases such as (9) reduces the value of the criterion in (8) for delineating inflection and derivation.

A third widely used criterion is based on productivity. Aronoff and Fudeman (2005: 161) formulate it as in (10).

- (10) [I]nflectional morphology tends to be more productive than derivational morphology.

As formulated, (10) raises two problems, both of a by now familiar nature. First, the hedge “tends to” and the degree “more” make (10) a characterization of the prototypes rather than a criterion to be used in a terminological definition. Second, the use of productivity makes (10) dependent on a definition of this concept. *Productivity* has been used in different senses and for our purposes Corbin’s (1987) analysis into three concepts is useful. The underlying notion of *disponibilité* (‘availability’) does not distinguish inflection and derivation, because both consist of a large body of available affixes or processes. The derived notions of *rentabilité* (‘profitability’) and *régularité* (‘regularity’) are more interesting here. *Rentabilité* is a gradual property and is realized to the highest degree when it can be reliably predicted that the output of the process exists. The idea of *régularité* is that the resulting word (or word form) has a predictable form and meaning.

English nominal plural /z/ is a good example of a highly productive process on both counts. It applies to almost all nouns unless there are semantic reasons for not having a plural. Only very few nouns form their plural in other ways. Moreover, the form and meaning are in almost all cases entirely predictable. There are three phonological realizations of /z/, but the choice among them is entirely determined by the last phoneme of

the base. Apart from a few lexicalized plurals with special meanings, the meaning is the combination of “plural” with the meaning of the base noun. This makes it a prototypical case of inflection. However, irregular inflection, for example *-en* as an English nominal plural, scores low on both counts. There are very few cases where it applies and in the case of *children*, it triggers further, unpredictable phonological changes. This arguably makes *-en* more typical of derivation.

When we apply (10) to (1) and (2), we encounter a different type of problem. For most case-number combinations, Polish has different possible endings and the choice among them can only be predicted in part by phonological properties, gender, and animacy of the base noun. A well-known problem case is the formation of the genitive singular of masculine inanimate nouns, as illustrated in (11).

- (11) a. *ser* *sera* (‘cheese,’ nom./gen. sg.)
 b. *deser* *deseru* (‘dessert,’ nom./gen. sg.)

There is no general rule saying when *-a* or *-u* is to be used. Polish grammars, for example Bielec (1998: 109–10) and Orzechowska (1999: 306), give semantically based generalizations, but they are not absolute rules. Conversely, the pair in (2) is an example of a highly productive affixation process in English. Almost all transitive verbs can have an adjective in *-able* with the meaning “which can be V-ed.” On the basis of such considerations, Bauer (1988b: 79–80) argues that “derivation is more productive than is generally thought,” whereas “[i]nflection is less productive than is frequently believed.”

A possible way out in view of data such as (11) is to assume that the unit for which we determine whether it is productive or not is not the affix, but the feature combination. Every Polish noun has word forms for each of the slots illustrated in (1), except if there are obvious semantic reasons for not having a plural. This would also solve the problem of classifying irregular plurals in English as inflection. This is the basis of Matthews’ (1974) *Word and Paradigm* model. The idea is that inflection has paradigms but derivation does not.

There are two types of problems with this idea. The first is the existence of so-called *defective paradigms*. Thus, for the present indicative of the French verb *clore* (‘close’), Grevisse (1980: 810–11) gives only the forms in (12):

- | | | | |
|------|----------------------|-----------------|--------------------|
| (12) | | <i>Singular</i> | <i>Plural</i> |
| | <i>First person</i> | <i>je clos</i> | — |
| | <i>Second person</i> | <i>tu clos</i> | — |
| | <i>Third person</i> | <i>il clôt</i> | <i>ils closent</i> |

Despite paradigmatic pressure, there are no forms for the first or second person plural. Yet, the forms in (12) are prototypically inflectional. A much more serious problem with paradigms as a criterion to distinguish inflection and derivation, however, is of a general terminological nature. In order to use *paradigm* in the definition of inflection, we should have a definition of *paradigm* that is independent of *inflection*. In Latin grammars, verbs are neatly organized in conjugation classes with forms in each slot representing a feature

combination. However, when we only have as a basis the set of word forms, for instance for an as yet undescribed language, and have to determine which features constitute the structure of the paradigm, it is by no means straightforward what should be included in the paradigm. As Anderson (1992: 79–80) notes, it is difficult to escape circularity of definitions here.

Whereas all of the criteria discussed so far may serve to illustrate the nature of the prototypes of inflection and derivation, they have drawbacks when used as the basis of a terminological definition. In a context in which a definition of that type is required, Anderson (1982: 587) proposes (13) as the starting point:

- (13) Inflectional morphology is what is relevant to the syntax.

It is important to understand the status of (13). Bauer (1988b: 84–5) claims that “it is not sufficient as it stands to define the precise area it wishes to capture,” noting, for instance, that different syntactic theories lead to different sets of properties being relevant. In the original context of Anderson (1982, 1992), however, (13) is only the slogan used as a headline for a more precise claim supported by an elaborate theory that specifies what is relevant to syntax and why. For instance, the change of category in (2), though undoubtedly “relevant to the syntax” in a general sense, is not in the scope of (13). The only valid point Bauer can be said to make (or at least imply) here is that a terminological definition of inflection is theory-specific. This is true for scientific terminology in general and can therefore not be used as an argument against any specific definition.

A central element of Anderson’s system is the notion of agreement. The contrast in (14) can serve as a starting point.

- (14) a. One delegate from each country attends the meeting.
b. Two delegates from each country attend the meeting.

The different forms of the verb *attend* in (14a) and (14b) do not indicate properties of the verb, but only properties of its subject. Therefore, the form of the verb is not a lexical choice, but it depends on agreement.

Anderson (1992: 82–3) distinguishes four types of relevant properties. They are illustrated in (15).

- (15) a. Agnieszka cieszy się nową sukienką.
Agnieszka_{NOM} is.happy.about REFL new_{FEM-INSTR-SG} dress_{INSTR-SG}
i.e. ‘Agnieszka is happy about her new dress’
b. Ankara ve İzmir gideceğim.
Ankara and Izmir_{DAT} I.go
i.e. ‘I go to Ankara and Izmir’

Anderson’s first type of inflectional property he calls configurational. In Polish (15a) we find this when the verb *cieszyć się* (‘be happy about’) governs the instrumental case

of *sukienka* ('dress'). The case, number, and gender of *nowy* ('new') are determined by agreement, Anderson's second type. The feminine gender of *sukienka* is an inherent feature, Anderson's fourth type. His third type is phrasal properties. An example is the dative ending *-e* in the Turkish example (15b). This ending has scope over the entire coordinated NP *Ankara ve İzmir*, so that the first of these does not get any case ending.

It should be kept in mind throughout that the classification as inflection or derivation pertains to features, not to individual occurrences. The fact that the singular number of *meeting* in (14) or the feminine gender of *Agnieszka* in (15a) does not trigger agreement in these sentences is not relevant. The point is that there are contexts in which these features trigger agreement, for example for *delegate* in (14) and for *sukienka* in (15a).

Whereas in distinguishing inflection and derivation Anderson (1992) concentrates on identifying properties of inflection, ten Hacken (1994) proposes independent definitions of inflection and derivation. The definition of inflection (1994: 298) is (16).

- (16) An inflection process is a process realizing a feature or combination of features F on a word W, such that:
- The value of F is determined by agreement with another word or with a functional category.
 - If the two elements in agreement are in X and Y, either X and Y are in the same maximal s-projection, or the maximal s-projection of Y is the complement or the specifier of X.

It is noteworthy that (16) is formulated as a terminological definition in Bessé's (1997) sense. Compared to Anderson (1992), it relies more heavily on agreement. The technical formulation is meant to unify Anderson's configurational and agreement properties into one class. The final clause is meant to distinguish inflection from certain types of clitics. The term *maximal s-projection* refers to a domain of agreement that prevents, for instance, French pronominal clitics from being analyzed as inflectional markings. As noted above, ten Hacken's (1994) definitions are intended to be used in the context of Word Manager. This framework treats clitics in a different way to inflection because it takes the lexeme in the sense of Matthews (1974) as the basic unit of description. As a consequence, Anderson's (1992) category of phrasal properties is not recognized as inflectional. His category of inherent properties are not included in inflection because they are not features that need to be realized. Ten Hacken's (1994: 303) definition of derivation is (17).

- (17) A derivation process is the application of a functor element F to a word or phrase W in the lexicon, such that:
- The relation between W and F(W) can be expressed in terms of modification of the argument structure and/or the syntactic category of W;
 - For any W', if F can apply to W', the relation between W' and F(W') is the same as the relation between W and F(W);
 - Neither F nor W can play an independent role in syntax, but only F(W) can do so.

The idea that derivation is defined independently is remarkable, because in general the discussion of the way to delineate it from inflection concentrates on properties of inflection. Inspired also by Anderson (1992), (17) takes a process-based view of derivation, but whereas inflection realizes features, derivation brings about semantic and/or syntactic changes to the base. The second clause states that the derivational operation must have the same effects on different bases. The base can be a word or a phrase and, according to the final clause, it is not itself available for pronominal reference or other syntactic operations. This can be seen as the effect of the output ending up in the lexicon. The type of operation is restricted by the condition in the first bullet point. As it stands, it is not obvious how prefixation as in (9) is included in the scope of derivation, but there are various ways the clause could be amended to remedy this.

Anderson's (1992) delimitation of the domains of syntax and the lexicon and ten Hacken's (1994) terminological definitions of inflection and derivation illustrate how the categorical approach has been pursued. The perceived success of such approaches depends on the tolerance to the use of theory-internal concepts and to individual classification decisions that do not converge with traditional classifications.

2.5 SOME BORDERLINE CASES

Among the phenomena that have been treated as derivation by some and as inflection by others are adverbs, participles, and diminutives. The first two of these put into question the notion of lexeme as used in traditional grammars of Latin and Greek.

In the case of adverbs and participles, the issue is the set of syntactic categories. As noted in the discussion of (8), change of syntactic category is one of the most commonly adopted criteria for delineating inflection and derivation. The status of adverbs was mentioned in the discussion of (7) above. Whereas classical grammarians consider them a separate category, some modern theories take them to be inflected forms of adjectives. In the case of participles, classical grammarians such as Dionysios Thrax treat them as a separate category (cf. Robins 1979: 33–4), but from the 18th century onwards traditional grammars of Greek and Latin include them in the verbal paradigm. A special case is found in Celtic languages, where so-called *verbal nouns* are by far the most frequent form of verbs. In her detailed analysis of verbal nouns in Irish, Bloch-Trojnar (2006) argues that two of their four main uses are inflectional and the other two derivational. This is comparable to analyzing past participles such as (18a) as inflectional, but attributive passive participles such as (18b) as derivational.

- (18) a Boris has left his luggage at the railway station.
b. The problem of left luggage was discussed at the meeting.

How attractive a split analysis of the participle is, depends on the theoretical framework adopted. Bloch-Trojnar (2006) adopts Beard's (1995) Separation Hypothesis, which

radically separates the formation of a word form from its syntactic and semantic interpretation. In a framework in which a stronger correspondence between form and meaning is assumed, it is problematic to consider *left* as both inflectional and derivational when its irregular formation is the same in both cases.

Diminutives and augmentatives are addressed in more detail in another chapter of this volume. Here they are mainly interesting for the cross-linguistic differences in status. Whereas in Indo-European languages they are derivational, Anderson (1992: 80–1) notes that in Fula they behave inflectionally. Not only are they fully regular, Arnott (1970: 92) also gives examples of agreement such as (19).

- (19) a. loo-nde balee-re (<a> black storage-pot')
 b. loo-d'e balee-je ('black storage-pots')
 c. loo-ŋgel balee-yel (<a> little black storage-pot')
 d. loo-kon balee-hon ('little black storage-pots')

In (19), we see that the noun and adjective agree not only in number, but also in the feature diminutive. It is not the color referred to by the adjective, but the object referred to by the noun that is diminutivized. This is the same as the agreement of *nowq* in number, gender, and case in (15a). The agreement in (19) provides a strong argument for considering diminutives in Fula inflectional, whereas they are derivational in, for instance, Russian and Italian. Cross-linguistic variation of this type can occur whenever we have a feature that can be construed as meaningful, but also as a purely grammatical feature. Another feature which displays such variation is number, which is inflectional in Indo-European languages, but not, for instance, in Chinese (cf. Wiedenhof 2004: 217).

Phenomena at the borderline between inflection and derivation are often invoked as an argument that inflection and derivation should be seen as endpoints of a continuum. If we want to preserve inflection and derivation as concepts about which theoretical claims can be made, we need to select criteria as part of a terminological definition. Such a definition will then determine whether they are inflection or derivation.

CHAPTER 3

DELINEATING DERIVATION AND COMPOUNDING

SUSAN OLSEN

3.1 INTRODUCTION

THE *Handbook of Derivational Morphology* aims to provide insight into the derivational means of vocabulary extension found in natural language. Apart from overt affixation (i.e. suffixation, prefixation, circumfixation, infixation, transfixation, etc.), these means include conversion, back-formation, analogy, truncation, blending, and reduplication. Derivational morphology together with compounding constitutes the field of word formation which studies the creation of new lexemes. Inflectional morphology examines the (declensional or conjugational) variation in form of existing lexemes and is the topic of Chapter 2 in this handbook. This chapter concentrates on the delineation of the two major categories of word-formation, derivation and compounding, in order to provide a clearer vision of the type of phenomena that fall under consideration as products of derivational morphology.

Compounding, simply spoken, is a combinatorial word-formation process that creates complex words by combining lexemes (roots or stems). Its products, that is, compounds, are comprised of two or more lexemes at the word level such as *cheek bone*. Compounding is most often contrasted with overt affixation which derives a word from a lexeme by adding an affix, that is, a bound morpheme that combines with a specific category of base to form a pattern. An example of suffix derivation with a simple lexeme as a base is *wire+less*. A crucial feature of these combinatorial word-formation processes is that they are recursive and, as such, result in a hierarchical structure with binary groupings at each level of combination as the structures in (1) show:

- (1) a. [[[stress_N] [ful_A]] ness_N]
b. [[[smart_A] phone_N]] company_N]

Furthermore, compounds and affixations are morphosyntactically speaking headed structures. The suffix *-ful* in (1a) creates an adjective from the noun *stress*; the complex adjective *stressful* can serve as a base for further affixation by the suffix *-ness* which renders *stressfulness* a noun. Hence, each of these suffixes determines the word category of its derivative. Compounds are also headed in this structural sense. In the English example (1b), the head is the right-most constituent at each level of combination, but the head position can vary from language to language. The most productive compound patterns containing two native noun stems in the Romance languages, for example, have their heads on the left (cf. Rainer and Varela 1992, Scalise 1992, Fradin 2009, Kornfeld 2009). Consequently, affixation and compounding share most of their formal properties: they are binary branching, recursive, headed structures. Especially in languages that have right-headed compounds, like the Germanic languages, the primary difference between affixation and compounding lies in the status of the constituent parts: if at the relevant level of analysis both constituents are lexemes belonging to the open word classes of the language, the result is a compound, if one constituent is a formative, that is, a bound morpheme belonging to a finite class of elements in the language, the structure is an affixation.

