A comparison of roots as units of analysis in Modern Hebrew and Spanish: exploring a remnant approach to defining roots

Ignacio L. Montoya
City University of New York
imontoya@gradcenter.cuny.edu

1. Introduction

The root as a morphological unit has been utilized in the description and explanation of a multitude of linguistic patterns. In most accounts of Semitic languages, for example, abstract, non-concatenative roots serve as the formatives around which the system is structured (e.g., Harris 1941; McCarthy 1981; Arad 2005), and in Indo-European historical linguistics, most of the lexicon has been reconstructed in terms of roots that correspond to the template *CeC, or a predictable variant (Forston 2004).

The concept of the root, though, is not approached consistently across diverse morphological theories. In some models, for example, the root is a meaningful unit (McCarthy 1981), and in others, simply a unit of form (Aronoff 1994). Even in the treatment of Semitic languages, where the root has long played a role (Aronoff 2013), the root as a necessary grammatical unit has recently been questioned (e.g., Bat El 1994; Ussishkin 2005). Moreover, across different linguistic traditions, the construct of the root has been conceptualized in distinct ways, making it difficult to make cross-linguistic comparisons. Considering the treatment of roots in Semitic, Indo-European, and Austronesian, Blust (1988) speculates that "the principal common denominator in [the various uses of the term root] appears to be an accidental coincidence in terminology" (2). In fact, cross-linguistic comparisons of word-internal morphological constituents such as roots and stems are not widely represented in the literature.

Given this scarcity of cross-linguistic comparisons of roots, the present study considers one of the problems involved with cross-linguistic investigations, that of defining roots in such a way that meaningful comparisons can be made. To that end, this paper explores a methodology for identifying roots across languages that addresses the concern expressed by Blust (1998) by ensuring that we are comparing like units across different languages. This methodology will be applied to the morphological systems of Modern Hebrew (henceforth Hebrew) and Spanish, which then allows for us to consider the extent to which roots are comparable across the two languages.

This paper is organized as follows. In Section 2, two approaches for characterizing roots are presented: the positive approach, in which roots are defined in terms of properties they possess or functions they perform, and the negative approach, in which roots are characterized as the element that remains after all morphological processes have been accounted for. The negative, remnant approach will be adopted in this paper, and will be discussed in greater detail in Section 3. In Section 4, the process of identifying roots will be presented and applied to Hebrew and Spanish. The elements yielded from the application of this procedure will be described, as will problematic issues that merit further investigation. Section 5 offers a comparison of the properties of roots identified via the remnant approach. Section 6 concludes

with a discussion about how this approach might be used to develop a more extensive typology of roots and about potential theoretical implications of the findings of this paper.

2. Operationalizing roots

Broadly speaking, roots may be characterized in one of two ways, which may be termed positive and negative characterizations. The positive characterization involves conceptualizing roots in terms of the properties they possess or the functions they perform, both of which are determined prior to the analysis of a specific language. In the introductory textbook *Language Files*, for example, a root is defined as "the free morpheme or bound root in a word that contributes most semantic content to the word, and to which affixes can attach" (Mihalicek and Wilson 2011: 703). As this glossary entry exemplifies, a root is defined in terms of what it is (i.e., a type of morpheme) and what it does (i.e., contributes semantic content and serves as the base of affixation). In this characterization, roots are building blocks, units that are selected, or the starting points of morphological processes.

The negative characterization, on the other hand, involves conceptualizing roots in terms of what remains after inflectional and derivational morphology has been accounted for (Blevins 2006). This characterization is represented in a different introductory textbook. In Robins' (1964) *General Linguistics: An Introductory Survey*, the root is defined as "the part of a word structure which is left when all the affixes have been removed" (206). More recently, it has similarly been described as "what is left when all morphological structure has been wrung out of a form" (Aronoff 1994: 40). In this characterization, words are the starting point and roots are the remnants of analysis.

Broadly speaking, morphological analyses described as morpheme-based (following Stewart 2008), such as Distributed Morphology (Halle and Marantz 1994), adopt a positive characterization, whereas those that are word/lexeme-based, such as A-Morphous Morphology (Anderson 1992), adopt a negative characterization. The present paper adopts a negative characterization consistent with word/lexeme-based models.

