

# Roots and root classes in comparative grammar

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This paper proposes that a root should be defined as a contentful morph that can occur as part of a free form without another contentful morph. This definition can be applied to all languages using the same criteria and is very largely in line with existing usage. Roots are concrete forms with a shape consisting of a contiguous string of segments, so that consonantal skeletons of the Semitic type do not fall under the definition. They differ from affixes in that they may occur freely and have contentful meaning, i.e. denote an action, an object or a property. These three root classes are closely related to the word class notions verb, noun and adjective. The definition of *root* proposed here is largely intuitive, but it must be noted that heterosemous root pairs (such as English *hammer* (noun) and *hammer* (verb)) cannot be seen as having “the same root”, but must be treated as sister roots.

keywords: root, word class, content morph, heterosemy, conversion

## 1. Introduction: Roots in general grammar

The term *root* has long been an important technical term in research on grammar, more technical than “word”, but what exactly is a root? This has rarely been discussed, and this short paper is devoted to this topic. It offers a definition of the term for textbook purposes and comparative purposes and discusses some of the conceptual issues that arise. The definition is meant as a contribution to the methodology of comparative grammar, not as an empirical claim. Linguists often use *root* as a comparative concept, and as such the term should have a definition that can be applied uniformly to all languages.

In addition, I briefly discuss the role of the three root classes (object roots, action roots, property roots) for comparative grammar, following my earlier treatment in Haspelmath (2023b). Because of typical associations between semantic classes and discourse functions, the general word class concepts noun, verb and adjective are closely related to the three semantic root classes.

Finally, I discuss the phenomenon of heterosemous root sets, like *hammer* (noun) and *hammer* (verb), or *dance* (noun) and *dance* (verb) in English. Such root pairs (or larger root sets) have often been described in derivational terms (e.g. by zero-derivation or conversion), but I propose that they should be treated as sister roots that are formally identical (having the same shape) and semantically related.

Some aspects of the current definition may seem unintuitive, but the purpose is to provide a rigorous definition of root that is consistent with other concepts and can be applied to all languages using the same criteria.

## 2. Defining the root

The definition of the term *root* that I propose here is given in (1).

(1) **root** (Haspelmath 2023a: 287)

A root is a contentful morph (i.e. a morph denoting an action, an object or a property) that can occur as part of a free form without another contentful morph.

This definition presupposes the terms *morph* and *free form*, which I discussed at greater length in earlier work. Briefly, a morph is a minimal form, i.e. a form that does not consist of other forms (Haspelmath 2020). Colloquially, linguists often use the term *morpheme* in this way, but morphemes are often more abstract, so that they may have different “realizations”, or they may be zero or discontinuous. By contrast, morphs are by definition pairings of a shape (i.e. a sequence of segments) and a meaning. A free form is a form that may occur on its own, isolated from other forms (Bloomfield 1933: 160; Haspelmath 2021: §4).

Morphs are often divided into “lexical” and “grammatical” morphs (i.e. roots vs. markers), but these terms are not very clear. The term “lexical” has four different meanings (Haspelmath 2024b), and the term “grammatical meaning” is not immediately clear either. It thus seems best to define *root* with respect to concrete types of meanings, namely actions, objects and properties. The term *contentful* was adopted from the definition offered by Bauer et al. (2013: 17):

A root is the centre of a word, a lexically contentful morph, either free or bound, which is not further analysable.

Linguists sometimes contrast “function words” with “content words”, and while these terms are not much less vague than “grammatical items” and “lexical items”, I use “contentful” here in the more precise sense “denoting an action, an object or a property”.

The definition in (1) contains a qualifying clause (“that can occur as part of a free form without another contentful morph”) because there are some kinds of morphs with contentful meaning that we would not call roots. In particular, many languages have causative affixes, such as Japanese *-ase* (as in *yom-ase(ru)* ‘make (someone) read’). These can be said to denote an action, but they are not roots. In addition, some languages have affixes with “root-like” meanings such as Bella Coola *-ak* ‘hand’ and *-uc* ‘mouth’ which only occur together with a root, with an instrumental sense (Mithun 1997). Such elements are often called “lexical affixes”, as opposed to affixes with grammatical meanings or functional roles, but they are “lexical” only in the sense that they are contentful.<sup>1</sup> Contentful affixes are thus excluded from root status by the definition in (1) on the grounds that they do not occur on their own without another contentful morph.