Semantically the two types of construction tend to differ. An affix adds a general meaning component to its base. The suffix *-er*, for instance, denotes the agent of some activity, *-less* signals absence of some entity, *-ish* similarity with some property, the prefix *un-* negation of some feature, etc., so the affixations *dancer* ‘one who dances,’ *worthless* ‘without worth,’ *reddish* ‘slightly red’ and *untidy* ‘not tidy’ carry clear and explicit meanings. In a major class of compounds, often termed root or primary compounds, on the other hand, the connection between the denotation of the constituents is not overtly expressed: *Monsoon wedding*, *cadaver dog*, *sandwich war*, and *lawyer joke* are open in meaning until the intended relation is discovered. (Section 3.5 discusses a second large class of compounds, the verbal or synthetic compounds, whose interpretation is more specific in that it is based on the argument structure of the head.)

The notions free vs. bound form as well as that of a general meaning component can be quite elusive, however. Hence, obstacles arise in the demarcation of derivation from compounding when the decision as to whether a particular morpheme constitutes an independent lexeme, or whether it carries a generalized meaning, becomes hazy. This central problem is taken up in Section 3.2. Then Section 3.3 continues this discussion by dealing with the problem of bound roots, unique morphemes, neoclassical combining forms, and verbal prefixes and particles. Section 3.4 examines the interesting phenomenon of bound roots and lexical affixes in the incorporating languages. The structural ambiguity of the class of synthetic (or verbal) compounds is the topic of Section 3.5, and, finally, important ambiguities that arise between the products of compounding and other types of derivational processes such as conversion, back-formation, analogy, and different types of truncation that operate on complex bases as well as reduplication that creates a complex base constitute the topic of Section 3.6. Following these discussions a summary is given.

3.2 LEXEME OR AFFIX?

3.2.1 Transition from Lexeme to Suffix

A major problem in distinguishing derivation from compounding stems from the fact that—as the result of natural events occurring in the historical development of a language—an affix may emerge from an independent lexeme. To be more precise, Dalton-Puffer and Plag (2000) show that the development of the nominal suffix *-ful* in the Modern English pattern *cupful*, *handful*, *spoonful*, *mouthful*, etc., began in the 19th century on the basis of a phrasal structure in which a noun denoting a container functioned as the head of a complex noun phrase modified by an adjective phrase containing as its head the relational element *full*. Over the course of time, collocations such as *2 cups full of rice*, *3 barrels full of wine*, and the like underwent a series of interrelated developments: the plural marker on the nominal container began to shift to the end of the collocation, the spelling of the adjective *full* was reduced to *ful*, and the whole phrase came to be written as a complex word (i.e. *cupfuls*, *barrelfuls*). As a final result, the original adjective *full* had given way in this particular environment to a bound element *-ful* with nominal features. These changes from an independent adjective to a noun-creating formative are so radical that they leave little doubt that a new suffix pattern had emerged.

It is characteristic of the transition from an independent lexeme to a suffix for the lexeme to pass through a stage in which it is entrenched in a collocation and fixed in a specific order. A case in point is the Romance suffix—*ment(e)* that derives adverbs from adjectives (the ensuing discussion is based on Detges forthcoming) as in French: *lentement* ‘slowly’ < *lent*, *-e* ‘slow’; Italian: *chiaramente* ‘clearly’ < *chiaro*, *-a* ‘clear’; and Spanish: *generosamente* ‘generously’ < *generoso*, *-a* ‘generous.’ Historically, *-ment(e)* goes back to the ablative form of the feminine Latin noun *mens*, *mentis* ‘mental disposition, mind.’ As an independent noun in Classical Latin, it could be modified by an adjective phrase as in *mente valde placida* ‘with a very calm mind’ and alternate with other semantically similar head nouns in the same phrasal position such as *pectore* ‘breast,’ *corde* ‘heart,’ and *animo* ‘mind,’ for example, *laetanti pectore* ‘joyfully,’ *ardenti corde* ‘ardently,’ *studioso animo* ‘eagerly.’ With increased frequency, the *mente* construction became fixed in the order adjective + *mente* without intervening elements and, according to Detges, could at this stage (i.e. in the Classical Latin period before 200 AD) be considered a compound comprised of an adjective together with the noun *mente* because *mente* had not yet lost its nominal features. The transition from the head of a nominal compound to an adverbial suffix can be shown to have taken place when the construction shifted from its attitudinal meaning to a non-attitudinal one that could no longer be related to the “intention, disposition” meaning of the earlier nominal head of the compound. This stage is documented in the Reichenau Glosses from the 8th century where, for example, the word *solamente* is discussed as being in use in the spoken language in the same

meaning and function as the Classical Latin adverb *singulariter* ‘individually, one by one.’

The development from a compound constituent to a suffix is documented in the Germanic languages as well, cf., for example, for the German forms *-heit*, *-lich*, *-schaft*, *-sam*, *-tum* as well as for their English cognates. Henzen (1965: 110) observes that words whose meaning predisposes them to serve as elements of compounds may lose their independence in proportion to the productivity of the compound pattern of which they are a part. Erben (1983: 125–6) considers the grammaticalization from an independent word to a suffix to be complete when the original form no longer occurs independently, or at least when it can no longer be associated with the new form phonetically or semantically. For example, the Modern German suffix *-heit* stems from the Old High German noun *heid/heit* meaning ‘kind, appearance, status.’ In the 8th century compounds ending in *-heit*, such as *mana-heit*, *narra-heit*, are recorded and, around the year 870, twelve compounds ending in *-heit* are documented in Otfrid’s *Evangelienbuch*. Most of these compounds are formed with adjectival first constituents, for example *bōs-heit*, *kuon-heit*, *tumb-heit*, and serve as precursors for the New High German suffix pattern denoting abstract deadjectival nouns as in *Bos-heit* ‘meanness, malice,’ *Kühn-heit* ‘boldness,’ and *Dumm-heit* ‘dumbness, stupidity.’ Erben (1983: 127) gives an Old High German example in which the free form *heit* and a combined form *zága+heit* occur together in a single sentence. The gloss indicates the degree of meaning separation that distinguishes the two uses at this stage of the language [my emphasis, S.O.]:

- (2) *uuas nihein héit thúruh sina zágaheit*
 was no *personage* through his *timidness*
 ‘[he] was not a great personality due to his timidness’

By Middle High German times the independent noun *heit* was disappearing from the language as the growing number of combinations in *-heit* began to outnumber and overtake the older suffix pattern of abstract nouns ending in *-ī* (surviving into the modern language in forms such as *Dicht-e* ‘thickness,’ *Fläch-e* ‘flatness,’ *Näh-e* ‘closeness’). In Modern German, the suffix *-heit* has become the most productive formative in the creation of deadjectival abstract nouns and the noun *heit* no longer exists in the standard language. Erben attributes the success of the *-heit* pattern in suppressing the *-ī* pattern to the clearer structure of the *-heit* words at a time when the *-ī* suffix was undergoing a phonetic weakening that applied to all vowels in the final syllable of a word. In a like manner, the suffix *-lich* has its roots in compounds with Old High German *lih* ‘body’ as a second constituent, the suffix *-schaft* developed out of compounds with Old High German *scaf* ‘state, condition,’ *-sam* from compounds with Old High German *-sam* ‘same,’ and *-tum* from compounds with Old High German *tuom* ‘judgment’ (see Erben 1983: 126–8).

A similar genesis can be traced within the history of the English language in the case of the suffixes *-hood* and *-dom*. Modern English *-hood* arose from the Old English noun *hād* ‘state, rank, condition’ so that formations like *childhood*, *statehood*, *fatherhood*, etc., were originally compounds. And Modern English *-dom* developed out of Old English

dōm ‘judgment, law, state,’ cf. *freedom*, *wisdom*, which also took on the additional meaning of ‘territory’ in Middle English in words such as *kingdom*. Trips (2009) provides a detailed discussion of the history of these suffixes and Marchand (1969: ch. 4) sketches the earlier development of *-ly*, *-ship*, and *-some* into suffixes as well.

3.2.2 The Term Semi-suffix

Synchronically it is possible to observe patterns of formations that appear to be caught up in the transition from compounds to suffixations sketched in the previous section. For example, Marchand characterizes the elements *-monger*, *-wright*, and *-wise* (as in *warmonger*, *playwright*, and *crosswise*) as being “[h]alfway between second-words and suffixes.” These forms are no longer in use as independent words in Modern English; nevertheless, Marchand (1969: 210) argues that they are still “felt to be words” and therefore considers them semi-suffixes. Other examples seen by Marchand as belonging to the category semi-suffix are *-like* and *-worthy*. Although *manlike* appears upon first glance to be a compound made up of a noun and adjective, negated forms such as *ungentlemanlike*, *unbusinesslike*, *unsportsmanlike* show that *-like* formations have become reanalyzed as denominal suffixations that allow prefixation by means of the negative prefix *un-* which attaches to adjectives and adjectival derivations (but not to compounds). The same logic applies to *-worthy* formations, cf. *unpraiseworthy*, *untrustworthy*.

Fleischer and Barz (1995: 27) discuss the advantages of postulating an intermediate category for similar cases in German where a word appears both independently and in a series of formations. The primary motivation for a category semi-suffix (German *Halbsuffix*, *Suffixoid*) according to these authors is to be found in the weakening or generalization of meaning displayed by the proposed semi-suffixes vis-à-vis their independent counterparts, as well as in their characteristic distribution in a series of formations. Such criteria indicate that the combined form has distanced itself from its free variant and is possibly on its way to developing into a suffix. The authors are, however, in actual fact hesitant to accept such an intermediate category even though they acknowledge that phenomenon itself exists and in the 4th revised edition of their handbook—Fleischer and Barz (2012)—reject it altogether.

The German noun *Gut* ‘goods’ provides an example. Due to its relatively general meaning, it occurs in many combinations as a second constituent. In a number of these it yields a collective meaning “material needed for V” where a verbal first constituent provides information about the specific process involved: *Back-*, *Mahl-*, *Pflanz-*, *Streu-*, *Walz**gut* ‘material for baking, grinding, planting, spreading, crushing.’ With nominal first constituents that denote an abstract cognitive concept, a collective reading results that can be rendered as “N assets”: *Bildungs-*, *Gedanken-*, *Lied-*, *Kulturgut* ‘educational, thought, song, culture assets.’ As a result of the minor semantic distance between the *-gut* of the combined forms and the independent word *Gut*, Fleischer and Barz (1995: 143) consider these combinations compounds. Similarly, the relatively general German noun *Zeug* ‘stuff’ recurs as the second constituent in

combinations denoting “a group of utensils connected with a verbal activity”: *Ess-*, *Näh-*, *Rasier-*, *Schlag-*, *Strick-*, ‘eating, sewing, shaving, drumming, knitting utensils.’ Again, Fleischer and Barz (1995: 144) consider these constructions to be compounds. So here we find concord between Marchand (1969: 210) and Fleischer and Barz (1995) when the former argues that the fact that a word occurs frequently as a second element in combinations does not mean that it must have suffix status. As examples, Marchand cites English *proof* as in *bombproof*, *fireproof*, *rainproof*, *soundproof*, *waterproof*, and *-craft* as in *mothercraft*, *priestcraft*, and *witchcraft*.

Nevertheless, Fleischer and Barz (1995: 177–8) go on to classify combined forms ending in *-werk* and *-wesen* as suffixes. *Werk* as an independent noun means ‘work, production, opus.’ In combinations it may denote a work of nature as in *Ast-*, *Laub-*, *Buschwerk* ‘branches, foliage, shrubbery,’ artifacts made with a certain material, cf. *Leder-*, *Pelz-*, *Zuckerwerk* ‘leather, fur, sugar work,’ or collectives such as *Dach-*, *Balken-*, *Gitter-*, *Mauerwerk* ‘roofing, timberwork, grating, masonry.’ The noun *Wesen* has the meaning ‘essence, character, being.’ As the second element in a combination it takes on a more general meaning denoting the total collection of all offices and processes belonging to an institution: *Kredit-*, *Rechts-*, *Schul-*, *Gesundheits-*, *Finanz-*, *Strassen-*, *Versicherungswesen* ‘system of credit, law, school, healthcare, finance, traffic, insurance.’ Apparently Fleischer and Barz find the difference between “system of N” in the combinations and “essence, character” in the independent noun significant enough to merit the classification of *-wesen* as a suffix and similarly for *-werk* vs. *Werk*, although it is not clear why. *Laubwerk* and *Lederwerk* do not seem to be any less compound-like than *Nähzeug* and *Strickzeug*. Erben (1983: 81), on the other hand, considers all these formations, that is combinations in *-gut*, *-zeug*, *-werk*, and *-wesen*, semi-suffixes.

The conclusion, then, must be that the postulation of an intermediate category between a lexeme and an affix does not guarantee any real clarity in dealing with the question of the delineation of an affix from a lexeme, and thus serves no function. But upon closer examination, other problems accrue with the use of the term. Certain lexemes lend themselves easily to combinations in which they are specified via a co-constituent. The word *free* is a relational adjective and as such is easily combinable with its thematic object, both in phrasal constructions (*free of pain*, etc.) as well as at the word level, cf. *crisis-free*, *error-free*, *fat-free*, *pain-free*, *sugar-free*, *stress-free*, *tax-free*, *traffic-free*. These examples demonstrate that compounds group naturally around certain core lexemes into constituent families. The meaning of the core constituent in a constituent family may deviate from the central meaning of the independent lexeme. For instance, the compound *US-friendly* is understood literally as ‘friendly to/with the US,’ whereas *-friendly* in the combinations in (3) has shifted in meaning to signal ‘helpful, accommodating,’ a semantic extension associated with the central meaning of *friendly*, although not identical to it:

- (3) *user-friendly*, *reader-friendly*, *listener-friendly*, *environment-friendly*, *planet-friendly*, *industry-friendly*, *consumer-friendly*, *child-friendly*

Classifying *-friendly* as a semi-suffix on the basis of this meaning extension would characterize it as suffix-like in its properties and, in so doing, obscure an essential aspect of the nature of compounding.

3.2.3 “Morphological Transcendence”

Shifted meaning in combination with another lexeme is not specific to semi-suffixes, but is a more general phenomenon and is especially true of compounds. A novel compound must have a compositional meaning in order to be understood, but once a compound is accepted by a speech community it may take on idiosyncratic properties that result in the loss of its original transparency. The current consensus in psycholinguistics is that access to complex words in the mental lexicon proceeds via two different modes simultaneously—the parser automatically attempts to decompose the complex into its constituents while at the same time implementing a search for a whole-word entry, cf. the dual route models of Caramazza et al. (1985) and Frauenfelder and Schreuder (1992). In a series of psycholinguistic experiments, Libben (1994) provides additional evidence that the parser does indeed access all possible morphological analyses, a view also shared by, *inter alia*, Kuperman et al. (2010) and Ji et al. (2011). Using ambiguous novel compounds as stimuli, Libben forced his participants to decompose them by asking them to pronounce the words. *Busheater* and *seathorn* were read as *bush+eater* and *sea+thorn* rather than as *bus+heater* and *seat+horn*, a choice obviously influenced by the English digraphs <sh> and <th>. In a follow-up experiment, however, the reaction times required for a lexical decision on orthographically constrained ambiguous novel compounds such as these were the same as for orthographically unconstrained ambiguous novel compounds, for example *feedraft* (*fee+draft*, *feed+raft*). Both types of ambiguous novel compounds—orthographically constrained and unconstrained—required higher reaction times than unambiguous novel compounds such as *larkeater*. These results indicate that the orthographic constraints operate post-lexically, that is after all possible parses are generated. Furthermore, in the first test, no significant difference between the two possible parses for orthographically unconstrained ambiguous novel compounds was found, that is between *fee+draft* and *feed+raft*. The results did show, however, that there were stable preferences for one of the choices in each individual case that seemed to be based on semantic plausibility (for *cartrifle*, *cart+rifle* was spoken more often than *car+trifle*, but *car+driver* was chosen over *card+river* for *cardriver*). In order for a decision to involve semantic considerations, all parses must first be made available: as with the orthographic factor, a choice based on semantic plausibility must operate post-lexically. Libben et al. (1999) confirmed this finding in two further experiments by showing that ambiguous novel compounds prime associates of both possible parses. The stimulus *clamprod*, for example, primes both *sea* for *clam* and *hold* for *clamp*.