3. Remnant approach to roots

Though certainly in many instances both the positive and the negative approaches identify the same element as a root, this paper is based on the assumption that the negative, remnant characterization is better suited for answering questions about cross-linguistic comparisons of roots. One of the problems with the positive approach is that it entails having a set of properties or functions for roots defined *a priori*. If we take a positive approach to characterizing roots, then we run the risk of either (a) having used different characteristics in different languages, as Blust (1988) suggests has happened, thereby hindering meaningful cross-linguistic comparisons, or (b) deciding on an *a priori* set of properties or functions that may not actually be appropriate for certain languages. In contrast, the negative, remnant approach provides a procedure for identifying roots that is independent of particular properties. Given that it can be applied in the same way across different languages to yield what can be considered like units, this procedure for identifying roots facilitates meaningful cross-linguistic comparisons. Across different languages, we would be comparing the part of the word that expresses no grammatical information. Furthermore, the fact that roots are not identified based on their properties or functions then allows for a more empirical exploration of the properties and functions of those units.

Though implications for morphological theory using this approach are considered in Section 6, the procedure for identifying roots developed in this paper is not based on very many strong theoretical claims about morphological structure, though, certainly, no linguistic

analysis is truly pre-theoretical. One of the main assumptions of this paper, for example, is that the word is a relevant and relatively stable cross-linguistic unit of analysis. This follows work in what may be broadly called a Word and Paradigm orientation (e.g., Anderson 1992). Though the construct *word* is not a fundamental unit in certain approaches (e.g., the Distributed Morphology framework of Halle and Marantz 1994), a great deal of literature supports the notion of the word as a foundational morphological unit (e.g., Robins 1959; Aronoff 1976; Dixon and Aikhenvald 2002; Blevins 2016). Given the emphasis on the surface grammatical word as a starting point of analysis, therefore, it would be reasonable to say that this approach is better aligned with a word-based model, though it is not necessarily inconsistent with a morpheme-based model, depending on how such a model characterizes the grammatical word.

4. Identifying roots

Adopting the remnant approach, one would identify roots by starting with a surface grammatical word. The next step would be to remove all of the exponents of grammatical properties that are expressed in that word. This includes both inflectional elements (i.e., those that participate in relating forms within paradigms), such as person, number, and tense, and derivational properties (i.e., those that involve relationships between lexemes), such as adjectivization, causative, and diminutive markers.

One consequence of this approach is that, though there are debates in the literature regarding the status of, for example, theme vowels in Spanish and templates (a.k.a., *binyanim*) in Hebrew, this process would remove all such exponents regardless of whether they are inflectional or derivational since they are in any case associated with grammatical features. Once this unit, which we will call the root, is determined in this way, we can then start to examine the properties that the root possesses and the roles it plays in the linguistic system.

We should also note that a similar procedure can be applied to identify the stem, which can be considered the element that remains after inflectional exponents have been removed. The stem merits a much fuller discussion of its own, and conclusions regarding the nature of the stem would also inform us further regarding the nature of the root. However, such an investigation is beyond the scope of this paper.

4.1 Identifying roots in Hebrew

Using the remnant approach to identify roots in verbs in Hebrew is relatively straightforward, unlike the more problematic nominal system, which is discussed below. Identifying the root in a verb involves removing the exponents of person, number, gender, tense, mood, voice, and inflectional class. A key component of Hebrew verbal structure is the *binyan*, also known as the template. This paper assumes Aronoff's (1994) treatment of *binyanim*, in which they constitute both inflectional and derivational elements, though the overall analysis would not change if *binyanim* were considered either strictly inflectional or strictly derivational. Exponents of inflectional class are the markers of the *binyan* (i.e., conjugation class, which is expressed as a prosodic template) that a surface word belongs to. In the verbal system, this procedure yields exactly the kind of element that one would expect: an abstract, discontinuous, consonantal sequence – the traditional Semitic root. The following examples illustrate the application of this procedure:

(1) *ʃomeret* 'she guards' → *ʃomer* → *ʃ-m-r*

(2) *hitlabeʃ* 'he dressed himself' → *l-b-ʃ*

In (1), starting with the surface form *ʃomeret* 'she guards' and removing the gender exponent – the suffix *–et* – produces *ʃomer*. Since the fact that this verb is in the present tense is indicated by the vowels *o* and *e*, these vowels are also removed, yielding the root *ʃ-m-r*. The same process yields the same kind of tri-consonantal unit in (2), where the surface word is *hitlabeʃ* 'he dressed himself'. Of note in this example is the fact that one could parse the exponents of the various features in different ways. For example, one might consider that the initial *h* by itself marks past tense since it is found in the past tense form of at least one other inflectional class, or one could treat the whole prefix *hit* as a unit associated with inflectional class. In either case, though, all of the elements except *l-b-ʃ* provide grammatical, as opposed to lexical, information. For example, the distinction between prefixal consonants and root consonants can be seen in McCarthy's (1979) treatment of the prefixes as occupying a tier distinct from the root tier. With regard to vowels, in some cases, such as in (1), they mark tense and in others, such as in (2), they mark inflectional class. Moreover, in some cases, the *binyan* itself can also be considered derivational (Aronoff 1994). Regardless of the parsing, though, all of these elements are exponents of one grammatical feature or another, so they are all removed to yield the root.

