MORPHOLOGICAL PRODUCTIVITY

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1 *Introduction*

> 'Produktivität' zählt zu den unklarsten Begriffen der Linguistik.
> ['Productivity' is among the least clear concepts in linguistics.]
> Mayerthaler (1981: 124)

1.1 The issue

This book deals with productivity as it affects morphological systems. Unfortunately, in the present state of morphological studies, this opening statement may mean different things to different people, even a definition of 'productivity' being a matter of some dispute. In order to develop a position from which conclusions can be drawn, it is thus necessary to begin from the very beginning, and gradually to construct a secure foundation of notions to support the enterprise. We can begin this construction by considering one fundamental definition of 'productivity'.

Hockett (1958: 575) gives the label 'productivity' to that property of language which allows us to say things which have never been said before, the design feature that Chomsky (1965: 6) calls 'creativity'. We do not have to go any further to see that this is an area in which there is, at least, some terminological difference of opinion. To add to the confusion, Chomsky (1965: 5) also talks about syntactic processes being 'productive' without making it clear whether 'productive' and 'creative' are the same or different things, while others, such as Lyons (1977: 76–78), distinguish carefully between the two terms, though not all scholars draw the same distinction. The question of whether it is useful to distinguish between 'creative' and 'productive', and if so in what way, is one which will be taken up again later in this book (see section 3.10). First, though, it must be shown how productivity in Hockett's sense affects morphological structure.

The general assumption among linguists is that people can say things which they have neither said nor heard before because they know (albeit

not explicitly) the rules for the combination of appropriate elements into sentences and because they are able to assign meanings to those elements. In other words, starting from a store of elements each of which has a predetermined semantic and/or pragmatic value, people are able to create new combinations which allow the transfer of more complex meanings to their interlocutors. It is the creation of the new combinations from a set of stored elements which is crucial here. None of the word-forms in Oscar Wilde's

(1) I can resist everything except temptation.

is unfamiliar; it is the creation of the new combination of word-forms which produces the new and striking message. Similarly, in morphology, it is the creation of new lexemes and word-forms, never before heard or spoken, which provides the greatest proof that productivity is also a feature of that level of language. As Hockett (1958: 307) puts it 'The productivity of any pattern – derivational, inflectional or syntactical – is the relative freedom with which speakers coin new grammatical forms by it' or, as Di Sciullo and Williams (1987: 8) say, the fact that an affix can be used to make new words makes it 'productive in the most basic sense of the word'.

However, even these apparently simple statements give rise to new questions. Hockett talks of 'relative freedom' which raises the question of whether productivity is a yes/no question or a matter of gradient. Di Sciullo and Williams speak of 'the most basic sense' of 'productivity' implying that there are other less basic senses. How many senses of this term there may be is a question that will permeate this entire book. The question of gradient or scalar productivity will be dealt with specifically at a number of points (see especially chapter 5).

To put all this into some perspective, let us consider a few relatively simple examples, beginning with English plural marking. English has a number of different ways of marking plural on nouns, as is shown by plural nouns such as *cats*, *dogs*, *horses*, *oxen*, *deer*, *mice*, *hippopotami*, *cherubim* and so on. The productive aspect of this is shown by the fact that native English speakers have the ability to pluralise nouns they have encountered only in the singular. In a celebrated article, Berko Gleason (1958) illustrated that children aged under five can accurately produce the plural of *wug* as *wugs* (with the appropriate allomorph: /z/). Assume then that a speaker of English were to meet the following words, all new in the speaker's experience (since they are innovations designed to make the point):

(2)

argaz	'crate of specific style'
smick	'type of cracker biscuit'
brox	'piece of computer hardware'
ceratopus	'type of dinosaur'
cheppie	'type of antelope'

The question is: How will the speaker make these words plural? In English there is a high probability that a speaker will use the appropriate regular plural ending on any word. That is, we would expect to find *argazzes*, *smicks*, *broxes*, *ceratopuses* and *cheppies*. There is accordingly a high probability (though not complete certainty) that the many alternative plural markers will not be used. The examples above have been chosen to make this point, so I shall consider them in detail.

The noun *argaz* 'crate' is actually a Hebrew noun, and in Hebrew it takes an *-im* plural. It is therefore possible that the plural *argazim* will be found. There is not much precedent for using a Hebrew plural in English, but there is some (*cherubim*, *seraphim*, *kibbutzim*, *goyim* may be an exhaustive list). Use of the *-im* plural would require the particular type of crate to be perceived as being connected with Israel or Judaism, and demand knowledge of the correct Hebrew plural. The regular English plural is much more likely.