The activation of all possible parses is termed by Libben “maximization of opportunity.” The disadvantage incurred by the activation of all possible morphological analyses is that some of the activated information will be redundant. This disadvantage

is counterbalanced, however, by the need for the quick and efficient retrieval of meaning. The availability of all possible morphological analyses guarantees that no time-consuming reanalysis is required in case of an incorrect parse. Nevertheless, accessing a non-transparent compound under such conditions will result in a conflict between the whole word meaning and the meaning of the constituents. Tests show that exposure to a constituent prior to the presentation of a transparent compound facilitates access to the compound. Opaque compounds, on the other hand, cannot be primed in this way by their constituents, cf. Libben et al. (2003). This is known as the semantic transparency effect. Hence, the activation of, for example, *butter* and *fly* in addition to *butterfly* generates a conflict during parsing in need of resolution. At first it was believed that irrelevant information such as the meanings of non-transparent constituents could simply be suppressed. Due to findings in Libben (2010), the inhibition hypothesis has given way to the view that the mental lexicon is actually organized in a different manner. Rather than the deactivation of superfluous information, such conflicts cause the non-transparent constituents of opaque compounds to undergo a process of separation from their corresponding free form. This separation of meaning, termed by Libben “morphological transparency,” involves a semantic weakening or an increasing degree of abstraction such that the bound constituent transcends the meaning of its independent form. Hence, the process of lexical access induces compound constituents to establish their own positionally bound entries in the mental lexicon independent of the original free form whenever a conflict is perceived. The more often such a constituent is used as part of a compound, the stronger its representation will become and the less activation (and hence competition) will result from the free form. Evidence that this is the correct explanation for the semantic transparency effect is provided by lexical decision tests with words and non-word stimuli carried out by Nault and Libben (2004). Some of the non-words were lexemes that serve as the initial constituents of compounds. These resulted in greater rejection times as well as in a greater number of false positives than the non-constituent non-word stimuli did.

3.2.4 Essence of an Affix

The findings of the previous discussion lead us to assume that the mental lexicon contains, for example, in addition to an entry for the adjective *friendly*, an entry for the positionally bound constituent *-friendly* ‘helpful, accommodating’ found in the compounds in (3) which serves the purpose of alleviating direct competition with its free counterpart during access. A more complete understanding of the content and processes of the mental lexicon, therefore, sheds light on the natural process of meaning separation found in the case of compound constituents and calls into question the relevance of an intermediate category semi-suffix.

It is natural for speakers to construe compound constituents as bound variants of the corresponding free forms and to set up entries for them in their lexicon. The intuition that speakers have that allows them to differentiate between the constituent of a

compound and an affix arises on the basis of their implicit knowledge of the content of their mental lexicon. Marchand's hesitation to assume affix status for *-craft* in *witchcraft*, *priestcraft*, etc. (see Section 3.2.2) obviously has to do with the presence of the entry *craft* (as well as the related *handcraft*, *craftsman*, *crafty*, etc.) in the vocabulary. And *-monger* and *-proof* must still possess some degree of autonomy as a positionally bound noun and adjective, respectively, in the modern vocabulary to enable them to enter into new compounds such as *anger-mongers* or *rumor mongering* (*TIME* Feb. 18/Jan. 14, 2013) or appear as deadjectival converted verbs *climate-proofed* or *sound-proofed* (*The New Yorker* Jan. 7/March 4, 2013), cf. Section 3.5.1 where it is shown that suffixations as a rule do not undergo conversion. Thus, a deeper understanding of the nature of the compounding process speaks for a more perspicuous use of morphological categories. If the separation of meaning between a compound constituent and its corresponding free form is a natural phenomenon, the establishment of positionally bound compound constituents, and with them their constituent families, is not an indication of the beginning of a grammaticalization process leading to the emergence of an affix. This happens only under specific conditions. Consequently, the term affix should be reserved for reference to a pure formative, that is, a bound morpheme for which there is no competition with free lexeme in the mental lexicon, and the term semi-suffix is best avoided.

3.3 BOUND LEXEMES

3.3.1 Bound Roots, Unique Morphemes and Neoclassical Combining Forms

In spite of the courageous definition of the term affix just provided, one might wonder whether more needs to be said in order to distinguish an affix from a bound root. Bound roots are basic morphemes that have all the properties of lexemes except that they do not occur freely as, for example, *spec-* in *special*, *specific*, *specify*, *speciality*, and *ident-* in *identity*, *identical*, *identify* (Schmid 2011: 40). These words have been borrowed into English in their complex forms from Latin and French where they originated as derivations. But it is neither necessary to appeal to this knowledge (which many speakers lack anyway) nor to the higher degree of lexical-semantic content characteristic of bound roots vs. the more abstract semantics of affixes to differentiate the two. Apart from their distinct phonological differences from affixes, bound roots cannot be affixes because they co-occur with affixes and by definition affix + affix combinations are not possible.

Unique bound forms are roots that only occur once in the vocabulary such as the underlined portion of English *unkempt* or of German *Unflat* 'filth.' Unique bound forms are not restricted to occurring only as bases in combinations with affixes, as are the bound roots discussed in the previous paragraph, but are also found in combinations with stems, cf. English *raspberry*, *lukewarm*, and *nightmare* and German *Schornstein* 'chimney' and *Bräutigam* 'bride groom.' Hence, the argument against affix +

affix combinations just given cannot exclude them from being affixes. However, unique forms are one-time occurrences and thus differ markedly from affixes, which recur in a series of combinations. Furthermore, knowledge of the content of the mental lexicon will include the awareness of a closed class of affixal formatives with their characteristic phonological properties. The second element in *doughnut*, for example, would not be perceived as a suffix, whereas the ending of *laughter* might. Although not productive, (the remnants of) a pattern could be surmised for *-ter* on the basis of its similarity with *slaughter* since both words consist of a verbal stem and have an event/result meaning related to that stem. In addition, the monosyllabic form of *-ter* which, in contrast to *-nut*, contains a reduced vowel is not a possible stem.

A different sort of bound root is found in the neoclassical compounds that are prevalent in most of the modern languages of Europe. Neoclassical compounds are combinations of Greek and Latin lexemes that are formed according to the compounding rules of the modern languages, cf. English *neurology*, *democracy*, *stethoscope*, *suicide*, *anglophile* (Bauer 1998), French *aérodrome*, *hiéroglyphe*, *géographe*, *anthropomorphe*, *hétérodoxe*, *pathogène* (Zwanenburg 1992), Polish *fotografia*, *makroekonomia*, *neofita* 'neophyte', *poligamia*, *kse-nofobia* 'xenophobia', *neurologia* (Szymanek 2009) and Basque *telefono*, *mikrobiologia*, *filologia*, *elektromagnetismo* (Artiagoitia et al. forthcoming). The combining forms used to create neoclassical compounds do not occur as independent words in the modern languages and are, furthermore, are often restricted to either the initial or final position of a combination; for example, *astro-*, *bio-*, *electro-*, *geo-*, *gastro-*, *tele-* occur initially while *-cide*, *-cracy*, *-graphy*, *-phobe*, *-scope* occur finally (cf. Plag 2003: 155ff.). Hence, as Bauer (2005a) states, neoclassical compounds do not fit the definition of compounds and this is precisely the motivation for establishing a special category to accommodate them. In their formal aspects they even seem to have much in common with prefixes and suffixes. However, prefixes and suffixes do not combine with one another as the neoclassical combining forms characteristically do. So the need does not arise to appeal to the fact that they were lexemes in their source language to exclude them as affixes in the modern languages.

The establishment of a special category of bound forms is also the best course of action for a problem to which Aronoff (1976) drew attention, namely the case of the Latinate verbs in English whose structural components are not morphemic in the strict sense as in *permit*, *remit*, *submit*, *transmit* or *conceive*, *deceive*, *conceive*, *receive*. The bound units in these structures differ from the neoclassical forms in that they are without an identifiable component of meaning and, hence, do not function as combining forms. Nevertheless such words are analyzable as containing two structural units as the regular allomorphic variation of their stem demonstrates, cf. *permission*, *submission*, *transmission* and *conception*, *deception*, *reception*, etc.

The neoclassical combining forms, on the other hand, are productive elements that are not necessarily restricted to only combining with one another—many of them also combine with native roots in the respective language as, for example, English *speed+ometer*, *mob+ocracy*, *Kremlin+ology*, *weed+icide*, *chimp+onaut* (Adams 1973, 2001, Bauer 1998) and Polish *fotokomórka* 'photocell', *kryptopodatek* 'crypto-tax', *pseudokibic* 'pseudo-fan', and *helmofoon* 'headset' (Szymanek 2009). In these combinations, they can give rise to

new constituent families. Formations like the German *Kartothek*, *Filmothek*, *Spielothek* ‘collection of maps, films, games’ in addition to *Bibliothek* ‘archive of books’ demonstrate this. A particularly interesting example of relevance for the discernment of derivation from compounding concerns the final combining form *-itis* which signals ‘disease, inflammation’ in combination with an initial combining form, cf. *appendicitis* ‘inflammation of the appendix,’ etc., in (4a). However, when *-itis* appears with a native English lexeme, its meaning shifts to ‘addiction, abnormal excess of,’ cf. (4b).

- (4) a. appendicitis, arthritis, encephalitis, gastritis, laryngitis, meningitis,
tonsillitis
b. computer+itis, cellphone+itis, facebook+itis, junk-food+itis,
telephone+itis

So *-itis*₂ of (4b) has established itself as a second bound form in an extended, but related, sense to the combining form *-itis*₁ in (4a). In addition, *-itis*₂ displays a phonological form that is quite similar to other suffixes in English; it begins with a vowel (as do, e.g., *-ion*, *-ic*, *-ify*, *-ize*) and is bisyllabic with a strong–weak stress pattern that conditions a base ending in a weak stress and, thus, consists of at least two syllables. These are properties that are typical of suffixes, in particular the type of suffixes that have been termed “non-stress neutral” or were thought to belong to class 1 in Level Ordering theories such as Allen (1978), Siegel (1979), and Kiparsky (1982b), and hence make *-itis*₂ (lacking a free counterpart in the English lexicon) quite suffix-like. Factors ruling against this characterization are the existence of the related neoclassical pattern and the relatively restricted number of formations compared to more typical cases of affixation.

3.3.2 Prefix vs. Preposition and Adverb

Traditional grammars have a history of treating prefixation, not together with suffixation as a type of derivation as modern linguistic theory does, but as a type of compounding. For the Germanic languages, this was the case *inter alia* in Herman Paul’s (1955) *Deutsche Grammatik* as well as in the first edition of Walter Henzen’s (1947) *Deutsche Wortbildung*. Bauer (2005a) reports that this tradition was prevalent in Romance linguistics as well. The reason for this was the historical awareness that many prefixes originated in prepositions and adverbs that occurred as first constituents of compounds, accounting for their function as modifiers of the head element rather than as formatives for new words like suffixes. The transition from free prepositions/adverbs to first forms of compounds and finally to bound formatives follows a path similar to that sketched in Section 3.2 for suffixes. Prefixation is exceptionally productive in the formation of verbs. The verbal prefixes in Modern German *be-*, *ent-*, *er-*, and *ver-* derive from earlier prepositions but no longer have free counterparts. They are unstressed and inseparable from their stems, cf. *sie besprechen das Band* ‘they are recording the tape.’ Prepositions, in their intransitive use as adverbs, often appear together with a verb stem as particle

(also termed phrasal, multi-word or compound verbs). The prepositions heading the PP complements in (5a and b), for example, take an NP object. In (5a' and b') the same forms occur intransitively as particles forming the complex verbs *aufsprühen* and *aus-schütten* where the particles *auf* and *aus* are stressed and occur separately from the verb stem in all clauses that require the finite verb to occur in the second (functional) position of the clause. The same phenomenon, including the separation of the particle from its verb stem, occurs in English as can be seen in the glosses in (5), and indeed this phenomenon is found throughout all the Germanic languages.

- | | | | |
|-----|-----|---|---|
| (5) | a. | Sie sprüht die Farbe <u>auf</u> die Wand | 'She sprayed the paint <u>on</u> the wall' |
| | a'. | Sie sprüht die Farbe <u>auf</u> | 'She sprayed the paint <u>on</u> ' |
| | b. | Er schüttete das Wasser <u>aus</u> dem Glas | 'He poured the water <u>out</u> of the glass' |
| | b'. | Er schüttete das Wasser <u>aus</u> | 'He poured water <u>out</u> ' |

Interestingly, there is a small class of prepositions in Modern German that allow both intransitive particles and also have prefix variants. The contrast between the two constructions clearly demonstrates the difference between a verbal particle and a verbal prefix. The prepositions *durch* 'through,' *über* 'over,' *um* 'around,' and *unter* 'under' belong here; they occur as separable verbal particles as the examples in (6a' and b') show and as prefixes as in (6a'' and b''):

- | | | | |
|-----|------|--|--|
| (6) | a. | Die Mücken fliegen um die Kérze | 'The gnats are flying around the candle' |
| | a. | Die Mücken fliegen <u>um</u> | 'The gnats are flying around' |
| | a''. | Die Mücken <u>um</u> fliegen die Kerze | 'The gnats are flying around the candle' |
| | b. | Die Bande streift durch die Stádt | 'The gang is roaming through the city' |
| | b'. | Die Bande streift <u>durch</u> | 'The gang is roaming through' |
| | b''. | Die Bande <u>durch</u> streift die Stadt | 'The gang is roaming through the city' |

The difference between a particle and a prefix is found in the separability and stress on the particle vs. the inseparability and lack of stress on the prefix. Moreover, the particle defocuses the prepositional object by suppressing it formally; hence, its existence is implicit and presupposed. The prefix verb, on the other hand, inherits the original object of the preposition that is incorporated into the verb stem and expresses it as its own direct object, cf. Olsen (1996).

3.4 BOUND ROOTS AND LEXICAL AFFIXES IN THE INCORPORATING LANGUAGES

Bound roots discussed in Section 3.3.1, which appear to be a relatively marginal phenomenon in the European languages, constitute a more regular phenomenon in other

languages such as the noun incorporating languages. An example of noun incorporation is the complex verb in (7a), taken from the Iroquoian language Tuscarora, which contains the verb root *-ù:rəl-* ‘split’ and an incorporated the noun root *-rəlʔn-* ‘log.’ Roots in the Iroquoian languages are bound; they must combine with affixes to occur freely. The verb root in (7a) occurs with three prefixes, the first two are inflectional and the third is pronominal, expressing first person singular and satisfying the external argument of the verb, cf. Mithun (2000: 916).