With regard to identifying nouns and adjectives in Hebrew using the remnant approach, removing the inflectional exponents is much more straightforward than dealing with the derivational exponents. The inflectional exponents are readily identifiable; these include gender and number suffixes, as well as the possessive markers and markers of definiteness, whether these are considered affixes or clitics. The complications for nominal forms arise, however, as a result of issues regarding nominal derivational patterns, what are referred to as the *mishkalim*. The following examples serve to illustrate:

(3) *jatsran* 'manufacturer' → *j-ts-r* (cf. *jitser* 'he manufactured'; *dabran* 'talkative', *diber* 'he talked')

(4) *ʃulxan* 'table' → *ʃulxan* (no relation to *ʃalax* 'he sent')

In some cases, a word indeed seems to clearly exhibit derivational morphology that can be removed. For example, in (3), the noun *jatsran* 'manufacturer' seems straightforwardly derived from its verbal counterpart, *jitser* 'he manufactured', with *j-ts-r* as its root, in the same way that *dabran* 'talkative' is derived from the verb *diber* 'he talked' and shares the root *d-b-r*.

On the other hand, a word such as *ʃulxan* 'table' in (4) has no derivational morphology associated with it. What might appear to be a tri-consonantal root in that word, namely *ʃ-l-x*, is indeed a root associated with a verb. However, the verb in this case, *ʃalax* 'he sent' is not related to *ʃulxan*, either synchronically or diachronically. An alternative analysis would be to claim that words such as *ʃulxan* are not based on roots. However, if we are defining the root as the element that remains after all inflectional and derivational information is removed, then we must conclude that the root of *ʃulxan* is essentially the non-decomposable surface word itself. This observation that nominals in Hebrew appear to have two different kinds of roots was noted in Arad's (2005) Distributed Morphology analysis of Hebrew roots in which she speaks of two different kinds of roots: consonantal and syllabic.

4.2 Identifying roots in Spanish

Applying the remnant approach to surface words in Spanish yields elements that have been referred to as roots by some and stems by others, which supports the idea that the distinction

between roots and stems is complicated and suggests that further work on how to treat the stem is critical for understanding how these two elements interact.

As we did for Hebrew, we start our treatment of Spanish by first removing the inflectional exponents, such as tense, aspect, person, and number, and then removing derivational exponents. Both of these processes are relatively straightforward. Theme vowels, though, which are sometimes considered to be empty morphs, potentially pose some complications. However, the analysis of this paper follows that of others in which theme vowels are treated as markers of inflectional classes (Harris 1991; Aronoff 1994). Thus, given that they are exponents of grammatical properties, they are removed in order to determine the root.

As in Hebrew, another issue that can arise has to do with multiple potential segmentations. For example, a variety of segmentations can be justified for a verb like *bailaríamos* 'we would dance' in (5): *bail-aríamos*, *bail-aría-mos*, *bailar-íamos*, *bail-ar-ía-mos*. In all cases, though, the root is the same, since the competing segmentations all involve grammatical exponents.

(5) *bailaríamos* 'we would dance' → *bail-*

(6) *desordenar* 'to disarrange' → *desorden-* → *orden-*

The example in (6) illustrates how a derivationally complex word is stripped of its inflectional morphology to yield a stem and then stripped of its derivational morphology to yield a root.

4.3 Interim conclusion and problems to be resolved

The discussions in Sections 4.1 and 4.2 involve relatively unproblematic examples. They are meant to illustrate the principles involved in the remnant approach and to demonstrate how this procedure in its most straightforward application leads to analyses that are different from some other accounts. For example, forms such as *fulxan* in (4) are not generally regarded as roots, in large part because they do not have the properties that are adopted prior to analysis as the defining properties of roots in Semitic (i.e., their abstract, discontinuous nature). In a remnant approach, though, such forms are like the canonical tri-consonantal roots, such *ʃ-m-r, l-b-ʃ,* and *j-ts-r* in (1-3), in that they too are the parts of the word that contain no grammatical information. There is a way, therefore, in which the two types are like entities and it is worth considering the kinds of conclusions that can be reached in treating them as such. In addition, given that the Spanish roots in (5) and (6) are also operationalized as the parts of the word that do not convey any grammatical information, roots in Hebrew and roots in Spanish determined using a remnant approach are also like entities, and a cross-linguistic comparison of the two has the potential to yield meaningful insights.