Some languages also have compound-like forms with contentful morphs that do not occur in free forms without another contentful morph. For example, elements such as

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<sup>1</sup> In Haspelmath (2024b), I distinguish four senses of “lexical”: relating to word-forms, relating to lexemes, relating to the inventory, and relating to the mental lexicon. A lexeme must be based on a root, i.e. on a contentful morph (Haspelmath 2024a: 68–69), so it is the second sense of “lexical” that would be relevant here. But it seems best to avoid the use of “lexical” in the sense of “contentful” (or one may replace it by “lexemic”, as suggested in Section 5 below).

English *geo-* and *socio-* in “neoclassical compounds” are contentful but always occur together with other contentful morphs, so they do not count as roots either.<sup>2</sup>

### 3. How roots have been defined elsewhere

The term *root* has been used widely in linguistics since the 19th century, especially by Indo-Europeanists, following its use in Semitic linguistics.<sup>3</sup> For example, Marouzeau (1961: 194) defined *root* (French *racine*, German *Wurzel*, Italian *radice*) as in (1).

(2) **racine** (*Wurzel / Root / Radice*)

Élément irréductible du mot, obtenu par élimination de tous les éléments de formation discernables, concevable comme caractéristique d’un concept donné et susceptible de figurer, intact ou modifié, dans les diverses formations qui constituent une famille de mots ; ainsi l’élément qui apparaît sous la forme \**am-* dans fr. *amour*, *amitié*, *amateur*, sous la forme \**aim-* dans *aimer*, *aimable*, *aimant*...

The term *root* also appears in Nida’s (1949: 82) classical introduction to descriptive morphology:

(3) **roots vs. nonroots**

Roots constitute the nuclei (or cores) of all words. There may be more than one root in a single word, e.g. *blackbird*, *catfish*, and *he-goat*, and some roots may have unique occurrences. For example, the unique element *cran-* in *cranberry* does not constitute the nucleus of any other words, but it occurs in the position occupied by roots; cf. *redberry*, *blueberry*, *blackberry*, and *strawberry*. All other distributional types of morphemes constitute nonroots.

These definitions are not very precise, as they make reference to vague notions such as “elements of formation” or “nucleus/core (of a word)”. Still, there is no doubt that these definitions aim at contentful morphs, i.e. minimal forms that denote actions (verb roots), objects (noun roots) and properties (adjective roots). Linguists’ intuitions about the meaning of the term *root* are thus fairly clear, though it has proved difficult to provide a definition. (There is only one respect in which different linguists seem to have diverging intuitions: the question whether “roots” can show heterosemy, which will be discussed in Section 6.)

Let us consider a few more textbook definitions of the term *root* from more recent works:

(4) a. Harley (2006: 288)

**root:** the morpheme conveying the main meaning in a word. In *cats*, *cat* is the root. In *teacher*, *teach* is the root. In *economics* and *economy*, *econom-* is the root.

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<sup>2</sup> Such elements are often called “(obligatorily) bound roots” in English-language linguistics (e.g. Bauer et al. 2013: 18), but in many languages, all roots must occur with some affixes (e.g. most Russian noun roots, and most Italian verb roots). Thus, the fact that these elements are bound forms is not a remarkable feature from a cross-linguistic point of view. Their crucial property is that they need to combine with another contentful morph.

<sup>3</sup> In Indo-European linguistics, the term *root* was originally used in a diachronic sense, referring to elements that are hypothesized to have existed in the deep past. This usage was apparently strongly influenced by Sanskrit, where “roots” play an important role in Pāṇini’s works (e.g. Whitney 1885).

b. Lieber (2009: 204)

**root**: the part of a word that is left after all affixes have been removed. Roots may be free bases, as is frequently the case in English, or bound morphemes, as is the case in Latin.

c. Aronoff and Fudeman (2011: 2)

A **root** is like a stem in constituting the core of the word to which other pieces attach, but the term refers only to morphologically simple units.

d. Booij (2012: 29)

Stems can be either simplex or complex. If they are simplex they are called **roots**. Roots may be turned into stems by the addition of a morpheme...