- (7) a. /waʔ-t-k-rəʔn-ù:rəʔ-ʔ/
 AOR-DU-1.SG-log-split-PFV
 ‘I split a / the logs’
- b. /u-rəʔ:ʔn-e waʔ-t-k-ù:rəʔ-ʔ/
 N-log-NOM.SUFF AOR-DU-1.SG-split-PFV
 ‘I split a / the logs’

The incorporated construction typically has a counterpart in which the noun is found external to the verb. This is shown in (7b) where the verb root appears with its prefixes but without the nominal root. Instead, the nominal root, now marked with a neuter prefix and a nominal suffix, heads an independent noun phrase. While the independent noun constitutes its own phrase in the analytic construction occurring with functional elements that determine its reference, definiteness, quantity, etc., the incorporated noun root is devoid of such syntactically relevant markers and is understood generically, that is, as a modifier that restricts the type of activity denoted by the verb. The verbal meaning is narrowed from “splitting” in (7b) to “log-splitting” in (7a). This formal difference between the analytic and synthetic constructions spawns different functional uses. Pragmatically, the independent noun is used to introduce new discourse entities, to express focus or contrast and to signal salience; the incorporated noun root is chosen when the entity in its denotation is already present in the discourse or otherwise backgrounded. Incorporation often affects the verb grammatically as well, resulting in verbal diatheses such as intransitivization, passivization, and causativization (Mithun 2000). If compounding is defined as the combination of two lexemes (roots or stems), the complex verbs resulting from noun incorporation obviously qualify as compounds with bound lexical constituents.

The interest of such formations to the topic at hand, that is, the delineation of derivation from compounding, lies in their close relationship to a construction similar to noun incorporation but differing from it in that one of the constituents is formally an affix rather than a bound root. Nevertheless, the root+affix combinations in question share the grammatical, discourse, and semantic properties that are typical of regular noun incorporation: they result in verbal diathesis, carry distinct discourse functions, and derive subordinate level concepts prone to lexicalization. At the same time, the verbalizing (or nominalizing) affixes in question have meanings more typical of roots than of derivational affixes. Hence, these formatives have been termed “lexical affixes,” cf. Mithun (1999, 2000).

Mithun (1999) reports that numerous examples of lexical suffixes can be found in Spokane, a Salish language spoken in Washington State. The suffix *-cin* ‘mouth, food’ occurs in the complex noun *n-č’ m-cín* ‘the mouth of a river, lit. LOCATIVE-river-mouth’. Yup’ik, an Eskimoan language spoken in Central Alaska, has an even larger number of lexical suffixes as, for example, the verbal *-cur-* ‘hunt’ in *nayircurtuq* ‘he is seal-hunting; lit. seal-hunt-INDIC.INTR-3SG.’ There are strong arguments, that in spite of their root-like lexical meanings, these units are indeed suffixes (cf. Mithun 1999: 48–56 and 2000: 922–3): In Spokane nominal roots can occur alone and in Yup’ik verb roots can appear with just an inflectional suffix, but in neither language is this possible for the lexical suffixes. In Yup’ik words, an initial root is followed by a series of suffixes but the lexical suffixes cannot assume the initial position; they must follow a root. Generally, the lexical suffixes are not cognate with any of the roots in the languages that have them, but they do have unrelated counterparts that occur as an independent root or stem under the discourse conditions that require the analytic rather than the incorporated version of the sentence. Although the semantics of the lexical suffixes is root-like, they tend to have a broad range of meanings that are typically more diverse than the meaning of equivalent roots. Derivations resulting from lexical affixes are often lexicalized and speakers are aware of which combinations exist and are in use in the speech community. Finally, the lexical suffixes serve as formatives in the creation of new lexemes: they recur in patterns much like derivational suffixes as can be seen in the Yup’ik pattern formed on the basis of the suffix *-cur-* ‘hunt’: *nayircurtuq*, *kanaqlaggsurtuq*, *tuntussurtu*, *yaqulegcurtuq*, *neqsurtuq*, *kayangussurtuq*, etc. ‘(he is) seal-hunting, muskrat-hunting, caribou-hunting, bird-hunting, fish-hunting, egg-hunting, etc.’ and speakers create new formations on the basis of such patterns (Mithun 1999: 51, 55). Furthermore, the individual lexical suffixes differ in their productivity, some being more productive than others, which is also a feature typical of derivational patterns. Moreover, lexical prefixes have been found in two Salishan languages, Bella Coola and Nuxalk, as well as in Nisgha, a Tsimshianic language, also of British Columbia (Mithun 1998: 300–1). Finally, even though the inventory of the lexical affixes in the languages that have them is quite large, they represent closed classes.

What is the explanation for this interesting mix of root-like semantics and affixal form? Mithun (1998, 1999, 2000) argues that the root-like meanings of the lexical affixes stem from their diachronic origin as roots of incorporated structures. The lexical affixes are found in semantic constellations typical of incorporated structures including the classificatory pattern exemplified in (8) by Mohawk, an incorporating language of the Iroquoian family, where the verb has incorporated a general nominal root “liquid” that is further specified by the more specific independent noun “milk,” rendering a meaning like “I liquid-consumed milk.”

- (8) Mohawk
 onòn·ta’ ‘wa’khnekì·ra’
 milk I-liquid-consumed = ‘I drank milk’

Bella Coola has lexical suffixes that act similarly. In (9) the verb is comprised of the verbal root *-qis-* ‘scorch’ together with the nominal lexical suffix *-uc-* ‘mouth, food’ meaning ‘to cook; lit. scorch food.’ The independent object “strips of spring salmon skin” then specifies the type of food cooked (Mithun 1998: 306).

(9) Bella Coola

s-íq-k ^w	ta-s-qis-uc-im-tx
NOM-split-QUOT	PROX-NOM-scorch-food-PASSIVE-ARTICLE
‘What he cooked was strips of spring salmon skin’	

The Salishan languages are verb initial and many of them still have verb-noun incorporation structures in addition to lexical affixes. Interestingly, the lexical suffixes are nominal and the lexical prefixes are verbal (although the lexical affixes are not cognate with the roots), cf. Mithun (1998: 308). Although the present-day Eskimo-Aleut languages—as opposed to the Salishan languages—do not allow noun incorporation in its root+root form, Mithun (1998, 1999, 2000) assumes that it may have been an earlier option and, again, the source of the lexical affixes. If the lexical affixes have indeed developed via a grammaticalization process from the lexical roots of earlier noun incorporation structures, this would explain their relatively large number, since their source would have originated in the open classes of verb and noun roots. It also explains their root-like semantics as well as their slightly more generalized meaning. Mithun (2000: 926) sketches a plausible scenario for this transition from bound lexical root to lexical affix: Assuming that the productivity of noun incorporation in the source language begins to diminish, over time two types of language change could obscure the relation between the original constituent roots of the incorporation structures and their independent counterparts, inducing a gradual grammaticalization process that could result in lexical affixes: First, incorporation structures that had already become an established part of the vocabulary would continue on their own individual course of development as autonomous words, allowing more general and diverse semantic aspects to creep into the constituent parts while still maintaining the basic core of their original meaning. Second, individual roots in the vocabulary could fall out of use in time. In this case, their incorporated counterparts would be prone to reanalysis as formatives without independent counterparts. If this scenario is correct, the development of lexical affixes may well have proceeded in much the same way as sketched in Section 3.2 for the suffixes and prefixes of Romance and Germanic, that have also originated in independent lexemes of the open classes. Hence, it is worth asking whether the reason for the discrepancy in number of lexeme-to-affix cases in the non-incorporating vs. incorporating languages may lie in the nature of the lexeme that serves as their source. In the Romance and Germanic cases discussed above, the prerequisite for the grammaticalization of a lexeme as a derivational affix (suffix or prefix) was an intermediate stage as a compound constituent which—according to the discussion in Section 3.2.3—is encoded by speakers as an additional entry in the mental lexicon for a positionally bound variant of the free lexeme. Incorporating languages, in which the lexemes are bound roots from the

start, satisfy this precondition generally, allowing the reanalysis to draw from a larger pool of lexical sources.

3.5 SYNTHETIC COMPOUNDS

The term synthetic compound was apparently first coined by von Schroeder (1851–1920) for a class of complex words, exemplified by German *Machthaber* “power holder,” which appear to involve a synthesis of two formation processes: the first and second elements form a compound (cf. *macht+hab-*), while the second and third exemplify a derivation (i.e. *hab+er*). The peculiarity of this class of formations was that neither the first two elements alone nor the final two formed a word—a word only came about when all three elements occurred together. Wilmanns (1986: 2–3) referred to such constructions as *Zusammenbildungen* “together formations,” a term which has survived in its original sense in contemporary German linguistics and is employed in order to avoid the use of the term “compound,” cf. Neef (forthcoming). The issue from the start has been the uncertainty as to whether complex words like *power holder* should be analyzed as compounds (= (10a)) or derivations (= (10b)):

- (10) a. [[power]_N [hold_V+er]_N]_N
 b. [[power_N + hold_V]_V -er]_N

In English, the term synthetic compound is first found in Bloomfield (1933), where two types are distinguished, the denominal “synthetic” constructions such as *long-tailed* and the deverbal “semi-synthetic” constructions as in *meat eater* (ten Hacken 2010c: 233). Marchand (1969: 15–18) makes use of the term in a like fashion; the key words he uses as representative of the category are *watchmaker* and *hunchbacked*. Although Marchand explained the semantic properties of synthetic compounds by relating them to an underlying verbal nexus, he considered them to be genuine compounds that do not differ “at the level of morphologic structure” from regular primary compounds consisting of a N+N or a A+N as found in *steam boat* and *color blind*. Allen (1978), too, analyzed synthetic compounds as the adjunction of two lexemes with the same structure as primary compounds. It was most likely early insights like Marchand’s and Allen’s that opened the way for modern theories of word formation to extend the content of the term from its originally narrower sense to become equated with the class of compounds based on a verbal interpretation as a whole, that is, those whose interpretations arise on the basis of the argument structure of the deverbal head regardless of whether the head can occur alone (*programmer*—*computer programmer*) or not (??*keeper*—*house keeper*).

Some early approaches, however, were hesitant to assign synthetic compounds the same structure as primary compounds. Botha (1981), for example, argued extensively against this step for both Afrikaans and English. His analysis in which they were derived via affixation from underlying phrases ran into criticism because the A+N constituents

(cf. Dutch *blauwogig*, German *blauäugig*, and English *blue-eyed*) lack the inflection required in an NP, hence, therefore could not be syntactic phrases (cf. Booij 2002: 158, ten Hacken 2010c: 235). In accordance with her argument linking hypothesis, Lieber (1983) adopted the structure in (10b) for *truck driver* and assumed that *truck* was linked as an argument to the verb *drive* which headed the initial V constituent and formed the base of a derivation by means of the suffix *-er*. This solution incurred the objection that compound verbs of the form N+V (cf. **to truck-drive*) are not possible in English and hence do not constitute plausible bases for the very productive pattern of synthetic compounds, cf. Booij (1988: 67). In addition to this objection, Booij provided a counterargument against the structure (10b): the head of Dutch *aardappelgevrete* ‘excessive eating of potatoes’ is *gevrete*, a deverbal prefixation showing that *aardappel* does not constitute a constituent together with the verbal stem *vrete*, but rather the deverbal nominal head *gevrete* is first derived via prefixation at which point *aardappel* is adjoined via composition.

The majority of authors (Allen 1978, Selkirk 1982, Plag 2003, ten Hacken 2010c, among many others) have opted for the N+N adjunction shown in (10a) augmented by the concept of argument inheritance. The deverbal noun *holder* inherits a modified version of the argument structure of the transitive verb *hold* and assigns the inherited internal object to its first constituent (cf. Booij 1988, 2002, Lieber 2004, Jackendoff 2009). Although the internal arguments of nouns are in general optional, nouns derived from transitive verbs often sound odd when they occur alone, but their status improves when they appear with their internal object, cf. ??*installer* vs. *window installer*, *installer of windows*. When the object of the verbal activity can be inferred, the deverbal agent noun is often lexicalized, as in *settler* ‘homesteader’. The lexicalization process is independent of the productive word-formation pattern which draws on the lexical meaning of the constituents in a compositional manner just as the syntax does, cf. *score settler*, *Crowd pleaser*, *decision maker*, *page turner*, *blowout preventer*, etc., all fit this pattern. Hence, *pleaser*, *maker*, *turner*, *preventer* can be considered possible (relational) nouns that are most sensible when their meaning is completed by their objects. Although the most frequent affixes involved in synthetic compounding are *-er*, *-ing*, and *-en*, most linguists have followed Allen (1978), Botha (1981), Selkirk (1982), and others in assuming that the head constituent of a synthetic compound in this newer sense can arise by means of a wide variety of deverbal suffixes (cf. *globe-spanning*, *law enforcement*, *cost reduction*, *slum clearance*, *snow removal*, *teacher trainable*) as well as by conversion, cf. *tax cut*. In this context, Lieber (2010b) discusses a major difference in compounds with affixed and converted heads. The latter induce a verbal interpretation based on the subject argument much more freely than the former, cf. *fleabite*, *cloudburst*, *dogfight*, *footstep*, *heartbeat*, *sunrise*.

Interestingly, some linguists who consider the deverbal synthetic pattern *power holder*, *truck driver*, etc. to be compounds structured along the lines of (10a) still reject subsuming the denominal pattern *blue-eyed*, *open-minded*, *three-wheeler* under the same analysis. The stumbling block is the oddness of the derived head ??*eyed*, ??*minded*, etc. Plag (2003: 153) analyzes *blue-eyed* as a phrasal affixation in which the suffix *-ed* attaches to the noun phrase *blue eyes*, thus directly mirroring its semantics ‘having blue eyes.’ Adhering to the same goal of proposing an analysis that directly accounts for the semantics of the

construction, ten Hacken (2010c: 240) adopts a structure along the lines of (10b) for *blue-eyed* and *three-wheeler*. But since the first constituent lacks the obligatory inflection that is required in a phrase (*blue eyes*, *three-wheels*), he assigns the A+N constituent the status of a “morphological phrase,” stipulating that morphological phrases are created in the lexicon which enables them to take part in word-formation rules, but do not enter the syntax.

Misgivings about the well-formedness of the simple derived heads that form a constituent under the analysis in (10a) need not stand in the way of a uniform treatment of the verbal-based and nominal-based synthetic patterns. Whereas the incompleteness of ??holder vis-à-vis *power holder* is related to the underlying transitivity of the verbal argument structure, the incompleteness of ??eyed, ??legged, ??wheeler, etc., could well be a matter of pragmatics. The simple adjective *bearded* is an acceptable word because not every man wears a beard and so the property of having a beard is informative. Adjectives expressing properties that all objects of a category automatically possess are not informative unless they contain a further specification that increases their information content as seen in *blue-eyed*, *short-legged*, *three-wheeler*, cf. Booij (2002: 158) and Neef (forthcoming). Consequently, a uniform analysis treating both variants of the synthetic pattern as regular compounds is both empirically sound and theoretically explanatory. Synthetic compounds with a deverbal head differ from primary compounds in that the relation upon which their interpretation depends is not implicit, but inherent to the verb and inherited from the verbal base by the derived head. In the case of synthetic compounds with denominal heads, the suffix expresses a possessive relation explicitly. Here there is no difference to normal compounds. If a derivative is uninformative (cf. ??haired) a compound structure has the potential of providing it with more information (i.e. *long-haired*). Compounds as well are subject to the same pragmatic requirement on informativeness, cf. ??page book, ??horn cattle whose status improves with more information: *200-page book*, *long-horn cattle*. Other views at odds with this conclusion exist. One example is Booij’s (2009: 212–14) analysis of synthetic compounds in construction grammar that unifies two schemata $[NV]_V$ and $[V\ er]_N$ into a single complex schema $[[NV]_V\ er]_N$. This solution formalizes the construction in more or less the descriptive terms of traditional grammar as recounted above, but offers no explanation for the extreme productivity of synthetic compounds in spite of the limited productivity of the proposed internal NV-constituent.