It is important to note, though, that the present analysis serves as simply a preliminary treatment of the topic. As such, it raises many issues that need further development. One of the issues to be resolved in the application of the remnant approach involves cases where some kind of morphological structure seems apparent but it is problematic to treat that structure as either derivational or inflectional. In Spanish, for example, one of those cases involves Latinate roots, which have a parallel in English (cf. Aronoff 2007). If we take a word such as *recibir* 'to receive' we see that it seems to be composed of two elements, *re-* and *-cibir*, both of which recur in other other words in which they play a similar role (e.g., *reducir* 'to reduce', *percibir* 'to perceive'). However, these relationships cannot be straightforwardly categorized as either clearly inflectional or derivational and are perhaps best considered as simply diachronic artifacts that are no longer active synchronically. In Hebrew, this issue is evident with certain kinds of nominal patterns, or *mishkalim*. In the word *misrad* 'office', for

example, we can recognize a morphological element, the *miCCaC* template, that is evident in words such as *mikdaʃ* 'temple' or *mivxan* 'test' (cf. *kideʃ* 'he sanctified' and *baxan* 'he examined'); however, it is difficult to argue that in *misrad* that template is an exponent of a grammatical or semantic feature. Other issues that should be considered are how to deal with cases of root allomorphy in which a basic form is not clearly motivated. Both Spanish and Hebrew offer examples of this (e.g., involving diphthongization in the former and spirantization in the latter).

5. Comparison of roots in Spanish and Hebrew

Once roots have been identified in a language, we can then ask questions about the properties and roles of roots in that language. Thus, rather than assuming that, for instance, roots in Hebrew are abstract, discontinuous, consonantal forms and then concluding that they are not evident in certain nominal forms, we instead include those nominal forms in our calculations of roots and then ask whether roots in Hebrew have a particular shape. In this section, those kinds of questions are asked for Hebrew and Spanish, and the answers for each language are compared.

One of the questions that is commonly asked with regard to roots is whether they are morphemic (i.e., units of meaning), or whether they are purely units of form. Can a stable lexical meaning be associated with a root? In Hebrew, the answer to that depends on whether we look within a lexeme or across lexemes. Within a lexeme, roots do indeed seem to be associated with a stable lexical meaning, as in (7), in which all forms are clearly associated with a meaning of LEARN.

(7) *lamad* 'he learned', *lomedet* 'she learns', *nilmad* 'we will learn'

This is not necessarily the case across lexemes, though, as illustrated by (8).

(8) *kibed* 'he offered refreshment', *hixbid* 'he burdened', *kaved* 'liver'

Indeed, as has been noted in the literature, trying to find a common meaning in certain sets of words that share a common root, such as those in (8), is theoretically and empirically very problematic (Aronoff 2007).

In Spanish, the same kind of stability within a lexeme is evident. In contrast to Hebrew, though, significant stability is also found across lexemes. The nature of the morphological system supports fewer instances of completely opaque meanings. That is in large part because roots do not tend to be as frequently shared across lexemes. For example, whereas one root can be associated with several conjugation classes in Hebrew, this is not the case in Spanish. Furthermore, Spanish tends to have more transparent derivational morphology, unlike the complex system of nominal derivational patterns, the *mishkalim*, of Hebrew.

Another question that can be asked about roots is whether they have a distinctive characteristic shape in a particular language. In Hebrew, the answer to that is, in large part, yes. With regard to all verbal and many nominal words, roots have a readily identifiable prosodic shape: the canonical tri-consonantal sequence or one of a limited set of variants (e.g., roots with four or more consonants). These sequences are abstract in the sense that they are not pronounceable in isolation. As noted earlier, though, there is an asymmetry between nouns and verbs such that abstract roots cannot be identified in certain nominals, such as the previously mentioned *fulxan* 'table', in (4), from which no additional morphological structure can be removed. Therefore, though abstract canonically tri-consonantal roots can be identified

for many lexical words, the root system in Hebrew is not uniform with regard to the shape of roots.

