

Morphological theory and English

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ABSTRACT

This paper presents a review of a number of recent issues in the field of generative morphology, with their implications for the description of English. After an introduction to the field two types of question are considered. First, I examine the nature of word structure and illustrate two competing approaches, one of which assumes that words have a constituent structure (much like the phrase structure of syntax) and the other of which rejects this assumption. Then we look at the way morphological structure interacts with syntax. We examine the extent to which syntactic principles can account for the behaviour of certain types of compounds and also the expression of syntactic arguments in nominalizations.

1. Introduction: morphology in generative grammar

This review will deal with a number of trends in recent morphological theory as they affect our understanding of English morphology. Descriptions of English morphology can be found in Adams (1973), Bauer (1983), Spencer (forthcoming) and Szymanek (1989); Selkirk (1982) contains a good deal of factual information, too. The standard descriptive source (with historical information) is Marchand (1969).

Morphology entered the domain of generative linguistics with Chomsky (1970), Halle (1973), Siegel (1979) and Aronoff (1976). Morphology stands at the interface between the lexicon, phonology and syntax, and many of the most significant questions concern the way that morphological representations interact with representations at other linguistic levels. At the same time, important questions have been raised about the nature of morphological units and morphological processes. Generative grammar seeks to provide an explicit, formal theory of language structure. Originally this meant constructing sets of rules, which are ultimately formalizable as mathematical expressions, but which in practice are usually stated in a relatively informal notation. Such a set of rules is a grammar, and this is held to underlie the native speaker's tacit (unconscious) knowledge of his/her language. More recently, grammars have been viewed as sets of principles and constraints on the well-formedness of linguistic expressions, but the overall conception remains essentially the same.

It is very important that such a grammar provide a representation of all the grammatical expressions of the language (i.e., sentences in the case of syntax,

words in the case of morphology) and fail to prove a representation of those expressions not permitted in the language. We say that a grammar generates the well-formed expression (i.e., correctly formed sentences or words).

There are three main aspects of word structure: (i) the phonological structure of words and morphemes; (ii) the internal structuring of words, i.e., the way that component morphemes combine, and also the relationships that hold between sets of morphologically related words; (iii) the relationship between word structure and syntactic processes and representations. In this review I shall be concerned with questions (ii) and (iii), basing myself on phenomena in English which have been the subject of recent theoretical discussion.

2. The internal structure of words

There have been two basic approaches to account for the structure of a word such as *untied*. First, we can store individual morphemes *un-*, *tie*, *-d*, along with their meanings or grammatical function, and then combine them to give first [un + tie], then [[un + tie] + d]. On this conception a morpheme is essentially like a morphologically simple (monomorphemic) word, stored in the lexicon. This is basically the model proposed by Halle (1973), one of the first explicit statements of generative morphology. The other conception is to regard the verb stem *un-tie* as the result of a morphological operation of prefixation performed on the root (or word) *tie*. The past tense is then formed by virtue of another operation of *-d* suffixation. In this view it is the lexical roots like *tie* which are stored in the lexicon, and the inflectional and derivational morphemes are added by specifically morphological operations. This model was first argued for by Aronoff (1976) (though he only discussed derivation; Beard, 1987, proposes a model including inflection). Finally, we can adopt Halle's model for derivational morphology, but handle inflection in something closer to Aronoff's way. An influential approach along these lines is the model of inflection proposed by Anderson (1982).

These competing views mean that one of the main controversies in generative morphology is whether word structure should be thought of as like syntax, and involving the successive concatenation of morphemes, the way that words are concatenated to form sentences, or whether this analogy with syntax is misleading. An important notion here is that of 'morpheme'. In structural theories of morphology a word form such as *cats* consists of a root morpheme *cat* and a plural morpheme *-s*. This sort of description is often referred to as an Item-and-Arrangement model. However, we can also say that the abstract lexeme CAT, which has the basic phonological shape /kat/, is modified by addition of the *-s* plural marker. This sort of approach is often called the Item-and-Process approach. For a simple-minded example such as this there

seems to be little difference between the two formulations. However, consider an irregular plural form such as *men*. What is the plural morpheme in this word? These types of cases are notoriously difficult for Item-and-Arrangement models, but submit to description under an Item-and-Process view, where we can simply say that there is an idiosyncratic pluralization process which involves changing the vowel. This sort of situation lessens the value of the whole concept of 'morpheme'.