3.6 DERIVATION BY CONVERSION, BACK-FORMATION, ANALOGY, BLENDING, AND REDUPLICATION

3.6.1 Conversion

Conversion is the process by which a lexeme belonging to one lexical category is taken over into another lexical category; consequently, the lexemes in a conversion relation

share a phonological form and are closely related in meaning. The major patterns are verb to noun (e.g. *to fight* > *a fight*) and noun/adjective to verb (cf. *a text* > *to text* and *obscure* > *to obscure*). Conversion from suffixed bases is not usual. Marchand (1969: 372) sees the reason for this in the function of suffixes as categorizers: suffixes determine the category of a derived word and subsequent conversion, that is, an unmarked change in category, would obscure this function, cf. *happiness* > **to happiness*. No such obstacle stands in the way of converting a compound, however, because the head of a compound is not an affix but a lexeme. The major stock of compounds in a language is found in the open class of nouns, and compound nouns can indeed be converted to verbs, cf. *to blackmail*, *blindfold*, *broadside*, *earmark*, *handcuff*, *honeymoon*, *shortlist*, *skyrocket*, *spotlight*, etc. A new verbal form such as *to instant-message* must be seen as a product of the derivational process of conversion in the same way that *to text* < *a text* is and, hence, a derivative of the compound noun *instant-message*. It is important to see that the verb *to instant-message* is not a genuine compound. As such it would have to have been created by the free combination of the two lexemes involved, the noun *instant* and the verb *to message*. It is rather the case that the compounding process creates the complex noun *instant-message* which can subsequently be converted as a whole to the verb *to instant-message* with the related meaning ‘to send an instant message.’ Compound adjectives are not as frequent, but they can serve as the source of new verbs, cf. *soundproof* > *to soundproof* and *climate-proof* > *to climateproof* (as discussed in Section 3.2.4).

Conversion may interact with compounding on different levels. The result in each case is a slight addition in meaning that clearly reveals the derivational history of the complex word. For example, from the nominal compound *whitewash* denoting ‘a liquid for whitening’ the denominal verb *to whitewash* ‘to whiten with whitewash, to gloss over or cover up’ can be derived via conversion. This complex verb can then give rise to the converted deverbal noun *a whitewash* meaning ‘an instance of whitewashing’ or ‘a cover-up.’ Hence, the noun *a whitewash* in this second sense is a derivation, while the original complex mass noun on which it is based, that is, *whitewash*, is a compound. The original nominal compound in fact consists of the two lexemes *white* and *wash*; the nominal *wash* meaning ‘a liquid for washing’ is a conversion from the verb *to wash*. The complex lexeme *a whitewash*, thus, has the derivational history shown in (11):

- | | | | |
|------|--------------------------------|-------------------|---|
| (11) | <i>to wash</i> > <i>a wash</i> | V conversion to N | ‘liquid for washing’ |
| | <i>white</i> + <i>wash</i> | compound A+N | ‘liquid for whitening’ |
| | <i>to whitewash</i> | N conversion to V | ‘to whiten with whitewash, to cover up’ |
| | <i>a whitewash</i> | V conversion to N | ‘an instance of whitening with
whitewash,
an instance of covering up’ |

Consequently, one can give the side of a building a “wash” and one can give it a “white-wash” and one can also give something a “whitewash” in the extended sense of a cover-up, but *a whitewash* is not a result of the free combination of *white* and *wash*, it is a conversion from the verb *to whitewash*, just as *a wash* is a conversion from the verb *to*

wash. If the semantics of *a whitewash* relates it to the verb *to whitewash*, then it is a product of conversion and not of compounding.

3.6.2 Back-formation

Back-formation is a derivational process that is, in effect, the converse of affixation. Instead of adding an affix to a lexeme to derive a new word, back-formation creates a new lexeme via the subtraction of a supposed affix from an apparently complex base. The mistaken analysis is motivated by the phonological and semantic similarity of the supposed affixation to other cases of genuine affixation. Examples of new lexemes that arise via back-formation are *to cohes* < *cohesion* (cf. *act* > *act+ion*), *to seize* < *seizure* (cf. *close* > *closure*) and (a) *laze* < *lazy* (cf. *crisp* > *crisp+y*). Affixation relates a less complex word to a more complex one, while the direction of the relation is reversed in back-formation.

Synthetic compounds are a major source of novel back-formed verbs, cf. *chain-smoker* > *to chain-smoke*, *babysitter* > *to babysit*. Adams (2001: 118) points out that neoclassical compounds can also be back-formed to verbs, cf. *to biodegrade* < *biodegradable*. A novel back-formed verb—like *to anger-manage* from *anger management*—is not a genuine compound. A compound is a free combination of two lexemes with an open relation between them. A back-formed verb is a reduction of an existing complex word, hence its semantics will be based strictly on the meaning of the complex word; the constituents are not freely related to one another as in a compound. Therefore, *to anger-manage* cannot mean ‘to manage by the use of anger, in the form of anger, in spite of anger’ or any of the other possibilities which would be possible for a genuine compound. Its interpretation is in fact based on the motivating synthetic compound *anger management* and, hence, is restricted to the meaning ‘to manage anger.’ The same applies to the compound bases *chain-smoker*, *window-shopper*, and *ghostwriter* giving rise to the back-formed verbs *to chain-smoke*, *window-shop*, and *ghostwrite* with the non-compositional meanings denoting the activity of a *chain-smoker*, *window-shopper*, and *ghost-writer*.

3.6.3 Analogy

The process of analogy allows a new word to be created by analyzing a base as a formal and semantic complex A + B. If one of the elements, A or B, is exchanged for an element C, perceived as more appropriate for the desired meaning of the new word, either C + B or A + C arises. Examples of individual analogical derivations are *whitemail* < *blackmail*, *slow food* < *fast food*, and *underwhelmed* < *overwhelmed*. The complex words *whitemail*, *slow food*, and *underwhelmed* are not products of the process of compounding as seen by the restriction of their meaning to a variation of the meaning of the analogical base. *Whitemail* denotes the opposite of the process

of extortion encoded in *blackmail*. *Slow food* and *underwhelmed* are understood in opposition to *fast food* and *overwhelmed*. The openness of meaning characteristic of the compounding process is lacking.

The same reasoning applies when a series of formations develops on the basis of an original analogic formation. In (12a) the meanings of *First Couple* and the additional forms arise on the basis of the knowledge of the whole word *First Lady*. It is not the case that *First* alone takes on the meaning ‘presidential.’ Similarly, *landscape* in (12b) serves as the analogical basis for the other forms which include ‘landscape’ in their meaning, that is *moonscape* ‘landscape on the moon.’

- (12) a. First Lady > First Couple, First Daughters, First Dog
 b. landscape > moonscape, seascape, cityscape, dreamscape, spacescape, streetscape

Each analogical series must be considered on its own merits; the words in (13), namely, are compounds containing the positionally bound constituent *e*, an abbreviated form of “electronic.” This meaning component enters into the complex meaning of each of these words in a compositional manner, hence these formations are best considered as compounds.

- (13) e-mail > e-commerce, e-shopping, e-cash, e-business, e-delivery, e-readers

3.6.4 Blending

The process of blending has much in common with compounding, although it differs from compounding in its intentional nature. In blending, two lexemes are combined, but at the same time they are superimposed upon one another leading to a shortening of one or both constituents. Nevertheless, the meaning of each constituent lexeme flows into the meaning of the blend in the same manner as with compounds: *gundamentalist*, *screenager*, *stalkarazzi* are the equivalent of determinative compounds (‘gun fundamentalist, i.e. fundamentalist with respect to guns,’ etc.) while *dramedy*, *Spanglish*, *kidults* are the equivalent of coordinative compounds (‘drama-comedy, i.e. both drama and comedy,’ etc.). The shortened forms of the blend’s constituents are subject to prosodic factors, which is not characteristic of compounding but typical of certain derivational processes. Plag (2003: 125) shows how the whole blend has the same number of syllables as the full form of the underlying second constituent:

- (14) a. *globe*(1) + *obesity*(4) = *globesity*(4)
 b. *guess*(1) + *estimate*(3) = *guesstimate*(3)
 c. *friends*(1) + *enemies*(3) = *frenemies*(3)

In spite of their reduced phonological form, the constituents of the blend retain the meaning of the original lexemes; in order to understand *threepeat* and *Twitizens* both components must be reconstructed: *three* + *repeat* and *Twitter* + *citizens*. A blend can serve as an analogical base, inducing further formations: *chocolate* + *alcoholic* has led to *chocoholic* which in turn has enabled, *carbaholic*, *workaholic*, *shopaholic*, *spendaholic*, and possibly others. Here the status of *-aholic* is more difficult. It hinges on whether it has come to mean ‘addicted’ on its own and can enter new combinations freely. But as long as its full form needs to be recovered to reconstruct the meaning, it remains an analogical formation.

3.6.5 Reduplication

Reduplication is the repetition of phonological information present in the base lexeme. The reduplicated element can consist of one or more segments, one or more syllables, or the entire string of the base. In addition, it may have its own pre-specified features or segments that interact with the copied material. The reduplicated morpheme can be added as a prefix, suffix, or infix and may serve any inflectional or derivational function that is typical of regular affixation, such as pluralization, distribution, perfective, or progressive aspect, diminution, augmentation, intensification as well as variety and similarity. In (15a), a reduplicated syllable is prefixed to a verb in Mokilese to create a progressive form and in (15b) it is suffixed in Chukchi to signal the absolutive singular. Warlpiri in (15c) reduplicates the entire base in plural formation, while the repeated base in Tamil in (15d) appears with a pre-specified initial segments to signal plurality with variation (Wiltshire and Marantz 2000: 557–61).

- | | | | | | |
|------|----|-----------|----------|---------------|-------------------------|
| (15) | a. | Mokilese: | /wadek/ | /wad-wadek/ | ‘read—is reading’ |
| | b. | Chukchi: | /jilʔe-/ | /jilʔe-jil/ | ‘gopher, gopher ABS.SG’ |
| | c. | Warlpiri: | /kurdu/ | /kurdu-kurdu/ | ‘child—children’ |
| | d. | Tamil: | /maram/ | /maram-kiram/ | ‘tree—trees and such’ |

Reduplication was also used in the verb paradigms of Latin, Greek, and Germanic where it formed perfect stems (Latin *curr-/cucurr-* ‘run,’ Greek *lū-/lēlū-* ‘loose,’ Gothic *hait-/haihait-* ‘call’).

In present-day European languages reduplication is mostly found in individual colloquial remnants, cf. English *hush-hush*, *goody-goody*, German *Tamtam* ‘fuss,’ *Pinkepinke* ‘cash,’ French *train-train* ‘routine,’ *trou-trou* ‘row of holes.’ Unproductive rhyme and ablaut variants are also documented: English *willy-nilly*, *rassel-dassle* and *chit-chat*, *flip-flop* and German *schickimicki* ‘fashion buff’ and *Tingeltangel* ‘honky-tonk.’ There are patterns of apparently reduplicative structures that are productive, however, although

their products seem to be predominantly nonce formations rather than suitable candidates for the permanent vocabulary. One type of genuine reduplication is exemplified by creations like English *moon*—*schmoon*, *baby*—*schmaby*, *Wittgenstein*—*Schmittgenstein*, in which the reduplicative copy has a prespecified initial onset *schm-* that replaces the original onset of the base and expresses a pejorative attitude. Another example of this type is the Turkish pattern with the prespecified onset *m-* as in *tabak mabak* ‘plates and the like,’ *dergi mergi* ‘magazines and the like,’ *kapı mapı* ‘doors and the like.’ As for another pattern of apparent whole word reduplication, there is some controversy as to its exact nature—that is, whether it exemplifies reduplication or compounding. While Ghomeshi et al. (2004) refer to it as “contrastive reduplication,” Hohenhaus (2004) sees it as “identical constituent compounding.” In this construction, the head constituent is repeated as a modifier. Much like a regular determinative compound that picks out a subset of the head denotation, an identical constituent compound also identifies a subset of the denotation of its head that contains the prototypical instances of the category. So, one can take a *cat nap* or *sofa nap*, but the identical constituent compound *náp-nap* denotes a real nap, that is, the core sense of the noun. The same goes for *job-job*, *date-date*, and *logic-logic*, cf. also German *Mädchen-Mädchen* ‘real girl (not a tomboy),’ Italian *lana lana* ‘real wool,’ Spanish *mujer mujer* ‘real woman,’ *casa-casa* ‘real house (as opposed to a shelter),’ Russian *zheltyj-zheltyj* ‘real yellow’ and Persian *bikâre bikâr* ‘really unemployed (as opposed to being an artist)’ (Ghomeshi et al. 2004). Ghomeshi et al. show that the modifier constituent within a compound may be inflected, cf. *fans-fans*, *talked-talked*, and that the repetition occurs at the phrasal level as well, cf. *considered-it-considered-it*, *know-him-know-him*. The fact that the process occurs at both the morphological and phrasal levels need not rule out the morphological structures as compounds, however. They have the pre-stress intonation of determinative compounds and express the meaning one would expect if a concept modifies itself, that is the core concept. Furthermore the repeated constituent structure can itself occur as the modifier constituent in a determinative compound, cf. *wórk work day* (Ghomeshi 2004: 333). Expletive insertion (*abso-bloody-lutely*, *Ida-shitty-ho*, *un-fucking-believable*) is often considered a word-formation process expressing emphasis or intensification although it also occurs with the same properties at the phrasal level as in: *That comes as no fucking surprise* or *I’ll bloody swim to Barbados*.

3.7 SUMMARY

The most difficult task in delineating derivation from compounding is in determining when a lexeme has relinquished its independence and become an affix. The discussion of compounding has shown that there is indeed a legitimate intermediate status between a free lexeme and an affix, namely a bound positional variant of a compound constituent. But this is a normal consequence of compounding and should not be misconstrued as affix formation. Other types of bound roots can be found that have arisen due to

individual cases of historical development or to whole-word borrowings from another language. The term affix should be reserved for a bound formative that is not related in a psychological sense with another independent lexeme of the vocabulary. The interesting phenomenon of lexical affixes, that is, affixes that have root-like semantics, does not call this conclusion into question as they are formally speaking undeniably formatives. The number of affixes in a language is finite and their typical phonological and combinatorial properties are known in an intuitive sense to the speakers of the language. This is true also for the incorporating languages that have lexical affixes; their numbers can be large, but they are nevertheless finite. Synthetic compounds are not necessarily ambiguous or hybrid formations, but can be seen as compounds whose head constituents have undergone derivation (often accompanied by argument inheritance) and are subject to normal pragmatic constraints on informativeness. The difference between conversions, back-formations, analogical formations, and blends formed on the basis of a compound and genuine compounds lies in the fact that the meaning of the bi-lexemic derivations is not explainable as a compositional function of the individual constituents, but only by relating them to the whole complex form that serves as their base. Even when a series of like formations occur (cf. *workaholic*, *spendaholic*), their semantic dependency on a base word has a restrictive force on the number of potential formations that are created in opposition to affixation where the affix functions as an independent constituent and is not limited in the same respect. Finally, whereas genuine reduplication patterns with affixal derivation in its formal and semantic properties, many languages allow a superficially similar whole-word repetition process that closely resembles compounding. Rather than expressing a category typical of derivational affixes, the repetition of the head lexeme as its own modifier results in the determinative-like denotation of a core case of the head category.