Harley's "main meaning" is of course very vague, and Lieber's "removal of affixes" presupposes that we know what an affix is.<sup>4</sup> But the notion of "affix" remains undefined.<sup>5</sup> In Aronoff and Fudeman's and in Booij's definitions, "root" is defined in terms of "stem", but it is not clear that the notion of "stem" should be more basic than "root".<sup>6</sup>

Linguists most often talk about roots in connection with affixed forms, but in a language where a noun has only a single form (as in Vietnamese, which lacks inflectional affixes), we would nevertheless say that it has noun roots. Thus, it is better not to define roots in terms of affixes, but vice versa (affixes and clitics are two types of bound forms that are not roots; see Haspelmath 2023c).

One of the most sophisticated treatments of the conceptual issues surrounding roots is offered by Mugdan (2015: §4.1), who notes that "minimal signs fall into two classes", roots and affixes, as in the form *book-s*, where everyone agrees that *book* is the root and *-s* is the affix. He first considers the possibility that roots are potentially free and affixes obligatorily bound, but then he notes that Slavic languages such as Sorbian have many words (not only verbs but also nouns) whose root is not free but always occurs with an inflectional affix (e.g. *žon-* 'wife': nominative *žon-a*, genitive *žon-y*, accusative *žon-u*, etc.). Thus, Mugdan ends up bringing up the semantic criterion of "lexical" vs. "grammatical" meaning, even though he also notes that it is not always clear how to classify a morph's meaning:

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<sup>4</sup> Gebhardt (2023: xxiv) similarly defines a root as "an unanalyzable, monomorphemic form, free or bound, that's left when all affixes are removed".

<sup>5</sup> According to Lieber (2009: 197), an affix is "a bound morpheme that consists of one or more segments that typically appear before, after, or within, a base morpheme", but there is no definition of "base", and as she notes in her definition of "root", roots may be bound forms just as affixes. Gebhardt (2023: xiii) says that an affix is "a bound morpheme, excluding bound roots, that is added to a stem", so he defines "root" in terms of "affix" and vice versa.

<sup>6</sup> I propose the following definition, which is based on the "root" notion:

**stem**

A stem is a contiguous segment string that consists of at least one root and possibly some affixes and that can be combined with an affix.

This is very similar to the definition given by Aronoff and Fudeman ("a stem is a base unit to which another morphological piece is attached", 2011: 2), but more precise. Booij's (2012: 29) definition ("the stem of a word is the word form minus its inflectional affixes") is more narrow, as it excludes strings containing an inflectional affix, but we probably want to say, for example, that Latin *laud-ab-* is an "Imperfective Past stem" (consisting of a root and a tense suffix) that can be combined with person suffixes. (See also Mugdan 2015: §4.3 for some enlightening discussion).

Another distinction that is frequently appealed to is that between *lexical meaning* and *grammatical meaning*. It is based on a variety of factors (cf. Croft 2000: 258–260); putting it simply, lexical meanings have something to do with entities, properties and states of affairs in the extra-linguistic world, and grammatical meanings are relational or structural. (Mugdan 2015: 257)<sup>7</sup>

We will come back to this criterion in Section 5 below.

#### 4. Roots as concrete forms

In (1) above, a root was defined as a kind of morph, i.e. a kind of form (as discussed in Haspelmath 2020). A form is a pairing of a shape and a meaning (or function), and a shape is a contiguous string of segments. In this conception of morphs, there are no zero morphs, no discontinuous morphs, and no replacive morphs. Consider the German inflected verb forms in (5):

- (5) some German inflected verb forms
- |                           |              |
|---------------------------|--------------|
| <i>ich lauf-e</i>         | ‘I run’      |
| <i>wir lauf-en</i>        | ‘we run’     |
| <i>lauf-Ø!</i>            | ‘run!’       |
| <i>ich bin ge-lauf-en</i> | ‘I have run’ |
| <i>sie lief</i>           | ‘she ran’    |