Aronoff (1976) argued further against the morpheme concept. He pointed out that many morphological processes seem to apply to words rather than to morphemes. A survey of these issues can be found in Scalise (1984) and Spencer (1991). One of the points Aronoff makes is that it is not always possible to take the morpheme as a sign, that is, as a unit of meaning. Sometimes, we must recognize meaningless morphemes which nonetheless combine to form meaningful words. The prime example of this is a fairly large class of verbs in English of latinate origin consisting of a prefix and stem of the type *commit*, *receive*, *import*, *detain*. It seems clear that these are prefixed since the same prefixes, *con-*, *re-*, *in-*, *de-*, *per-*, *pro-*, *ex-*, *trans-* and so on recur. At the same time, a small number of recurrent stems can be identified, including *-mit*, *-ceive*, *-port*, *-tain*, *-fer*, *-late*, *-duce*, *-note*. However, it is impossible to provide a unitary meaning, or even collection of meanings, either for the stems or the prefixes'. Yet a word such as *transmit* or *collate* has a definite meaning. Aronoff argues that these latinate stems are morphemes rather than just meaningless morphs on the grounds that they undergo distinctive allomorphy. Thus, from *-ceive* we form adjectives such as *receptive*, *deceptive*, *perceptive*, and nominalizations such as *reception*, *deception*, *perception*. Here it is clear that there is a distinct allomorph, *-cept*, for these formations. Now, the only thing which can exhibit allomorphy is a morpheme, ergo stems such as *-ceive* are morphemes, albeit meaningless ones.

These and related arguments lead to the conclusion that we should regard at least certain types of morphological structure as the result of processes which stems undergo, rather than as 'things' (i.e., morphemes, which have a separate meaning and which are concatenated to form expressions with a complex derived meaning). This approach to derivational morphology is reminiscent of the 'Word-and-Paradigm' approach to inflection. In this approach inflectional formatives are not lexical entries (i.e., not morphemes) but are realizations or exponents of sets of morphosyntactic or morpholexical features. This is motivated by two types of phenomenon, *cumulation* and *extended* (and *overlapping*) *exponence*.

Cumulation occurs when a single formative signals more than one grammatical property or 'meaning'. For instance, in the Catalan verb form *porta* 'he

1. These are different from so-called 'cranberry morphs' such as the meaningless element *cran-* in *cranberry*. They recur in a whole series of words and have a definable morphological properties, just like bona fide morphemes.

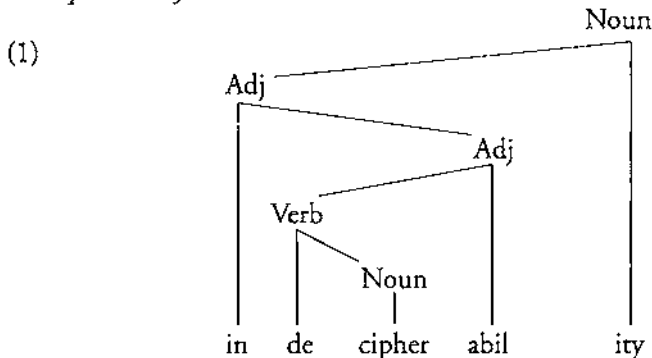
carries, is carrying', the desinence *-a* realizes ('is an exponent of') not just 3sg subject, but also tells us that the verb is indicative mood (cf. pres. subj. *port-i* and imperf. subj. *port-és-Ø*, with a zero agreement marker), and present tense (cf. *port-ava*, *port-á*, *port-ar-á*). Moreover, this desinence can be regarded as coding the fact that the verb is 1st conjugation (cf. *perd*, *tem*, *sent*, *serveix*).

Extended exponence refers to the fact that a single meaning or grammatical property can be signalled simultaneously by several different formatives in the word form. For instance, in the conditional form *portaria* we have an ending which under other circumstances would be the imperfect indicative of a 2nd/3rd conjugation verb. However, in conjunction with the future stem *port-ar* (itself related to the infinitive) the *-ia* ending signals conditional mood. Thus, we can't say that there is a morpheme *-ia* with the meaning 'conditional', nor can we say that there is a suffix *-ar* with this meaning. However, together the two formatives do indeed express the property 'conditional'.

Considerations such as these have led morphologists such as Anderson (1982) to abandon the morpheme concept altogether (especially for inflectional morphology). Anderson argues instead that we must assume that the grammar takes a word stem together with an abstract description of the inflectional form. We must then construct a set of rules to generate the word form corresponding to that inflectional description.