CHAPTER 4

THEORETICAL APPROACHES TO DERIVATION

ROCHELLE LIEBER

4.1 INTRODUCTION


THE literature on morphology in general and on derivational morphology in particular does not lack for theoretical overviews. Textbooks (Spencer 1991, Booij 2007, Haspelmath and Sims 2010, Lieber 2010a, among others) frequently treat theoretical approaches to derivation thematically, touching on such topics as the nature of word formation rules, level ordering, affix ordering, productivity and blocking, and the like. Several articles in Štekauer and Lieber (2005) give historical overviews of morphological theory (the chapters by Carstairs-McCarthy, Kastovsky, Scalise, and Guevara) or treat particular theoretical models (the chapters by Roeper, Beard, Štekauer, Tuggy, Dressler, and Ackema and Neeleman). My own chapter in Audring and Masini (forthcoming) fulfills this function as well. Therefore in this chapter I will not revisit this familiar ground.

Instead, what I hope to do is to look with fresh eyes at a central theoretical issue that arises especially with respect to derivation as opposed to inflection, compounding, or phrasal syntax. I will frame the discussion in terms of the Saussurean sign, or more accurately in terms of a contemporary re-imagining of the Saussurean sign, as I want to look at both the nature of signifier and signified and the relative importance of the mapping between signifier and signified in the treatment of derivational morphology. In Section 4.2, I look at and recast the Saussurean sign in relation to derivational morphology. In Section 4.3, I introduce the issue of mapping between the signifier and signified of this re-imagined sign. Section 4.4 looks in more detail at the conceptual side of the sign, Section 4.5 at the sensory-motor side of the sign, and Section 4.6 returns to the formal nature of mapping. I will argue that morphological theory has been preoccupied in recent decades with contesting the nature of mapping between signifier and signified, and that when the fundamental computational nature of both the signifier and

the signified is taken into account, the precise formal nature of mapping becomes less important.

4.2 RE-IMAGINING THE SAUSSUREAN SIGN

Most contemporary linguists will be familiar with Saussure's visual representation of the linguistic sign (Figure 4.1).

For Saussure, the fundamental building block of language is the sign, a pairing between a signified or concept, say  and a signifier or sound image, say /kæt/.¹ Saussure himself leaves vague what the conceptual content of the sign is, except to say that it is a segment of thought that is given shape by its pairing with a sound image and that thought itself is "chaotic by nature" (1959: 112).

Re-imagining the basic Saussurean idea in more contemporary terms, we might think of the signifier not so much as a sound image, but as a unit of the sensory-motor system (to use the terminology favored by Chomsky 1995), thus allowing us to speak of language in general, and not just spoken languages (Figure 4.2).

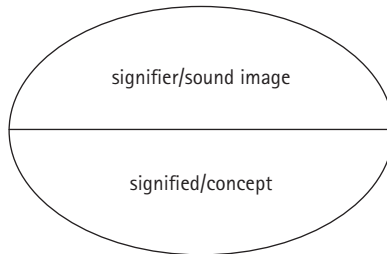


FIGURE 4.1 Saussure's sign

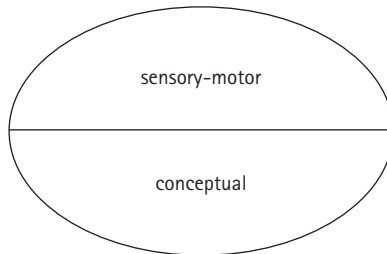


FIGURE 4.2 Saussure's sign re-imagined for the sensory-motor system

¹ Saussure himself uses the image of a tree (1959: 67). I use the cat instead only because it is a symbol that is conveniently available on my computer (and a tree is not!).

It is an uncontroversial tenet of Saussure that the mapping between the signifier and the signified is arbitrary, and this will of course be the case with our neo-Saussurean sign. But even for Saussure, the sign is not always perfectly arbitrary. Saussure had little to say that pertained directly to derivational morphology, but where he comes closest is in his discussion of “relative arbitrariness” (1959: 131–2). To the extent that signs are complex, they exhibit what he calls motivation (1959: 132):

...motivation varies, being always proportional to the ease of syntagmatic analysis and the obviousness of the meaning of the subunits present. Indeed, while some formative elements like *-ier* in *poir-ier* against *ceris-ier*, *pomm-ier*, etc. are obvious, others are vague or meaningless. For example, does the suffix *-ot* really correspond to a meaningful element in French *cachot* ‘dungeon’?

In contemporary terms, we might say that the more segmentable and semantically transparent a complex word, the more motivated or less arbitrary the sign.

Still thinking in more contemporary terms, one central issue that seems to arise in looking at complex words is the nature of non-arbitrariness, or the nature of the mapping between the sensory-motor part of the sign and the conceptual part. Indeed, much of recent morphological theory has been devoted to determining the formal properties of the mapping between the conceptual parts of complex words and the sensory-motor parts. And these formal properties in turn have hinged on the status of the morpheme, specifically whether we conceive of complex words as being composed of morphemes or not.²

4.3 THE PROBLEM OF MAPPING

Morphologists have long been accustomed to thinking of mapping in terms of either rules (analogous to rules of phonology) or hierarchically arranged structures (analogous to syntax). Borrowing from the American Structuralist tradition (Hockett 1954), these have been referred to respectively as Item and Process theories (IP) and Item and Arrangement (IA) theories. However, a useful and somewhat more sophisticated conceptualization of different models of mapping is that of Stump (2001), who has proposed a taxonomy based on two cross-cutting characteristics.

According to Stump, morphological theories can first of all be characterized as either LEXICAL or INFERENTIAL. In a lexical system, Stump characterizes “the association

² Saussure does not use the term “morpheme” and his position on the status of complex words is equivocal, as Carstairs-McCarthy (2005: 7–9) has shown. On the one hand, there are parts of the *Cours* where it appears that Saussure works with something like a notion of the morpheme, so that a complex word like *happiness* would consist of two separate signs in a structural or “syntagmatic” relationship to one another. On the other, it more often seems that Saussure treats complex words as whole signs, with their internal structure emerging as a function of what he calls “associative” relations to other signs (for example, *redness*, *baldness*, *hardness*, *squareness*, ...), as opposed to syntagmatic relationships.

between an inflectional marking and the set of morphosyntactic properties which it represents as being very much like the association between a lexeme's root and its grammatical and semantic properties." In an inferential system, "the systematic formal relations between a lexeme's root and the fully inflected word forms constituting its paradigm are expressed by rules or formulas" (2001: 1). Lexical theories embrace the morpheme as a unit of structure and inferential models do not. A second, and orthogonal, dimension of Stump's taxonomy divides mapping systems into those that are *INCREMENTAL* in the sense that "words acquire morphosyntactic properties only as a concomitant of acquiring the inflectional exponents of those properties," and those which are *REALIZATIONAL*, where "a word's association with a particular set of morphosyntactic properties licenses the introduction of those properties' inflectional exponents" (2001: 2).

Stump argues that *inflectional* morphology is best served by a model that is inferential and realizational, for example, his own Paradigm Function model. In contrast, theories that build inflected forms from inflectional morphemes that are put together with bases via syntactic or quasi-syntactic rules might be characterized as lexical-incremental models; Lieber (1992) is a model that takes this form. Distributed Morphology (Halle and Marantz 1993) represents a combination of lexical and realizational features, and Steele's (1995) "Articulated Morphology" is inferential and incremental, according to Stump (2001: 1–3). At the forefront of all of these models is the precise formal characterization of a mapping between form and meaning, viewed primarily from the perspective of inflection.

Stump's model is an excellent one for considering the nature of mapping in inflection at least in part because in the case of inflection we have a reasonably good

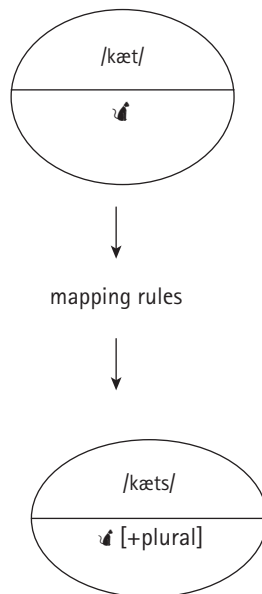



FIGURE 4.3 Mapping in inflection

characterization of what we are mapping onto what. That is, confining ourselves for the sake of convenience to spoken language, it is relatively uncontroversial that for inflection the mapping system must pair morphosyntactic features with phonological forms. Further, we have a pretty good idea of what morphosyntactic features look like. We may quibble about how many features are necessary and what their values should be, but it is not controversial to assume that there are number features, person features, tense features, and the like. We might visualize the theoretical treatment of inflection as in Figure 4.3.

We can, of course, look at the formal nature of *derivation* as well in terms of Stump's lexical/inferential and realizational/incremental parameters. But with regard to derivation, we do not have nearly as clear a notion as we do with inflection what we are mapping onto what. We will focus in the next section on the conceptual side of the sign and return to the formal complexity of the sensory-motor representation in Section 4.5.

4.4 THE CONCEPTUAL SIDE OF THE SIGN

The nature of what we might call the derivational signified has typically been left vague in most formal treatments of derivation. Indeed, as I argued in Lieber (2004), there is little agreement in the literature on what the semantic representation of simplex words should be, much less how the semantic representation of simplex words compares to that of derived words. Theorists like Anderson (1992) and Stump (2001) have assumed that derivation would be well-served by the realizational/inferential model. This conclusion is justified to the extent that the conceptual side of the derived sign is analogous to that of the inflected sign. But is it?

The classic Saussurean diagram implies that the conceptual part of the sign is in some way a holistic image that we represented earlier as . Saussure seems to claim that thought is chaotic and is organized only in the pairing of the signified with the signifier. One particularly contentious matter in the interpretation of Saussure is whether the signified is to be identified only by virtue of its relation to other signifieds—Saussure's notion of “value”—or whether there is something positive to be attributed to the signified as well. Although many interpretations of Saussure privilege the notion of “value,” I take the position of Bredin (1984: 72) that there must be more to the signified than what it is not. As Bredin argues, “When it is said that a concept is defined by its ‘not being’ any other concept, this is a shorthand, perhaps misleading, way of saying that it occupies a different place in the language system from any other.” The point is that whatever (or wherever) that “place” is, it is something positive.

In my re-imagining of the sign, I will concentrate on the positive content of signs as opposed to the “value” that arises from their relationship to one another. The primary question we must raise is how the conceptual content of the neo-Saussurean sign should be characterized formally. There are many conceivable formal models, including model theoretic semantics, the Lexical Conceptual Structures of Jackendoff (1990

and subsequent work), or the Natural Semantic Metalanguage of Wierzbicka (1996), but here I will fall back for the sake of illustration on my own framework (Lieber 2004, 2006, 2009a, b).

The symbol ♣ suggests that there are certain aspects of our knowledge of the concept “cat” that are sensory in nature—visual, tactile, auditory, and so on. This is what has been called in the literature “encyclopedic” knowledge (Harley and Noyer 1999, 2000), the “constant” (Rappaport Hovav and Levin 1996, 1998), “Conceptual Structure” (Mohan and Mohan 1999) or the “semantic body” in my own work. But as I have argued at length in Lieber (2004) and elsewhere, this encyclopedic knowledge of lexical meaning is only one part of our knowledge of lexical semantic representation. It is relatively uncontroversial that there is also a more formal and conventionalized part of meaning that we need to attend to, what I have termed the “semantic skeleton.” In the framework of Lieber (2004) the skeleton conveys the meaning at least that “cat” is an item that is referential in nature, and moreover one that is concrete and not processual. Theorists might disagree on the nature of the primitives that constitute the more formal part of the semantic representation, as well as on the way they are analyzed or generated, but I argue in Lieber (2004) that any account of the conceptual side of the sign must have something to say about both formal and encyclopedic aspects of meaning.

Another point that is critical for our purposes is that the semantic representations of underived words are not necessarily simple, but may in fact be built up out of smaller primitive parts. Further, those parts do not occur as an unstructured mass, but must be ordered in some way: linearly, hierarchically, or both. In other words, there must be some sort of structure to conceptual representations. And if this is the case with underived signs, it must also be the case—surely even more so—with derived signs. Further, assuming that parsimony is to be desired in a morphological theory, whatever the system for constructing the conceptual representations for underived signs turns out to be, the same sort of conceptual representations ought to be useful for derived words as well.

What follows is a short sketch introducing the framework of lexical semantic representation elaborated in Lieber (2004, 2006, 2009a, b, 2010b). In Lieber (2004: chs 1, 2) I argue that any framework for the representation of the semantics of words (what I have been calling here the conceptual part of the sign) must have several features:

- it must be decompositional
- its primitives must be of the right “grain size”
- it must be cross-categorical
- it must be able to deal with both simple and complex lexemes

To these desiderata I would now add another. Although it is implicit in the idea of decomposition that what can be decomposed must have been composed in the first place, let me make explicit here that a theory of lexical semantic representations must have some sort of rules for composing primitives into well-formed representations. Given the possibility of creating potentially infinite numbers of newly derived words,

we must assume that there is a computational aspect to derivation and that some of that computation is semantic.

Suppose then that our framework contains some system for generating conceptual or semantic representations, which I will henceforth refer to as skeletons. Following most systems of this sort (model theoretic semantics, Jackendoff's Parallel Architecture 1990, 1997, the system of Lieber 2004), we will assume that skeletons consist of functions that take arguments. Abstracting for the moment away from the precise nature of semantic functions, we will assume first that our system generates representations of the following sort:

- (1) SKELETON \rightarrow [F (arg)]
 SKELETON \rightarrow [F (arg, arg)]
 SKELETON \rightarrow [F (arg, arg, arg)]

That is, functions can take up to three arguments. Why three is the upper limit is a question we might wonder about, but observation of semantic representations in the literature suggests that three arguments will be sufficient for our purposes.

Arguments, in turn, can be either open slots in the representation, which we will represent with square brackets, or they may themselves be skeletons. In other words, skeletons are recursive:

- (2) arg \rightarrow []
 arg \rightarrow SKELETON

Open slots will be satisfied in various ways, for example by being linked to a syntactic phrase or coindexed with another open slot in a skeleton, as will be illustrated in (4) and (5) below.

Functions would ideally be limited to a finite number of primitives. In Lieber (2004) I sketch a highly constrained featural system that is appropriate for lexical (as opposed to grammatical) meanings. Here, we need not worry about the nature of those features, although we will return to them briefly in Section 4.6. For now we will represent functions schematically with Greek letters:

- (3) F $\rightarrow \alpha, \beta, \gamma, \delta, \dots$

The final part of the system that is necessary, at least within the framework of Lieber (2004), is a means of integrating the skeletons that are composed as part of the word formation process. Within the literature on word formation, this sort of integratory principle is usually represented as some sort of coindexation, roughly speaking, a process that identifies arguments in a skeleton as being matched with the same referent. Exactly how coindexation works is an important issue, but for our purposes a more or less generic version such as that in (4) will be sufficient.

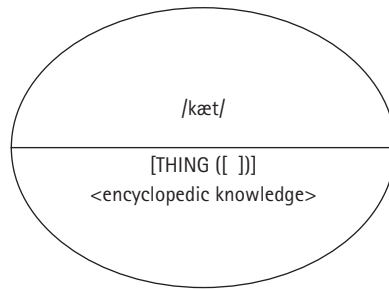


FIGURE 4.4 The simplex sign *cat*

(4) Principle of Coindexation

In a configuration in which semantic skeletons are composed, coindex the highest argument with the highest (preferably unindexed) embedded argument. Indexing must be consistent with semantic conditions on arguments, if any.