There is no particular reason to expect *smick* to have anything but a regular plural, and it would be extremely surprising to find anything other than *smicks*.

The word *brox* ends in the sequence *-ox*, and it is feasible that it might make its plural like *ox* and that we would find *broxen*. On the whole this seems very unlikely. The majority pattern with such nouns is illustrated by *box*, *cox*, *fox*, *pox* and not by *ox*. However, such an ending cannot be excluded, particularly with the meaning given above. Among certain computer mavens, the computer called a *Vax* has *Vaxen* as its plural. Here the final *-x* seems to have been sufficient to call forth the unusual plural marking. However, this plural is clearly an in-group form, and the normal plural is *Vaxes*. We would expect therefore to find *broxes*, too.

The word *ceratopus* is an interesting case. Words ending in *-us* in English are largely learned words, and a lot of them, though by no means all, have plurals in *-i*, following the Latin pattern. Thus we find *alumni*, *foci*, *fungi*, *gladioli*, *nuclei*, *stimuli* and so on, but also *campuses*, *choruses*, *geniuses* (*genii* is a joke), *isthmuses*, *polyanthuses*, *viruses*, *walruses* and so on. A plural in *-i* is thus a possibility for many learned words ending in *-us*. This possibility is strong enough to overcome etymology, so that we

hear, on occasions, *octopi* (*octopus* comes from Greek, not Latin), or *prospecti* (*prospectus* is a fourth declension Latin noun, not a second declension one, and its Latin plural is *prospectūs*). *Ceratopus* looks like a learned word, and thus appears to be a potential *-i* plural word. But a more learned analysis shows that it comes from Greek 'horny footed' and thus should not take such a plural from the etymological point of view. The classical plural *ceratopodes* seems unlikely (very few people use, or even know, *octopodes*), so that *ceratopuses* would, for anyone but the purest of purists, be the preferable solution.

The case of *cheppie* is even more complex. The word is taken from Tswana *tshêphê*, and its plural in Tswana is *ditshêphê* (Cole 1955: 88). English, which is notorious for its ability to borrow virtually any lexeme, seems in general reluctant to borrow plural forms from 'exotic' languages, so that the Tswana plural is probably unlikely in English. However, antelope form part of the class of huntable and edible animals that can take a zero plural, so that *cheppie* ought to be a possible plural form. This is counteracted by the fact that the final *-ie* would probably be associated with the English diminutive ending so that *cheppie* looks like a native word, and *cheppies* seems the most likely outcome.

The simplistic analysis of this state of affairs in English is that only the *-s* plural (with its three phonological variants) is normally used to make plurals of new words, and that all other plural forms can be lexically listed. While this type of analysis contains a considerable amount of truth, the discussion above should have indicated that it is overly simplified and that we are dealing with probabilities rather than certainties in this area. It is clearly the case that the *-s* plural is the most likely plural form (on these words or any others), but it is not the only possible plural form. We might, therefore, feel confident in saying that *-s* is the most productive plural ending in current English. But does saying that it is the 'most productive' imply that we can measure productivity on a scale, or is it simply a matter of *-s* being productive? It is less clear what we can say about the alternative endings. Is the Latin *-i* ending productive in English or not? Is there a difference in kind between the motivation for a putative *broxen* and the motivation for a putative *broxes*, or do they illustrate the same kind of phenomenon? These are questions to which we shall return (see e.g. sections 3.10, 3.12).

If we accept, for the sake of the argument, the simplistic view of English plural formation outlined above, we might wish to conclude that plural markers are divided into two classes in English: the productive and

the non-productive. We might consider that the productive marker was assigned by rule, while the unproductive markers were assigned by lexical list. This general picture is widely accepted in the literature, for example in much work on Lexical Phonology and Morphology. If this simplified picture were true, it might illustrate an ideal case. However, there are other patterns which depart considerably from this ideal. Consider next the case of plural in Dutch.

As in English, there are a number of plural markers in Dutch which are borrowed from Latin, Greek and Italian along with the lexemes they are used with. Also as in English, there are a small number of irregular native plurals: the plural of *kind* 'child' is *kinderen*, and there are no more than fifteen words which share this *-eren* ending (Geerts et al. 1984: 56–57). There are fewer such types in Dutch than in English. The default plural marker is *-en*, but there is another productive plural marker, *-s*. The ending *-s* is used if the noun is not already marked as irregular and