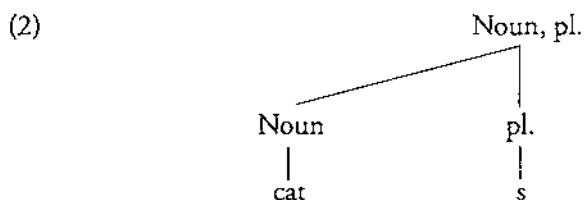
To give a very simple example we might have a rule for English saying that a verb marked [3sg present indicative] has a suffix /z/ attached to it. Hence, the stem *untie* will become *untie-s*. In the case of irregular forms a special rule has to be written for each word (e.g. *sing* [past tense] - *sang* (ablaut)).

Diametrically opposed to this type of approach are what we might call the Word Syntax approaches, which retain Halle's (1973) assumption that morphemes are lexical entries. In these approaches (e.g. Lieber, 1981, Selkirk, 1982, Di Sciullo and Williams, 1987) a word has a constituent structure, similar in kind to the constituent structure of a sentence. Such a structure can be represented by familiar tree diagrams. (They can also be generated by a phrase structure grammar.) An example would be (1), a representation of the word *indecipherability*:

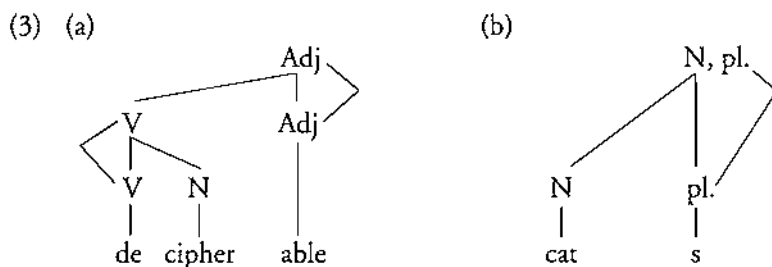


Each morpheme has its own grammatical category. We can imagine such a tree being constructed from the root *cipher* outwards to give [de+cipher], [[de+cipher]+able], etc. Each added affix defines the category of the resulting word, and for this reason is regarded as the head of the word. Because of the resemblance to syntactic structures such an approach is often referred to as Word Syntax.

This approach is also supposed to apply to inflected forms. For instance, the representation for *cats* will be (2):

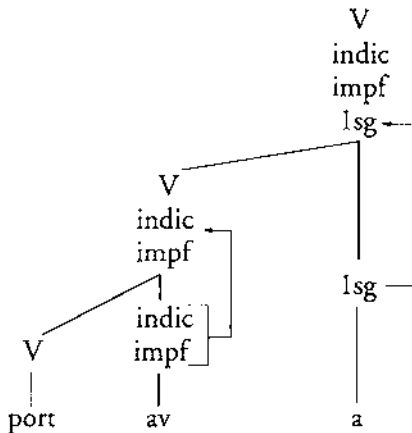


Here the plural suffix is the head of the word and thus characterizes the whole word as a plural form. Technically, the label 'pl.' in (2) is a morphosyntactic feature, and the noun *cats* is said to inherit this feature by a process of percolation. Feature percolation is supposed to take place just from heads. If we regard grammatical category labels like 'Noun', 'Adj.' as features of morphemes, then we can say that the way that *-able* in *decipherable* characterizes the whole word as an adjective is parallel to the way that *-s* defines *cats* as a plural noun. This can be seen in (3), where percolation is shown by an arrow:



However, with inflection there is already a problem. Inflections do not change grammatical category, so the fact that *cats* is a noun is a property of the stem *cat*, not of the plural suffix. But this suggests that a feature ('N') has come from a non-head, *cat*, rather than the head. A slightly more complete example from Catalan makes this more obvious:

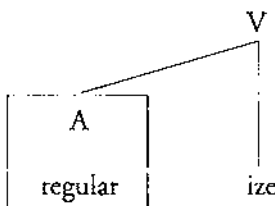
(4)



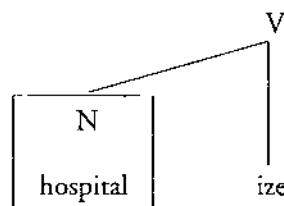
The suffix *-av* is the head of the stem *porta-av-*, and this stem therefore inherits the tense /mood /aspect features of the suffix by percolation. However, after suffixation of *-a*, the stem is the non-head. The only way for the word as a whole to be marked as imperfect indicative, therefore, is for these features to percolate from the non-head.