The rules in (1)–(4) would then give us well-formed skeletons like those in (5):

- (5) a. $[\alpha ([])]$
 b. $[\alpha ([_i], [\beta ([_i], [])])]$

Assuming, then, that skeletons like those in (5) are on the right track, and are associated as well with encyclopedic knowledge, then a simplex sign like *cat* would look something like that in Figure 4.4, glossing again over the nature of the primitives that constitute functions and representing them as in a familiar sort of shorthand as THING, CAUSE, BECOME, STATE, and so on.³

In other words, the sensory-motor part of the sign /kæt/ is associated with the conceptual part of the sign, or skeleton, in an arbitrary way.

Of course, the skeleton need not itself be as simple as that in Figure 4.4. Suppose that we look instead at an underived sign like *kill* (Figure 4.5).

Although the sensory-motor side of the sign is comparable to that in Figure 4.4, because *kill* is a verb and specifically a causative verb, the conceptual side is considerably more complex, with function embedded within function embedded within function (see Lieber 2004 for a full treatment of causative verbs). It is important to note here that causative verbs are semantically complex whether or not they are morphologically complex. That semantic complexity is ultimately the result of applying rules like those above for composing skeletons.

³ In the theory of Lieber (2004), what we are representing here as THING would be represented as the semantic feature [+material], CAUSE would (glossing over some details) be [+dynamic], BECOME would be [+dynamic, +IEPS], and STATE [–dynamic]. Again the precise nature of the featural system is not important to the issue at hand.

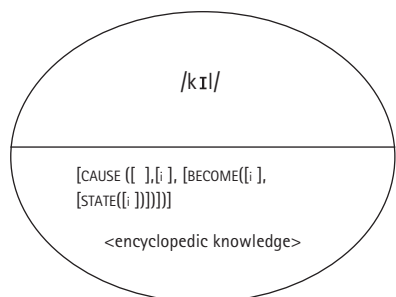


FIGURE 4.5 The simplex sign *kill*

We now have an interesting dilemma on our hands, that is, the dilemma of what constitutes a complex sign. Traditionally we have thought of complexity primarily as a matter of morphological segmentation (that is, a complex word has more than one morpheme). But it seems that there is more to complexity than this. Indeed, the notion of complexity is highly theory dependent. We must acknowledge that the conceptual side of the sign can be complex in its own way. Let us define a complex skeleton as one in which a function is embedded under another function. A simplex skeleton is one that contains only a single function with its (non-function) argument(s).

In addition to semantic complexity, we must also recognize sensory-motor complexity, a point we return to in more detail in Section 4.5. For example, /kɪl/ consists of a single morpheme (indeed, of a single syllable), arguably a sensory-motor representation that is relatively simple. But the sensory-motor representation can of course be complex as well, and indeed simple sensory-motor representations can be mapped onto either simple or complex skeletons, and complex sensory-motor representations may be mapped onto skeletons that are either simple or complex. As illustrated in (6) we have four possibilities:

- | | | | |
|-----|---------------|---|------------|
| (6) | sensory-motor | | conceptual |
| a. | simple | ↔ | simple |
| b. | simple | ↔ | complex |
| c. | complex | ↔ | complex |
| d. | complex | ↔ | simple |

We have considered cases (6a) represented by *cat* and (6b) represented by *kill*. We will now consider several examples of (6c), before considering whether (6d) is a plausible scenario.

In order to consider all the various possibilities, let us look in detail at two words that share core components of meaning with the simple sign *kill*, namely *deadify* and *euthanize*. The form *deadify* is a neologism listed in *Urban Dictionary* (<<http://www.urbandictionary.com/>>) with the meaning ‘to make someone dead, to kill, to own noobs’; as of

January, 2013, it is not attested in the *OED*.⁴ The words *kill*, *deadify*, and *euthanize* differ, of course, in the encyclopedic aspects of their meanings: *kill* is relatively neutral, but *euthanize* involves killing a person or animal to put an end to their suffering, and *deadify* seems to be associated in the examples in *Urban Dictionary* with the sort of killing that goes on in video games, “noobs” referring to inexperienced players. Both *deadify* and *euthanize* may be considered as hyponyms of *kill*, but I will assume that the hierarchical relationship is a function of the semantic body rather than the semantic skeleton.

What is interesting for our purposes is that these words differ in the encyclopedic components of their skeletons, and also arguably in the complexity of their morphological structure, that is, in the sensory-motor component of our re-imagined sign, but not in the complexity of the skeletal part of their skeleton. *Deadify* is nicely compositional, with both base and affix having easily identifiable forms. In a lexical theory that countenances morphemes and a complex syntactic structure of words we might represent the semantic composition of those morphemes as in Figure 4.6a.

Assuming such a morphemic analysis, we might imagine that the rules for composing skeletons embed the skeleton of *dead* in that of *-ify*, and indexation occurs to integrate the two representations into one. The composed skeleton is precisely the same as that for *kill* in Figure 4.5.

This analysis is not the only possible one for the sensory-motor side of the sign. Within inferential models, there is no reason to demand that the sensory-motor part of the sign be seen as structurally complex or be composed by syntax-like rules Figure 4.6b.

The composition of the skeleton is precisely the same, but in an inferential model, we make no claims as to any internal complexity for the phonological form of *deadify*. The complex skeleton is mapped onto a word that lacks internal morphological structure.

The word *euthanize* can be treated in a similar fashion. In this case, the affix is clear in form, but the base is not free-standing in English, and is therefore of dubious status, even from the point of view of lexical models. But again the internal composition of the sensory-motor form *euthanize* need not trouble us. Quite apart from whether we think that the word should be parsed as *euthan* + *ize* or not, the skeleton of the complex word must have a composed form that is precisely the same as that for *deadify* and indeed for *kill*. That is, although the sensory-motor part of the sign may be simple or not, the conceptual side of the sign is complex, just as it is in *kill* or *deadify*. We can represent this either as Figure 4.7a or as Figure 4.7b, where the only difference with the skeleton is whether the pieces are associated with the word as a whole or with two separate sensory-motor representations. Either way, the parts of the skeleton are composed by embedding [STATE ([])] in open slot labeled <base> and coindexing arguments.

We have now looked at three of the four cases in (6), the cases in which a simple sensory-motor representation is mapped onto a simple skeleton or a complex skeleton, and two types of cases in which a complex (or potentially complex) sensory-motor representation is mapped onto a complex skeleton. To be thorough, we should consider the

⁴ There is one attestation in COCA, but it seems fairly clearly to be a typographical error.

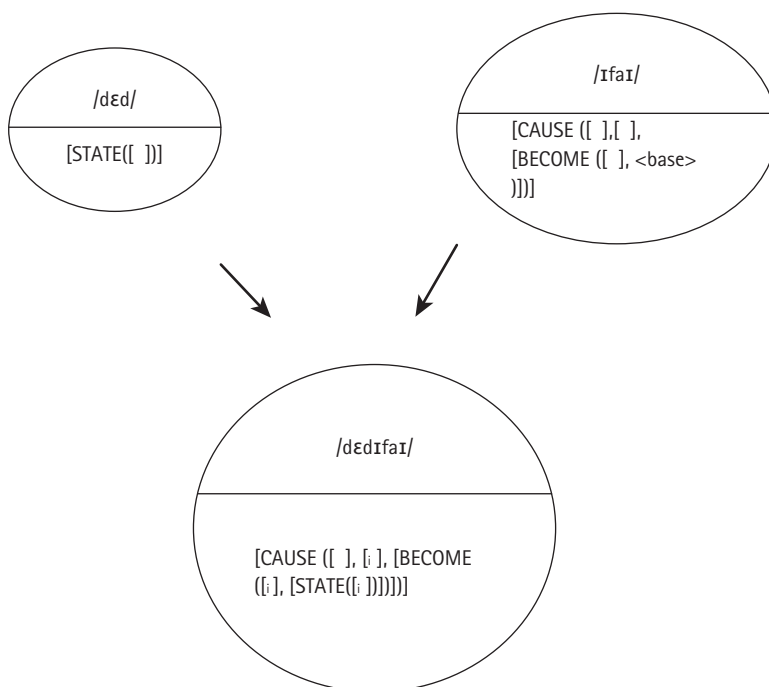


Figure 4.6a Semantic composition in a lexical model

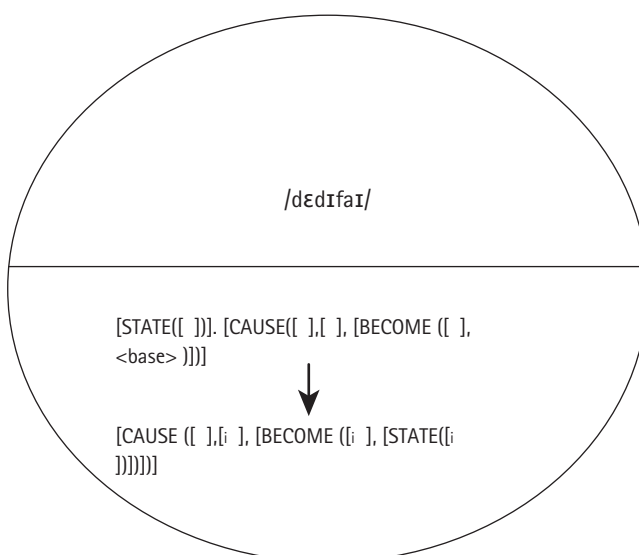


Figure 4.6b Semantic composition in an inferential model

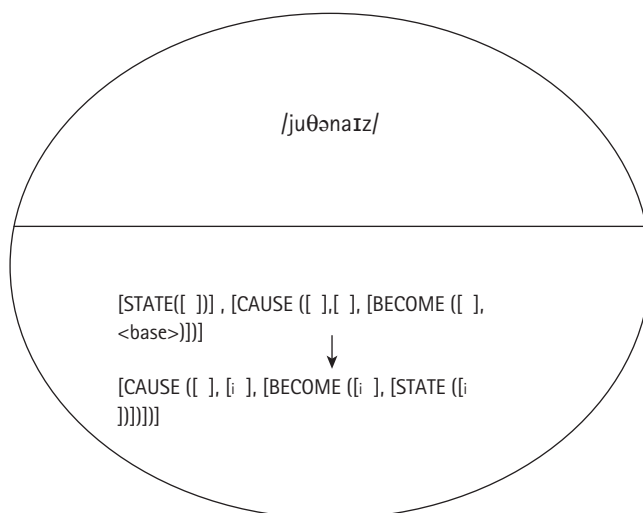


Figure 4.7a Euthanize in an inferential model

possibility of the fourth case, where a (potentially) complex sensory-motor representation is mapped onto a simple skeleton. This is what we would get in the case of a derived word with a highly lexicalized meaning, as for example in the case of the word *transmission* with the meaning ‘gearbox.’ Here, the sensory-motor part of the sign might plausibly be analyzed as [[transmit]ion], but the skeleton for the word would consist (at least in the system of Lieber 2004), as a single function with a single argument: [THING ([])].

4.5 THE COMPLEXITY OF THE SIGNIFIER

We have thus avoided discussing the form of sensory-motor representations, assuming them to be better understood than skeletons. It would, of course, be disingenuous to believe that the nature of sensory-motor representations is any less complex or interesting than that of the conceptual side of the sign. Although it is beyond the scope of this chapter to work out details of a theory of morphophonological representation, it is nevertheless worthwhile to consider at least briefly the nature of the complexity we find in the sensory-motor part of our sign. Presumably most linguists would agree that the smallest units of phonological structure are distinctive features, which are organized into segments, which in turn are organized into higher prosodic units such as syllables, feet, and prosodic words. Further, we must take into account that the phonological form of complex words is not necessarily concatenative, so that other factors such as reduplication, input and output conditions and templates are at play in the derivation of complex words involving reduplication or subtractive processes, for example (see Plag 1999, Lappe 2003, Inkelas and Zoll 2005, McCarthy 2008, as well as chapters 11 and 12 in the present volume). Confining ourselves henceforth to concatenative morphology, we might articulate the sensory-motor part of a complex word

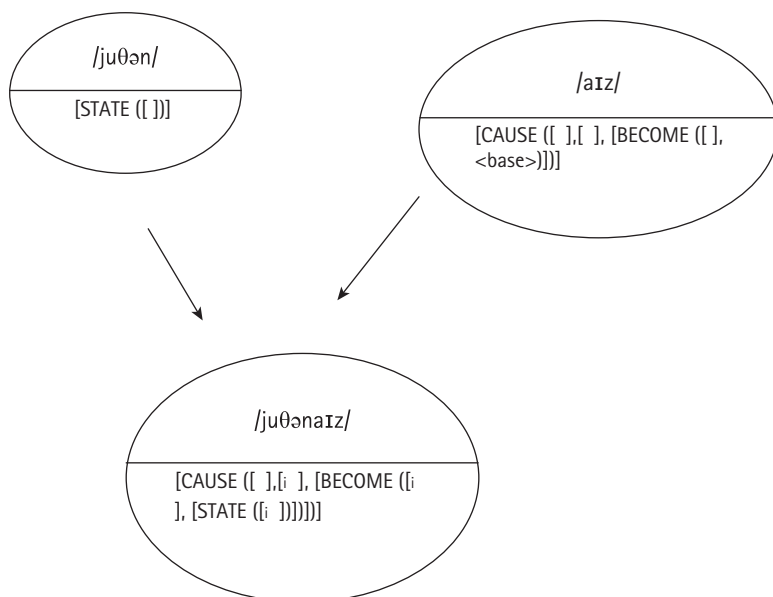
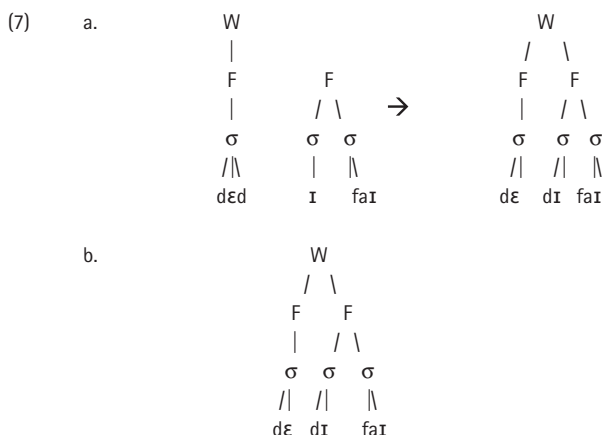


Figure 4.7b Euthanize in a lexical model

more fully as either (7a) or (7b), depending on whether we follow a lexical or an inferential conception of morphology:⁵



The representation in (7a) is, then, an elaboration of the sensory-motor representation in Figure 4.6a, and (7b) of that in Figure 4.6b. What is important to point out in either case, is that the phonological structure is not necessarily isomorphic with the conceptual structure of the sign, as segments may, for example, syllabify across morpheme boundaries.

⁵ For reasons of space, we start at the level of the segment in these representations, rather than with distinctive features.

The observation that complex words may have more than one sort of structure and that these structures need not be isomorphic has been made many times in the literature, figuring prominently in the debate over bracketing paradoxes (see Booij and Lieber 1993). We should observe, though, that the mismatch in structure has traditionally been stated in relatively simplistic terms. For example, the paradox concerning the word *unhappier* is frequently observed to be that the semantic bracketing must be [[un[happy]]er], whereas the phonological bracketing must be [un[[happy]er]] (see for example Spencer 1991: 44). But of course each of these structures can only be understood as shorthand for more complex and articulated conceptual and sensory-motor structures, perhaps of the sorts I have discussed here.