Many linguists have said that there is a “zero morph(eme)” in the imperative form *lauf*, and that there is a “circumfix” in the past participle form *ge-lauf-en*, but if a morph is a form, it cannot be zero or discontinuous. Zero elements are often useful to make a description more abstract and elegant, but they cannot be treated as forms. And “circumfixes” are best described in terms of constructions containing a prefix and a suffix.<sup>8</sup> Finally, cases where an inflected minimal form has a different pronunciation, like the past tense form *lief* with vowel ablaut (meaningful sound change), are not treated as “replacive morphs” either. The forms *lauf* and *lief* are simply different roots, though they are related by ablaut (more generally, by endophony).

Since there are no discontinuous morphs, the “roots” of Semitic languages are not roots in the sense of the definition in this paper. Consider the four Standard Arabic forms in (6).

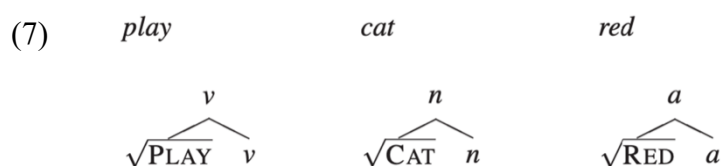
- (6) Arabic
- |                  |            |
|------------------|------------|
| <i>katab-naa</i> | ‘we wrote’ |
| <i>na-ktub-u</i> | ‘we write’ |
| <i>kaatib</i>    | ‘writer’   |
| <i>kitaab</i>    | ‘book’     |

<sup>7</sup> The contrast between lexical and grammatical meaning is also the basis for Urbanczyk’s (2011) definitions of roots and affixes.

<sup>8</sup> Defining a form as a pairing of a shape and a meaning may not be controversial, but treating the notion of morph (a kind of form) as basic for other concepts is not the only possibility. More common is the term “morpheme”, which is often defined abstractly as a kind of “unit” (e.g. Gebhardt (2023: xx): “a morpheme is the smallest unit of meaning and function in a language”). However, the problems that arise in identifying abstract elements such as zeroes (and abstract operations) are well-known, and the concrete definition adopted here is simpler and more appropriate for general and comparative purposes.

These forms contain four different roots (*katab*, *ktub*, *kaatib*, *kitaab*) that share the consonantal skeleton *k-t-b* and that have different vowel patterns. This kind of morphosyntactic organization could be called “skeleton-and-ablaut”, but a more common term is “root-and-pattern morphology” (e.g. Hudson 1986). It is perhaps somewhat unfortunate that the Semitic triconsonantal skeletons do not fall under the definition of “root” that is proposed here, because the term *root* ultimately derives from Hebrew (and Semitic) linguistics. However, Semitic-type consonantal skeletons are very rare in the world’s languages, and the term *root* is usually used by linguists in the sense given in (1).

Before moving on to root classes in the next section, I should briefly note another use of the term “root” that has become prominent in generative approaches, especially in Distributed Morphology (e.g. Bobaljik 2017; Embick 2021) and the Exoskeletal approach (e.g. Borer 2014; Lohndal 2020). In these approaches, a root is not a kind of minimal form, but an abstract element of the grammar, similar to an inflectional feature that is realized by an affix. Just as “abstract Case” is often written with a capital C in generative grammar (e.g. Chomsky 1981), the term “Root” is sometimes capitalized when referring to an abstract element (e.g. Embick 2021). There is much debate about the nature of abstract Roots (e.g. Harley 2014), but their most salient property is that they do not belong to one of the major word classes (“lexical category”) but are “acategorical”. In order to appear on the surface, they must be categorized by a “category-defining head” (*v*, *n* or *a*), as illustrated in (7) (from Embick 2015: 45). This is called the “categorization assumption” (Embick and Marantz 2008: 6).



In the abstract Root view, it is possible to say things such as “some affixes are roots” (Creemers et al. 2018), which would be contradictory for the traditional use of the term *root*. In this paper, I will not consider these approaches further, because they are based on highly specific assumptions about the nature of innate grammatical knowledge that cannot be discussed here.