A different problem for the notion of constituent structure in words concerns the notion of adjacency (cf. Siegel, 1977) in morphology, a specific example of a locality effect in grammar. To understand this notion, consider the case of nominalizations of verbs formed by suffixation of *-ize*, to give *-ization*. Now, *-ize* attaches to certain classes of adjectives and also to a smaller number of nouns, as in *industrial-ize*, *regular-ize* as opposed to *motor-ize*, *hospital-ize*. Other things being equal, it would theoretically be possible for the nominalization rule to be sensitive to this distinction, so that, say, *-ation* only suffixed to deadjectival *-ize* verbs. In other words, the *-ation* rule would be able to see the boxed part of the structures of *regularize* and *hospitalize* as in (5), and fail to apply where the boxed section is not an adjective:

(5) (a)



(b)



It is an intriguing fact about morphological processes that in general they are unable to make this kind of distinction (see Raffelsiefen, 1992, for a reanalysis of putative counterexamples). A number of authors propose principles to prevent such reference (e.g. Siegel, 1977, Williams, 1981). However,

this is unsatisfactory. Why build an elaborate tree structure only to impose a restriction preventing any of it from being accessible?

Another set of problems besetting theories of morphology relying on constituent structure is that known as 'bracketing paradoxes'. A bracketing paradox arises when a morphological construction seems to require one constituent structure analysis at one level and a different analysis at a different level.

A familiar example (though still controversial; see, e.g., Sproat, 1992) is that of the word *unhappier* (Pesetsky, 1985). The comparative *-er* suffix only attaches to a stem if the resulting word forms a single stress foot (i.e., if it has no secondary stresses). In practice, this means single syllables or disyllabic stems ending in syllabic consonants or *-i*. Phonologically, then, we would expect *unhappier* to have the structure of (6a):

(6) a. [un [happy er]]

Here, *-er* has attached to *happy*, which is permitted (hence we have *happier*). Then, we prefix *un-*. However, when we look at the semantics, we see that *unhappier* means 'more unhappy'. This means that the comparative morpheme takes the negative morpheme in its scope. This implies the structure (6b):

(6) b. [[un happy] er]

These are incompatible, hence the 'paradox'.

There are, in fact, a good many types of construction where this kind of anomaly arises, and there is no reason to believe they are all of the same kind, and should be analysed in the same way. Indeed, one class of bracketing paradoxes seems to be the result of a special type of word formation process in English. This is the type illustrated by the expression *transformational grammarian*. Though this can (facetiously) be interpreted to mean 'a grammarian who is transformational', the normal interpretation is 'specialist in transformational grammar'. On this reading, we obtain a morphological constituent structure in (7a) which is at variance with the phonological bracketing of the phrase, (7b):

(7) a. [[transformational grammar] ian]
 b. [transformational [grammar ian]]

The justification for (7a) is that *-ian* means (roughly) 'specialist in ...', and hence modifies the entire phrase *transformational grammar*.

In Spencer (1988; cf. also Spencer, 1991, ch. 10, Carstairs-McCarthy, 1992: 92-97; and see Beard, 1991, for a different analysis) I point out that this example represents a widespread feature of English in that we can form expressions meaning 'person who does/is associated with X' for a great variety of types of X, more or less independently of the morphological structure of X. Moreover,

this process (of 'personal noun formation') engenders a more drastic type of problem. Consider the following cases:

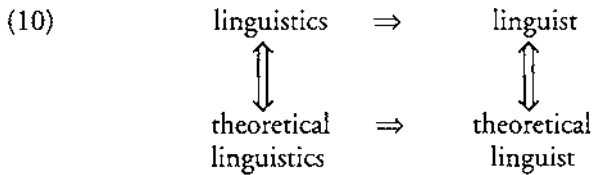
- (8) a. moral philosopher
 b. baroque flautist
 c. electrical engineer
 monumental mason
 historical linguist
 East German

The problem with the examples in (8) is that their sources (in (9)) seem to be morphologically inappropriate in various ways.

- (9) a. moral philosophy
 b. baroque flute
 c. electrical engineering
 monumental masonry
 historical linguistics
 East Germany

Yet we cannot argue that the examples of (9) are derived from those of (8) morphologically, because the specialist meaning found with (8) is obviously derived from the specialist meanings associated with (9), not vice versa. In (8a) we see a case where an affix *-y* is replaced by *-er*, and in (8b) the stem undergoes drastic allomorphy. The most telling examples are those of (8c), where we seem to have lost an affix in the course of the derivation. Clearly, these cases show that we don't even have a paradoxical bracketing: no sensible constituent structure of any kind can be given to these examples.