In Spanish, roots do not have a particularly distinctive form, neither with verbal nor with nominal words. Indeed, roots exhibit a wide range of shapes, including single segment roots such as the /d/ in *dar* 'to give' and multisyllabic roots such as that of *experimentar* 'to experience'. Roots in Spanish are also not particularly abstract; they resemble surface words and other morphological elements, with the exception that roots do not necessarily follow coda constraints in which, for example, clusters are prohibited (e.g., the root *experiment-* of *experimentar*).

If characteristic form is one property that can potentially be associated with roots, characteristic distribution within larger grammatical or prosodic units is another. In this case, both Hebrew and Spanish have roots that are readily identifiable distributionally. In Hebrew, abstract roots are interdigitated with vocalic templates in a predictable manner, such that they are readily easy to recognize within a word. With both verbs and nominals, the distributional relationship between affixes and roots is consistent. For example, number morphology always occurs after a root, most future affixes are before the root, and so forth. In Spanish, roots also have a diagnostic distribution. For instance, they always occur before inflectional morphology and in a predictable relationship to derivational morphology. Based on these two languages, then, it seems that one hypothesis worth exploring further is whether cross-linguistically distribution is a more reliable identifier of roots than form.

In some theoretical approaches, roots have been described as a-categorical. Therefore, one of the questions that can be asked is whether roots identified using the remnant approach can also be described as a-categorical, or whether they are instead reliably associated with a particular lexical category. With the notable exception of the aforementioned non-abstract nominal roots in Hebrew, which are consistently associated with nouns and adjectives, one cannot reliably predict whether a given root in Hebrew or in Spanish will be associated with, for instance, a noun or verb or both. For example, in both (9) and (10), the root *g-d-l* in Hebrew and the root *camin-* in Spanish respectively can be associated with a verb, a noun, or an adjective.

(9) *gadal* 'he grew', *godel* 'size', *gadol* 'large' → *g-d-l*

(10) *caminar* 'to walk', *camino* 'path', *caminable* 'walkable' → *camin-*

Notably, though, some exceptions to this generalization can be found. For example, in Hebrew, *kise*, which is another example of a non-abstract nominal root, is reliably associated only with a noun. In general, however, it does seem to be the case that in these two languages roots can be a-categorical.

In addition to considering the properties of roots, we can also ask about the roles that roots play in a language: How useful is the root as an analytical tool? Does it facilitate descriptions of patterns in a language with regard to morphology, phonology, syntax, or semantics? Such patterns include distributions, processes, and constraints, and the root may serve as a domain, a trigger, a target, etc.

One of the most commonly cited patterns involving roots in Semitic languages involves consonant co-occurrence restrictions. This refers to the observation that roots in surface words can have neither identical nor homorganic first and second consonants nor, with very few exceptions, homorganic second and third consonants (Greenberg 1950; McCarthy 1981; Bat El 2003). On the other hand, we do find many examples of identical second and third root consonants, and, though less frequently, identical and homorganic first and third consonants, as in (11).

(11) *ʔided* 'he encouraged', *nigen* 'he played'; **ideʔ*, **nineg*

These patterns can be described using the construct *root*, which indicates that the root can indeed be a useful tool for describing the pattern.

Two phonological processes in Hebrew that can be described using the root are sibiliant metathesis and the blocking of post-vocalic spirantization. Sibilant metathesis occurs in a very specific domain: with the *hitpa'el* conjugation class when a sibilant occurs in the first root position. To illustrate, in *lehiʃtalet* 'to dominate', which is related to *liʃlot* 'to control', the *t* of the prefix *lehit-* metathesizes with the first root consonant, the *ʃ* (cf. *lehitlabeʃ* 'to dress oneself'). Spirantization is a common process in Hebrew whereby *b*, *p*, and *k* become fricatives after vowels. This process, however, does not apply in all cases. One of the instances where it fails to apply is in certain conjugation classes, those which historically contained geminates. This can be seen in the alternation between *xover* 'he joins' where post-vocalic spirantization does apply and *mexaber* 'he connects' where the process is blocked. The root is a useful construct for describing this exception: Post-vocalic spirantization fails to apply to the second root consonant of certain conjugation classes. Though both of these processes may potentially be described without the root, this unit offers elegant and efficient statements of the linguistic patterns.

Roots are also useful in characterizing certain morphological alternation classes. Aronoff (2007) observes that, for example, some words with *n*-initial roots drop the *n* in certain cases and some other words do not. This is illustrated by (12) and (13), which have words associated with the roots *n-s-ʕ* and *n-h-g*, respectively.