## 5. Root classes and word classes

Now that we have seen that roots are contentful morphs (Sections 2–3) and that they are concrete forms rather than abstract entities, let me say a bit more about the three classes of roots: action roots, object roots and property roots, which are exemplified in (8), using Maltese examples.

- (8) a. some action roots: *kanta* ‘sing’, *fetaħ* ‘open’, *ħataf* ‘snatch’  
 b. some object roots: *siġra* ‘tree’, *għasfur* ‘bird’, *borża* ‘bag’  
 c. some property roots: *tajjeb* ‘good’, *żgħir* ‘small’, *għani* ‘rich’

Why these three classes? The reason is that they have played an outsize role in many recent discussions of word classes and their diverse cross-linguistic behaviour (e.g. Croft 1991, 2000; Hengeveld and van Lier 2010; Bisang 2023), and there seems to be broad agreement that for the big picture, these are the crucial classes. As emphasized by Croft in various publications, action roots tend to occur frequently in predication function,

object roots in reference function, and property roots in modification function (these are “prototypical combinations”; e.g. Croft 2003: §6.4; Baker & Croft 2017: 183), and as a result, they do not need function indicators in these discourse functions (see also Haspelmath 2021: §7.3):

- (9) semantic root classes and discourse functions
- a. action roots: no copula/verbalizer in predication function (e.g. *sing*)
  - b. object roots: no nominalizer/substantivizer in reference function (e.g. *tree*)
  - c. property roots: no relativizer/genitive in modification function (e.g. *good*)

These are very broad generalizations, but they seem to be robust across languages, regardless of the language type or language family. Further more fine-grained generalizations may be possible, e.g. about transitive vs. intransitive action roots, about inanimate vs. animate object roots, about permanent vs. temporary property roots, but these only lead to subclassifications, not to different major classes.<sup>9</sup>

Now how do these root classes relate to word classes in a comparative perspective? In Haspelmath (2023b: 34), I noted that when we consider the way in which the terms *verb*, *noun* and *adjective* are generally used in the literature, we can simply say the following:

- (10) word classes (as comparative concepts)
- a. a verb is an action-denoting root
  - b. a noun is an object-denoting root
  - c. an adjective is a property-denoting root

That is, word classes are not distinct from root classes in a comparative perspective, though the formal properties of these classes do of course differ strikingly across languages. However, regardless of what these formal properties are, action roots will almost always be called “verb”, object roots will almost be called “noun”, and property roots will typically be called “adjectives” (sometimes in seemingly contradictory expressions such as “in this language, adjectives are verbs”; cf. Croft 2022).

There is an enormous literature on word classes across languages (see van Lier (ed.) 2023), but the difficulties of word class assignment that have occupied linguists typically concern larger expressions, e.g. nominalized forms such as English *sing-ing* (which is sometimes called “noun”, even though the root *sing* denotes an action), or derived lexeme-stems such as English *sharp-en* (which is called “verb”, even though the root *sharp* denotes a property). There are many different views about the word class assignment of such larger expressions, because there is no clear set of cross-linguistically applicable criteria, and it is easy to cherry-pick one’s favorite properties for any particular language. Some authors have emphasized that “word class typology” can be done at multiple levels (root, stem, word-form, e.g. Lehmann 2008, 2013; Bisang 2023; or lexical vs. syntactic, e.g. Himmelmann 2008), but this has not led to the kinds of widely recognized results that Croft’s approach has given us.

To conclude this section, let us ask how the definition proposed here relates to the intuition that roots denote “lexical meanings” and affixes (or function words) denote

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<sup>9</sup> Of course, not all meanings expressed by languages fall into these three semantic classes. For meanings such as ‘wave’, ‘hate’, ‘die’, one would need still further categories. However, comparative concepts are typically restricted to a SHARED CORE, and there is little doubt that the meanings seen in (8)–(9) are the core of the meanings expressed by roots in the world’s languages. Thus, the fact that the classes are not exhaustive is not problematic in the present context.

“grammatical meanings” (see the quotation from Mugdan in Section 3 above). There is a surprisingly simple answer, given in (11).

(11) **lexical meaning (or lexemic meaning)**

A lexical meaning (or lexemic meaning) is an action meaning, an object meaning, or a property meaning.