The solution I advocate is to say that there is a process of personal noun formation which is independent of the morphological processes which realize it. In this respect, we can liken personal noun formation to plural formation: (more or less) every noun in English can have a plural, even though the plural morphology varies considerably. This is effectively to say that there is a separation of the abstract morphological process from the various morphological operations which might give rise to it. In fact, the way such expressions are constructed turns out to depend on the contents of the lexicon of English. We can form a personal noun in just those cases where the head noun in its unmodified form has some sort of personal form. For instance, corresponding to *linguistics* we have *linguist*. Therefore, when we form an expression *theoretical linguistics* and store this as a set phrase in the lexicon, this licenses the construction of the personal noun based on its head, viz. *theoretical linguist*. This can be thought of as a type of productive analogical formation, as diagrammed in (10):



This is only possible, however, when the three licensing expressions are lexicalized. If we try to construct a personal noun from a straightforward syntactic phrase, such as 'difficult linguistics' we are unable to form a personal noun. Hence, *difficult linguist* cannot possibly mean 'one who specializes in difficult linguistics', nor can *wooden flautist* mean 'one who plays a wooden flute'. This is because the positions in diagram (10) corresponding to that of *theoretical linguistics* is missing for these cases.

This type of phenomenon constitutes a case of word formation (derivation) which is based on the lexicon, and can be regarded as a type of paradigmatic word formation. This means that we no longer associate a specific meaning with a specific affixal morpheme and compute the meaning of the whole word as a combination of the meaning of the stem plus that of the affix. Instead, we assume an abstract derivation *process* (personal noun formation) and a relatively complex set of morphological *operations* which realize this process. These operations are defined in part by the idiosyncratic properties of lexical items. In this regard, we analyze the personal noun formation process in much the same way that inflectional processes are analyzed in a Word-and-Paradigm model. The approach is essentially the same as van Marle's (1985) analysis of feminine noun formation in Dutch, and it also owes a good deal to Beard's Separation Hypothesis.² Carstairs-McCarthy (1992) and Spencer (1991) discuss further possible cases of this kind.

3. The morphology-syntax interface

Having investigated the extent to which the internal structure of a word reflects the internal structure of a sentence we can now turn to the way that a word's structure can affect its syntactic properties. This is a particularly lively and contentious area of current research.

A question from the morphology-syntax interface which has aroused considerable interest in the theoretical literature concerns the way that the argument structure of a verbal stem can be satisfied in and outside of compounds. Argument structure (valency) refers to the types of subjects and complements a predicate can take. Thus, intransitive (*sleep*), monotransitive (*hit*), and ditran-

2. Stump (1991) presents some interesting criticisms of this treatment of personal nouns.

sitive (*give*) verbs each have a different argument structure. English represents a particularly intriguing example of this problem in the form of synthetic compounds.

It has become customary to distinguish two main types of compound in English. In root or primary compounds we simply compose one word with another, the meaning of the resulting expression usually being determined by the pragmatics of the situation (in the case of nonce forms, cf. Downing, 1977) or conventionally in the case of lexicalized compounds. Such compounds are generally headed structures (endocentric), the head being either a noun or adjective, modified by a noun, adjective or preposition-like element, as in (11):

- (11) a. N N: houseboat, boathouse
- b. A N: blackbird, postal order
- c. N A: canary yellow, ice cold
- d. A A: dark blue, icy cold
- e. P N bypass, in crowd

The second type of compound is referred to as a synthetic (deverbal) compound. Its distinguishing feature is that the head is a noun or adjective derived from a verb stem. Some typical examples discussed in the literature are shown in (12):

- (12) a. truck driver
- b. truck driving, motorway maintenance
- c. handmade, pan fried

The chief interest of these constructions is the claim that the modifier satisfies the argument structure of the verb stem. Thus, in *truck driver*, *truck* is said to function, effectively, as the direct object of *drive*. Thus, (12a) is comparable to (13a) and also to (13b):