(12) a. *pa'al* conjugation class: *nasa* 'he traveled', *jisa* 'he will travel'
b. *hif'il* conjugation class: *masia* 'he transports'

(13) a. *pa'al* conjugation class: *nahag* 'he drove', *jinhag* 'he will drive'
b. *hif'il* conjugation class: *manhig* 'he leads'

In the third singular masculine past, 'travel' is *nasa* and 'drive' is *nahag*. In the future, the *n* drops for 'travel', *jisa*, but not for 'drive', *jinhag*. Thus, these two words belong to two different alternation classes. What we can observe is that when in other conjugation classes where the *n* might potentially drop, the root behaves the same. For example, in the *hifil* conjugation class, the *n* also drops for the word associated with the first root but not for the word associated with the second root: We find *masia* 'he transports' versus *manhig* 'he leads'. Thus, these morphological alternation classes are root-based.

In contrast to the variety of patterns that can be described using roots in Hebrew, fewer such patterns are available in Spanish. One pattern that can be described using roots, however, involves diphthongization. In words where the alternation occurs, the stressed syllable of the root is diphthongized (Hualde 2005), as illustrated in (14) and (15).

(14) *pienso* 'I think', *pensar* 'to think'

(15) *duermo* 'I sleep', *dormir* 'to sleep'

The first syllable in the first word of each pair is stressed but not the first syllable in the second word of each pair. The domain of diphthongization is what has been identified as the root using the remnant approach; thus the root can potentially be used in the description of this morpho-phonological process. Overall, though, fewer patterns in Spanish seem to rely on a root for their description. Comparing similar patterns across Hebrew and Spanish reveals

that the kinds of patterns in Hebrew that can be described by roots cannot similarly be described in Spanish. For example, though both Hebrew and Spanish exhibit morphological alternation classes such as those exemplified in (12) and (13) for Hebrew, such patterns in Spanish make reference to a lexeme and not to a root (Bermúdez-Otero 2013). Thus, the root is a more useful tool for describing linguistic patterns in Hebrew than in Spanish.

6. Conclusions

With regard to taking preliminary steps towards a typology of roots, one of the biggest contributions of this work is the development of a methodology – what is referred to as the remnant approach – for identifying roots across distinct languages such that meaningful comparisons can be made. This methodology has the advantage of employing a characterization of roots that is independent of properties or functions and that therefore can be used to explore properties and functions in a cross-linguistic context.

In addition, applying this process to Spanish and Hebrew also illuminates some potential dimensions on which a more extensive typology can be based. Roots can be described on a scale of abstraction based on how close they are to surface forms. Some roots, such as those in Hebrew are abstract, and some, such as those in Spanish, are more concrete. In addition, abstractness can be considered with regard to both form and meaning. Distribution is another criterion that can be used for describing roots. Distribution of roots is predictable in both Hebrew and Spanish. Another dimension that can be used to describe roots is their prosodic shape, which may or may not be consistent for a given language (e.g., roots in Hebrew verbs have a characteristic discontinuous consonantal shape but Spanish roots can be very variable). We can also ask how uniform a system is for a particular language. As the asymmetry between nouns and verbs in Hebrew demonstrates, it is possible for roots in one lexical category to behave differently than in another. Another typological question to ask is whether certain kinds of roots in a language are associated with a particular lexical category. Though this does not appear to be generally the case in Hebrew and Spanish, the asymmetry in Hebrew between nouns and verbs hints at the possibility that this might be more clearly the case in other languages. Finally, it might also be fruitful to consider the kinds of patterns – distributions, constraints, processes – in which a root plays a role, and to ask the question: How useful is the root in describing the patterns of a language?

Though the purpose of this study was primarily to explore the implications of defining roots using the remnant approach, the preliminary findings present potential theoretical implications. For example, in terms of the status of roots – whether they are morphemes or purely formal – the results of this exploration support other literature on the topic that suggests that roots cannot straightforwardly be thought of as morphemes, if a morpheme is defined as a minimal unit of meaning. In addition, this work speaks to the importance of not taking for granted characterizations of roots when offering generalizations beyond a single language or language family. It is likely the case that those prior characterizations are based on a set of language-specific properties.

Indeed, these findings also speak to maintaining a certain level of caution against defining the root, and potentially other linguistic units, on the basis of properties in a limited set of languages. Though roots across languages certainly are expected to share some properties, we can also see that potentially few and potentially no properties across languages for roots will converge when we look at a much larger set of languages.

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