This definition may not seem very enlightening, but gaining deeper insight into the difference between lexemic and grammatical meanings is difficult. Perhaps the most sophisticated recent proposal has been summarized as follows:

lexical items (whether morphemes, words, or schematic constructions) are defined as potentially discursively primary; grammatical items, in contrast, are by convention discursively secondary. In other words, lexical items have the potential to express foreground meaning (whether they do so or not depends on context and speaker intentions), while grammatical items can only express their meaning as background information (outside metalinguistic and corrective contexts where conventions may be overridden). (Boye 2023: 81; see also Boye and Harder 2012)

In short, “lexical items” are characterized by “conventionalized discourse prominence”, and this is a feature of all roots in the sense of the definition in (1): All nouns, verbs and adjectives can be focused and occur on their own as answers, while the most typical “grammatical items” are bound forms (clitics or affixes).<sup>10</sup> As noted earlier, the term “contentful form” is better than “lexical form”, because “lexical” has a range of different meanings (Haspelmath 2024b). But while I would not recommend the characterization of roots in terms of “lexical (or lexemic) meaning”, such a definition would actually be compatible with the definition given here.<sup>11</sup>

## 6. Heterosemy: Homonymous root sets with related meanings

In this section, I will address an issue that has loomed large in the literature on roots: the idea that roots can be “precategorical” or “acategorical”, which contradicts what I said above in (10). However, many languages have homonymous root pairs of the following type:

(12) English

- a. *hammer* ‘hammer (i.e. an instrument)’
- b. *hammer* ‘hammer (i.e. hit with a hammer)’

(13) Italian

- a. *strega* ‘witch’
- b. *strega(-re)* ‘bewitch’

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<sup>10</sup> Note that there are some free forms such as *hello* or *ouch* which do not have lexemic meanings but would probably be said to exhibit conventional discourse prominence. These do not count as roots on the present proposal, which seems to be in line with normal usage.

<sup>11</sup> The reason why “lexemic meaning” is given as an alternative to “lexical meaning” is that “lexical” has four different meanings, which could be disambiguated by replacing them by “lectic”, “lexemic”, “inventorial”, and “mentalical”, respectively (see Haspelmath 2024b).



- (14) French  
 a. *combat* ‘(the) fight’  
 b. *combatt(-re)* ‘(to) fight’

- (15) Russian  
 a. *rabota* ‘(the) work’  
 b. *rabota(-t’)* ‘(to) work’

Linguists have been uncertain how to deal with such cases, and a variety of approaches have been proposed and discussed. For cases like *hammer/hammer*, derivational analyses in terms of zero-derivation or conversion have been proposed (see Valera 2015), and for languages with required inflectional affixes (like the infinitival suffixes *-re* and *-t’* in Italian/French and Russian), these affixes have sometimes been treated as having a word-deriving function. For Romance languages, there is an earlier tradition of treating nouns such as French *combat* as back-formed (as “postverbal nouns”, e.g. Malkiel 1977).

However, it does not seem to be advisable to adopt a derivational approach, because the direction of derivation is often unclear. Grestenberger and Kastner (2022: 1) formulate the issues that arise in a derivational approach as follows:

- (16) a. Is one of the forms derived from the other, or are both derived from one common ROOT?  
 b. If one is derived from the other, then which is the BASE and which is the DERIVATIVE?

The problem is that there are no cross-linguistically applicable criteria for answering either of these questions. It may sometimes seem evident that one of the two is derived from the other, e.g. the verb *to crown* is said to be derived from the noun *a crown* because it is impossible to say *to crown someone with a hat*. However, the semantic criteria are not robust,<sup>12</sup> and the alternative non-directional view is now perhaps more common.