- (13) a. to drive a truck
- b. a driver of trucks

Interestingly, there is some disagreement among native speakers as to how these are interpreted. For Lieber (1983), for example, (12a) is ambiguous, in that it can either be a synthetic compound corresponding in meaning to (13b), or it can be root compound with *truck* having just a general modifying function interpreted pragmatically (say, with the meaning 'the (taxi) driver who comes to work in a truck'). However, such a root interpretation only seems possible when the verb stem itself can easily be interpreted as an intransitive verb. When the verb is more or less obligatorily transitive, then the modifier has to function as its direct object. Thus, in Selkirk's (1982) example (14a), *tree* must be the

object of *devour*, and it is therefore impossible to have a direct object (such as *pasta*) expressed as a PP complement to the deverbal noun, as in (14b):

- (14) a. tree devourer
b. *tree devourer of pasta

In particular, (14a, b) could not be given an interpretation 'one who devours (pasta) in trees'.

Various attempts have been made to explain this pattern of data (recent summaries can be found in Spencer, 1991, ch. 8 and Carstairs-McCarthy, 1992, ch. 4). Some of the more interesting ones claim that general syntactic principles apply inside such compounds. Thus, there is a general principle (in Government-Binding theory this is the Theta Criterion, together with the Projection Principle) which accounts for the ungrammaticality of (15), in which our transitive verb lacks an object:

- (15) *Tom devoured.

The claim is that exactly the same set of principles will account for the ungrammaticality of (14b). We simply need to assume that some sort of locality principle governs the assignment of the direct object argument position, in order to guarantee that it is satisfied by the item 'closest' to the verb.³

The controversy surrounding synthetic compounds is beset by empirical difficulties, however, in that it is not obvious that cases such as (14b) are really ungrammatical, as opposed to very unusual (cf. Carstairs-McCarthy, 1992: 118). Of potentially greater theoretical significance is the existence of phrases such as (13b), or nominalizations such as (16):

- (16) a. the building of the pyramids by the Egyptians
b. the construction of pyramids by Egyptians

The questions here are (i) under what circumstances can the argument structure of the verbal stem be satisfied by *of*- or *by*-complements in this fashion? and (ii) by what mechanism can the derived nominal 'inherit' the argument structure of its verbal stem?

A recent set of answers to these questions suggests that the aspectual category of the nominalization is important, so that a processual nominal (i.e. with the meaning 'the process of *verb*-ing) will license, and indeed require the argument

3. One possible approach would be to regard synthetic compounds as effectively the result of noun incorporation comparable to that found with finite verbal heads in languages such as Mohawk or Eskimo, as described by Baker (1988). This is explicitly argued for by Roeper (1988), though it seems to me that his proposals are somewhat problematic. Baker himself distances himself from such a suggestion.

structure of the verb to be satisfied (Grimshaw, 1990). Thus, many *-ing* nominalizations of transitive verbs seem to require an object:

(17) They witnessed the devouring *(of the pasta).

On the other hand, if the nominalization expresses a result or state, then the possibilities are more restricted, and in general the subject⁴ of the verb must remain unexpressed. Thus, in (18) we have a result nominalization, as seen from the fact that it is in the plural. This is unable to cooccur with a *by*-phrase expressing its underlying subject:

(18) a. *the constructions of the pyramids by the Egyptians

On the contrary, if we wish to refer to those who did the constructing with such a result nominal we have to do so indirectly, by means of a possessive-like construction with an *of*-phrase:

(19) the constructions of the Egyptians

To a certain extent this kind of variation is found with agentive nominalizations. While *-er* nominalizations such as *driver* permit the object to be expressed as an *of*-phrase, this is not so, generally speaking, if the noun is not derived by affixation, but by conversion. Witness the contrast in (20) (despite the existence of the lexicalized compound, *pastry cook!*):

(20) a. a baker of delicious pastries
b. *a cook of delicious pastries

Likewise, not all suffixes permit the argument structure to be inherited. A neat minimal pair here (due to Randall, 1984) is the word *photographer*. With the stress *phótophograph*, this is interpreted as regularly derived by suffixation of *-er* to the verb *photograph*, much like *driver*. However, with the stress *phótógraph* it is interpreted more as a simple noun which fails to inherit its stem's argument structure. Hence we obtain the judgements in (21):

(21) a. a phótógrapher of exotic birds
b. *a phótógrapher of exotic birds

It remains an open question whether such questions are to be resolved by appealing to syntactic principles operating in word formation processes, or whether we assume that the lexical representations of such derived forms are

4. More technically, the *external argument*.

so structured as to interact with syntactic (and possibly semantic) principles so as to give the desired results.

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