What I have tried to do so far is to refocus our discussion so that we continue to think about mapping, but also to take into account the ways in which both the sensory-motor part of the sign and the conceptual part of the sign may be complex, as well as the fact that complexity on one side need not be matched with complexity on the other. In this light, it then makes sense to return to the issue of mapping.

4.6 A RETURN TO MAPPING

Thus far I have argued that both the conceptual and sensory-motor parts of the sign must be re-imagined as highly structured and that we are now approaching the point where we can consider how the mapping between these highly structured entities is to be accomplished. Before we do so, however, there is still one step that I think we have missed, namely that we must think about what the mapping process needs to accomplish. Specifically, what information does mapping add that cannot be gleaned either from the highly articulated phonological representation or from the skeleton?

Consider the sort of information that is available in what is typically called the “subcategorization frame” in a lexical model of derivation. I will use as my example the sort of word-syntactic theory I developed in Lieber (1980, 1992) in which morphemes are assumed to have lexical entries of the sort in (8) (Lieber 1980, 66):

- (8) dead [A]
 (phonological representation)
 semantic representation: ...
 -ify]_{N,A} —]_V
 (phonological representation)
 semantic representation: causative

The subcategorization frames in (8) tell us three things: whether a morpheme is free or bound, if bound, whether the morpheme precedes or follows its base, and finally, the categorial identity of the base and the resulting derived word. Almost the same information

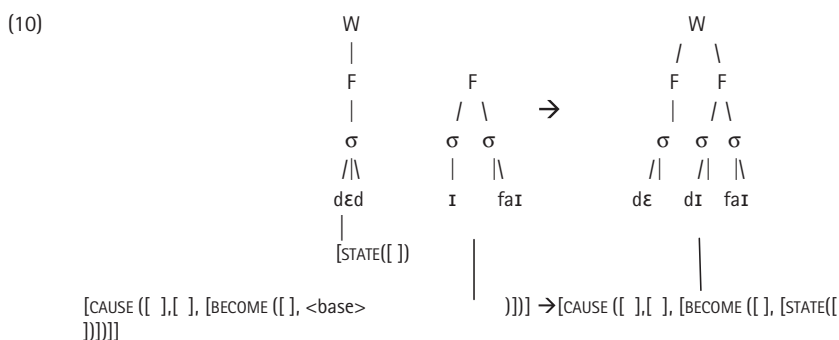
can be gleaned from the representations of a realizational model, as (9) illustrates (from Stump 2001: 257):

- (9) a. PF (<*friend*, privative adjective>) = <*friendless*, privative adjective>
 b. PF (<*X*, privative adjective>) = <*Xless*, privative adjective>

PF stands for “paradigm function” in Stump’s model, the equivalent of a derivational rule. As in the subcategorization frames of the lexical model, linear order is made explicit by the rule. Note that although Stump does not give the categorial identity of *X*, *Xless* is specified as an adjective, and specifically a privative adjective, combining categorial and semantic information. The realizational model differs from the lexical in not explicitly identifying *-less* as a bound morpheme, as this model does not make use of the notion of “morpheme” as a primitive, but the boundness of *-less* can be inferred from its presence only on the right side of the equals sign. Note as well that in both the lexical and the realizational type rules, neither the phonological nor the conceptual representations are formalized, so their complexity is left implicit.

The question we now return to is this: given a sufficiently articulated formal representation of the sensory-motor and conceptual representations, can any of this “mapping” information be inferred from what we already have? To the extent that some of this information follows automatically from other aspects of our representations, we will be able to reduce the importance of mapping issues. Further, if mapping cannot be completely dispensed with, we are left with the question of what is the best way to represent the mapping residue. This is the issue to which we now turn.

If we consider again the nature of phonological representations and skeletons, it appears that linear order can be inferred from the phonological representation of the sign, as Sproat (1985: 78) has already suggested. Further, the theory of lexical semantic representation that I have sketched in Section 4.4 assumes that hierarchical structure is encoded into the structure of the skeleton.



If phonological representations encode linear relations and skeletons encode hierarchical relations, it is conceivable that all that is left of the traditional subcategorization

frame or paradigm function rule is information about categorial selection. Where should that be encoded?

In Lieber (2006) I tried to argue that at least some categorial information can be derived from skeletons. All skeletons whose outermost function contains the feature [material] will correspond to nouns, and all skeletons whose outermost function consists of the feature [dynamic] without [material] will correspond to verbs or adjectives. Skeletons that lack both [material] and [dynamic] (but are characterized by other features) will correspond to adpositions. To the extent that such a program is successful, we might succeed in removing the last part of the mapping residue, with the result that the mapping between our re-imagined signifier and signified is unmediated by any other structure. That would be a startling conclusion, of course, as it would imply that no separate mapping rule or process is needed at all. But this is no doubt too strong a conclusion to draw.

Linguists have long attempted to derive syntactic categories from notional or semantic categories, but such attempts have never been entirely successful. Not surprisingly, the program of Lieber (2006) faces problems, not the least of which is its difficulty in distinguishing stative verbs from adjectives in any straightforward way (both are characterized by the feature [–dynamic]). If syntactic categories cannot in the end be derived fully from semantic categories, the mapping problem will never disappear entirely.

But suppose that it does not. It will still be greatly diminished. If both linear order and hierarchical structure are derived from other necessary parts of the representation, what we are left with is the task of providing the categorial information that mediates between the two sides of the base sign and those of the derived word (in an inferential framework that does not recognize morphemes) or between the two sides of the base and affix signs (in a lexical framework that does). We can look at complex words either way, but it is difficult to see what the empirical differences between the two approaches might be.⁶

4.7 CONCLUSION

In this chapter I have not provided a conventional historical survey of theoretical developments in morphology as they concern derivation. Rather, in reimagining the Saussurean sign in contemporary terms and applying it to complex derived words, I have tried to take a broad meta-theoretical approach; my hope has been to re-examine a specific preoccupation of our field over the last three decades. I have argued that we have tended to concentrate our attention on the issue of mapping without first adequately exploring what we are mapping. Theorists have especially given short shrift to the nature of the lexical semantic representation. What I have tried to establish is that

⁶ A similar point is made in Sproat (2005).

the theory of derivation must attend to the complexity of both the sensory-motor and conceptual sides of our re-imagined sign, and that by doing so we might go beyond the issue of the formal nature of mapping between the signifier and the signified that has so preoccupied morphologists over the last three decades. It remains to be seen where this redirection might take us.

CHAPTER 5

PRODUCTIVITY, BLOCKING, AND LEXICALIZATION

MARK ARONOFF AND MARK LINDSAY

5.1 INTRODUCTION

THE topic of morphological productivity as it has been conceived in linguistics for the last half-century is treated in greatest detail in Bauer (2001). If our brief discussion here leads the reader to that book, we will have gone a long way to doing our job. In this chapter, though, we also have a different aim, which is to recast the problem of morphological productivity in a different light. Indeed, we aim to show that the term itself may sometimes be less than helpful. We believe that the most interesting and, more importantly, addressable questions in this domain have always involved not the somewhat elusive notion of productivity, but rather competition. Before getting to that point, however, we must address a more fundamental question, one whose conventional response in linguistics has impeded progress in this particular domain, although it has been enormously helpful in the investigation of other areas of language, whether linguistic systems are entirely discrete in nature.

5.2 IS LANGUAGE DISCRETE?

The success of modern linguistics has always been rooted in the realization that languages are systems. But what sort of systems? Linguistics historically has been most successful dealing with discrete patterns and so we tend to assume that languages are wholly discrete systems. The analysis of productivity in word formation presents one of the most serious challenges to date to the blanket assertion that all patterns in language are discrete.

The first great achievement of historical linguistics in the 19th century, the comparative establishment of the relationships among the members of the Indo-European and Uralic language families, was based on the discreteness or “regularity” of sound change, what were called phonetic laws and compared at the time to the material laws of science. Famously, the major exceptions to Grimm’s law in Germanic languages were later subsumed under Verner’s law, providing strong confirmation for the methodological assumption of the regularity, exceptionlessness, or discreteness of sound laws.

In the first half of the 20th century, regularity and discreteness again showed great success, this time in the analysis of phonological patterns, the discovery of the phoneme, and the categorical nature of phonological alternations. Phonemic contrasts are famously categorical and even the distribution of allophones is usually taken to be discrete.

The second half of the last century saw the ascendance of syntax. The immediate constituent analysis of Rulon Wells (1947) led quickly to the phrase structure grammar of Chomsky (1957), which formed the foundation for transformational grammar, all discrete systems. All prominent frameworks for syntactic analysis since then have been discrete.

By the 1960s, especially with Chomsky’s (1965) distinction between competence and performance, most linguists could presume comfortably that language was rule governed at its core, so that all components of grammar could be assumed in turn to be discrete systems of regular rules. The messy nondiscrete aspects of language could be relegated to matters of performance or the lexicon, which Bloomfield (1933) had already characterized as a list of irregular items.

Morphology is a challenge for any theory of language that is focused on discreteness and regularity, because so much of morphology is neither. The first challenge for morphologists is to figure out how to integrate regular and irregular phenomena. In inflection, the tried and true method of assuming the dominance of regularity that had succeeded since the days of the Neo-grammarians again proved successful. A variety of researchers from Aronoff (1976) to Pinker (1999) to Brown and Hippiusley (2012) worked out the idea that irregular items, listed in the lexicon, could preempt or *block* their regular counterparts, which would emerge as defaults when not preempted by the irregulars. So, the English irregular past tense form *sang* blocks the regular form **singed*, which is the product of the default rule for past tense that adds the suffix *-ed* to English verbs.¹ There is even a hierarchy of outright exceptions like *went* instead of **goed*, rules with narrowly specified domains like the ablaut rules that characterize the relations among *sing*, *sang*, and *sung*, and the default regular rules.

One way to look at these narrow domains is in terms of the scope of the rules or relations that characterize them. A form like *went* is not describable by any synchronic

¹ In actuality, matters are not so simple. Bauer et al. (2013) show that many English irregular verbs show variation between regular and irregular forms, some well-known cases being *dived* vs. *dove*, *lighted* vs. *lit*, and *shined* vs. *shone*. For all these, variation is documented from quite early.

generalization that goes beyond one verb; *went* must simply be listed as the past tense of *go*.² A form like *transcended*, by contrast, is most easily thought of as being rule-derived, in the same way as a sentence like this one must be rule-derived. But the few hundred irregular verbs of English can be thought of as either stored or, more palatably for some, characterized by rules, if we assume that these rules simply have narrower scope than the default rule. The value of the rules for the linguist is that they express the generalizations, admittedly limited, that can be extracted from this set of irregular verbs. The potential wider applicability of these rules is revealed in the errors of children and second-language learners, who may produce forms like *brang*, extending the rule for *sing* to *bring*.

If these irregular but not completely unpredictable phenomena could truly be cast purely in terms of increasingly larger domains, then we could call productivity a discrete phenomenon and preserve the claim that the entire core of language, linguistic competence, is discrete. Unfortunately, the tactic fails. It is not just that the set of *sing/sang* verbs is limited to monosyllables ending in the sequences *-ing* and *-ink*. More importantly, not all such monosyllabic verbs succumb to the rule. Consider, for example, the three homophonous verbs *ring* (*my bell*), *ring* (*the city*), and *wring* (*out the clothes*). Each has its own distinct past tense forms: *rang*, *ringed*, and *wrung*. We might be able to tag *ringed* as an exception to the smaller-domain rule, so that it then falls under that larger-domain default, but we cannot do that with *wrung*, which must be either lexically listed like *went* or marked as exceptionally showing the vowel that we find in *hang/hung* instead of the vowel that is “normal” in irregular verbs ending in *-ing* and *-ink* like *sing* and *sank*. Furthermore, new verbs of this form are invariably subject to the default rule: *clinked*, *dinged*, and the website *Blinged out Blondes*, from which all things rhinestone are readily available.

Our inability to cast these phenomena in terms of domains leads next to the notion of discrete degrees of productivity. Default rules like *-ed* are *fully productive*: they apply to any verb that they encounter, except for those that are covered by rules of narrower scope. The rules for the past tense of English strong verbs, by contrast, are less than fully productive: they do not apply to every verb that meets their conditions. We can call them *semi-productive*. But now we need to ask ourselves how many of these discrete degrees there are. As Bauer (2001) so eloquently shows in his chapter on degrees of productivity, this question of how many degrees there are leads to a slippery slope that results inevitably in the abandonment of discreteness as a solution to the problem of productivity in word formation.³ Bauer’s catalog of terms that linguists have used for intermediate degrees of productivity includes, besides *semi-productive*, *semi-active*, *active* (though not fully productive), and *marginally productive*. We are led in the end to conclude, as Bauer does, that morphological productivity is scalar rather than discrete and that there is no finite number of degrees of productivity for us to name. As with the points on a compass, we may begin by naming four directions (North, East, South, and West) then

² The verb *go* has lacked a morphologically related past tense form since earliest Germanic times, at least. The past tense form *went* is from the verb *wend*, which is uncommon in Modern English but has a regular past tense form *wended*.

³ The claim that productivity is categorical is asserted as recently as Yang (2005).

add the four intermediate points Northeast, Southwest, Northwest, and Southeast, but soon we find ourselves needing to talk about South Southwest. Eventually we divide the circle of the compass into 360 degrees, each of these is divided into minutes and then seconds, but in the end we give up and admit that the points on the compass, as with any other circle, are numberless.

5.3 SCALAR PRODUCTIVITY VERSUS BLOCKING IN WORD FORMATION

The domain of linguistic inquiry in which the scalar nature of morphological productivity emerges most clearly is that of word formation or lexeme formation (Aronoff 1976, 1994). This was the last core aspect of language to be investigated by modern theoretical linguistics, most likely because of its resistance to discrete methods of study. The treatment of the relative productivity of rival English suffix pairs in Aronoff (1976) provides a valuable history lesson. The unconscious assumption underlying the entire discussion is that the difference between the two rivals is scalar rather than discrete, but the intellectual climate of the time made it impossible for this assumption to be made explicit even to the author of the work, as one of us can attest personally. It was only some years later that the author could even begin to formulate it (Aronoff 1983).

Aronoff (1976: 43) attempted to reduce the contest between rival suffixes to what was termed *blocking*, defined there as “the non-occurrence of one form due to the simple existence of another,” a definition since subject to much discussion and some revision (Rainer 1988, Bauer 2001). Blocking, understood in that sense, is discrete: one form exists and the other does not. But later research, some of which we discuss in more detail below, has revealed that this discrete definition fails to capture most of the more subtle interactions that we would surely like to subsume under the term. Most notably, as van Marle (1985) and Rainer (1988) observe, we would like to account for the rivalry within pairs (or larger sets) of affixes, not just between pairs of words, as this definition does. Furthermore, when one word blocks another, the blocked word may still occur, sometimes not with the sense that would be assigned to it if it had no rival, again contrary to this simple definition. In a sense, the word may be deflected instead of blocked.

Here are a few simple examples of how a rival word may be deflected rather than simply blocked. Consider the three English affixes *-ness*, *-ce*, and *-cy*. We can see from the three words *pleasantness*, *elegance*, and *buoyancy* that they can be rivals, each forming abstract nouns from adjectives.⁴ We know that *-ness* is overwhelmingly the overall default suffix for forming abstract nouns from the entire domain

⁴ There are others, most notably *-ity*, whose competition with *-ness* is the standard example. But *-ity*, like the two other Latinate suffixes mentioned here, is morphologically conditioned. It does not attach to