However, there are (at least) two logically distinct non-directional views:

- (17) a. the precategorial view:  
 Forms such as *hammer* (verb) and *hammer* (noun) are both derived from an abstract unit.
- b. the heterosemy view:  
 Forms such as *hammer* (verb) and *hammer* (noun) are different roots which are related via sister schemas (e.g. Audring 2019; Jackendoff and Audring 2020a, 2020b) and which can be said to be heterosemous root sets.<sup>13</sup>

The reason why this paper adopts the heterosemy view is that it is based on a conception of comparative concepts which requires that they are defined uniformly across languages, and this is possible only with concrete notions such as meaning, shape, form/expression, bound, as well as general concepts such as class, construction, and

<sup>12</sup> For example, while it has been argued that “true denominal” instrumental verbs in English are incompatible with instruments that are different from the base noun (*\*taping a picture to the wall with pushpins*, contrasting with *hammering the desk with a shoe*), this does not work consistently (for example, it is possible to talk about *taping a poster to a wall with band-aids*).

<sup>13</sup> The term *heterosemy* for the meaning relationship between words belonging to different word classes was introduced by Lichtenberk (1991).

inventorium.<sup>14</sup> Abstract “roots” can be posited for purposes of elegant description or analysis, but cannot be identified in a rigorous way in a general (or cross-linguistic) context.

Sister schemas can be illustrated by the sister words *ambition/ambitious* in (18) (from Jackendoff and Audring 2020b), which instantiate the more general sister schema pair in (19) that is also instantiated by word pairs such as *contagion/contagious*.

- (18) a. *ambition*  
 semantics: DESIRE<sub>1</sub>  
 morphosyntax: [N – aff<sub>2</sub>]<sub>1</sub>  
 phonology: /æmbɪf<sub>3</sub> ʃən<sub>2/1</sub>
- b. *ambitious*  
 semantics: [HAVING (DESIRE<sub>1</sub>)]<sub>5</sub>  
 morphosyntax: [A – aff<sub>4</sub>]<sub>5</sub>  
 phonology: /æmbɪf<sub>3</sub> əs<sub>4/5</sub>
- (19) *X-ion*  
 semantics: X<sub>1</sub>  
 morphosyntax: [N – aff<sub>2</sub>]<sub>1</sub>  
 phonology: /Y<sub>3</sub> ən<sub>2/1</sub>
- b. *X-ious*  
 semantics: [EXHIBITING (X<sub>1</sub>)]<sub>5</sub>  
 morphosyntax: [A – aff<sub>4</sub>]<sub>5</sub>  
 phonology: /Y<sub>3</sub> əs<sub>4/5</sub>

The two schemas are linked relationally because they share some of the same indices, specifically the index 1 for the meaning (‘desire’, or more generally ‘X’) and the index 2 for the shape (/æmbɪf/, or more generally /Y/). In much the same way, we can represent the relationship between *hammer* (noun) and *hammer* (verb) as in (20).

- (20) a. *hammer* (noun)  
 semantics: HAMMER<sub>1</sub>  
 morphosyntax: [N – ]<sub>1</sub>  
 phonology: /hæmər<sub>2/1</sub>
- b. *hammer* (verb)  
 semantics: [HIT (WITH SOMETHING LIKE HAMMER)]<sub>3</sub>  
 morphosyntax: [V – ]<sub>3</sub>  
 phonology: /hæmər<sub>2/3</sub>

On this view, there is neither a derivational claim nor a claim of an abstract root. The identity of the shape is captured by the index 2, and the related meaning is captured by

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<sup>14</sup> This also means that concepts such as “word”, “lexeme”, “morphology”, “syntax” and “lexicon” are not needed and are best avoided, because they are associated with stereotypes and are rarely defined properly. (The concept “word” is defined in Haspelmath 2023a, but not in a natural way.) It should be noted that one could alternatively take comparative concepts to be defined differently in different languages, but this makes sense only if they are hypothesized to be innately given (as natural kinds, analogous to the elements in chemistry; see Haspelmath 2018).

the presence of ‘hammer’ in the semantics in both words. More generally, we can say that English has the two sister schemas in (21).

- (21) a. *X* (noun)
- |               |                                    |
|---------------|------------------------------------|
| semantics:    | OBJECT (RELATED TO X) <sub>1</sub> |
| morphosyntax: | [N –] <sub>1</sub>                 |
| phonology:    | /Y <sub>2/1</sub>                  |
- b. *X* (verb)
- |               |                                      |
|---------------|--------------------------------------|
| semantics:    | [DO (IN RELATION TO X)] <sub>3</sub> |
| morphosyntax: | [V –] <sub>3</sub>                   |
| phonology:    | /Y <sub>2/3</sub>                    |

The precise meaning relationship in these sister schemas is not always predictable, though there are some subschemas with more specific meaning relationships and with high productivity (as discussed in works such as Plag 1999).

Thus, there are good reasons to say that *hammer* (noun) and *hammer* (verb) are two different (homonymous and heterosemous) roots, that neither is derived from the other, and that they are not derived from anything else either (such as an “abstract root”). The question asked by Grestenberger and Kastner (2022) (see 16a above) seems to presuppose that one of these two options must be true (either one is derived from the other, or both are derived from something else), but as we have seen, a non-directional AND non-derivational view is possible and preferable.

It should be noted here that the “acategorical” or “precategorical” view has been seriously discussed or even adopted by some typologists, e.g. Wiltschko (2005) for Salishan languages, Evans and Osada (2005) for Mundari, and Himmelmann (2008) for Tagalog. And intuitively, many linguists (not only typologists) would probably say that English *hammer* (noun) and *hammer* (verb) “share the same root”. On the present proposal, this is not the case, but it has the advantage of being conceptually consistent and of avoiding notions such as “derivation” and “abstract roots”.

Finally, I should mention that in addition to the derivational view and the heterosemy view, there is a third logical possibility, what can be called the “macro-class” view:

- (22) the macro-class view:  
 Elements such as English *hammer* are neither verbs nor nouns but belong to a larger class (“nomiverbs”), and elements such as *clean* are neither verbs nor adjectives but belong to a larger class (“verbectives”), and so on.

For language-particular analyses, this is surely a viable approach in many cases, and especially for “verbectives” (lexemes that correspond to either adjectives or verbs in other languages), this approach has often been adopted. However, as the formal criteria that are used to distinguish between different word classes are typically language-particular, this does not generalize. By contrast, the three root classes discussed in Section 5 show uniform behaviour across languages (Haspelmath 2023a: §2.1), and they can thus be used for defining the notion of root.

## 7. Concluding remarks

In this paper I have provided a definition of the widely used term *root* that is very largely in line with the way it is actually used. The definition makes crucial use of the semantic classes of actions, objects and properties (first highlighted by Croft 1991), and of the notion of a free form (introduced by Bloomfield 1933). A root is defined as a special kind of morph (i.e. a minimal form), which is in line with most linguists' intuitions, but as a form is required to have a continuous shape, triconsonantal skeletons such as the Arabic *k-t-b* for 'write' do not fall under the definition. It should perhaps be noted that roots have not only been discussed by morphologists, but also by phonologists who were interested in their properties compared to the properties of affixes (e.g. Bybee 2005; Urbanczyk 2011). For phonology, it is perhaps clearest that one needs a definition in terms of a minimal form that pairs a meaning with a shape (i.e. a contiguous segment string).

The term "root" became well-known in linguistics in the 19th century, during a period when historical-comparative linguistics made such rapid progress that it seemed possible to some linguists that we might identify the ultimate minimal constituents of which all languages were originally made up. It may be that the fact that minimal contentful morphs were called "roots" contributed to the erroneous idea that finding the ultimate "roots of language" might be within our reach. But we now know that *root* is no more than a handy short term for discussions of general grammar or language-particular analyses.

Some readers may find the present definition of *root* (as a contentful morph that can occur as part of a free form without another contentful morph) unintuitive, because traditionally, the notion of a free form has not played a big role in basic morphosyntax. However, the purpose of the proposed definition is not to offer an *intuitive* characterization of roots. Instead, its purpose is to make linguists aware that until now, no really good definition has been proposed, and that it is possible to formulate a very good definition on the basis of widely agreed semantic criteria plus the free-form criterion (i.e. that roots can occur on their own, or at most in combination with some nonroots).

It is not clear whether roots might play a significant role in our ultimate understanding of the grammatical properties of human languages (for example, whether they are innately given as part of a "universal grammar" of some kind), but for the time being, it seems best if we have clear definitions of our traditional terms, including *root*.

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