(a) if the noun stem ends in [əl], [ər], [əm] or [ən]: *lepel* 'spoon' > *lepels*; *bakker* 'baker' > *bakkers*; *bloesem* 'blossom' > *bloesems*; *keuken* 'kitchen' > *keukens*;
(b) if the noun stem ends in a vowel other than [ə]: *vla* 'custard' > *vla's*; there are several exceptions to this clause, but it can stand as a generalisation, albeit not as helpful a generalisation as it appears to be: Baayen (1989: 17) points out that there are only about half-a-dozen native words which fit the generalisation and all the examples cited by Geerts et al. (1984: 60) are borrowed words;
(c) if the noun stem ends in one of a number of specified derivational endings, including the diminutive *-(e)(t)je*, and *-eur*, *-oor*, *-aar* and *-erd*: *huisje* 'little house' > *huisjes*; *monteur* 'repair man' > *monteurs*; *majoor* 'major' > *majoors*; *schakelaar* 'switch' > *schakelaars*; *dikkerd* 'fatso' > *dikkerds*;
(d) if the base noun is a loan word and would take an *-s* plural in the lending language: *chef* 'chef' > *chefs*; *telefoon* 'telephone' > *telefoons*;
(e) if the base is a letter of the alphabet or an initialism: *b* > *b's*; *BV* 'plc' > *BV's*

(Geerts et al. 1984: 60–62; Van Marle 1985: 199–200; for a contrasting description of the distribution see Booij and Van Santen 1995: 65–70). In other cases, the ending *-en* is used for the plural.

The situation in Dutch, therefore, is importantly different from that in English. In English there is, in most cases, only one productive pattern. In Dutch, there are two competing patterns, both productive. However, as the situation has been described here, it is predictable which marker will be used. Under such circumstances the productivity of the different markers is entirely determined by the number of nouns with the appropriate base structure. (In fact, the situation described above is still a simplification, in that it ignores quite a large number of exceptional lexemes and in that nouns ending in [ə] appear to show unpredictable variation between *-en* and *-s* plurals: *klasse* 'class' and *hoeve* 'farmhouse' take *-en*, *tante* 'aunt' takes *-s* and *lade* 'drawer' can take either [Baayen 1989: 15]; nevertheless, the generalisation that has been drawn here remains largely true, and can be allowed to stand as an idealisation for expository purposes.)

Now let us turn to English adverbs ending in *-ly*, as discussed in Bauer (1992a). Speakers of current English appear reluctant to attach adverbial *-ly* to bases which already end in *-ly*. There are, for example, no instances of such words in the eighteen million words of the COBUILD corpus (see http://www.cobuild.collins.co.uk). Nonetheless, the first edition of *The Oxford English Dictionary* (1933; second edition 1989) lists *-ly* adverbs for all monomorphemic adjectives of English that end in *-ly*: *burlily*, *holily*, *jollily*, *melancholily*, *oilily*, *sillily*, *surlily*, *uglily* and *wilily*. At some point in the history of English, it appears, the reluctance to form such adverbs has, at least for certain classes of adjectives, not been as pervasive. However, although the same edition of *The Oxford English Dictionary* lists at least 473 words ending in adjectival *-ly* (e.g. *friendly*), it lists only ten *-ly* adverbials formed on the basis of such adjectives that are not obsolete or rare: *cleanlily*, *friendlily*, *ghastlily*, *homelily*, *kindlily*, *livelily*, *lonelily*, *lovelily*, *lowlily*, *manlily*. Here we have a large input class of potential bases, but an extremely small output class. In contrast to the situation we observed with Dutch plurals, the number of forms attested (or perhaps even possible) in the speech community does not appear to be fully determined by the size of the class of possible bases. It is cases of this type which appear to support the notion of productivity as a matter of degree, rather than as a simple yes/no choice.

Such observations also raise further questions. If someone were to use *-ly* adverbs such as those illustrated in examples (3)–(4) below, would they be producing ungrammatical sentences? Is the answer necessarily the same for both (3) and (4)? Does the answer depend on the period at which (3) and (4) were composed?

(3) Kim coughed poorlily.

(4) Pat was called upon to update the statistics monthlily.

In the next section I discuss the question of diachronic variation in productivity. Here I should like to note that this section raises two questions: whether the same notion of productivity (however defined) holds for the three cases that have been described above, and how variability in degree of productivity is to be accounted for.

1.2 Diachronic variation in productivity

Mayerthaler (1977) presents a discussion of French nouns and adjectives ending in *-al*. Some of these, like *cheval* 'horse', make their plural by replacing the *-al* with *-aux*. Others, like *bal* 'ball (at which you dance)', make their plural by adding *-s*. Historically, the *-aux* ending arose through the vocalisation of an *-l*, with the <x> a graphemic representation of an original final /s/. In a word like *chevaux*, the final consonant has disappeared and the /au/ diphthong has monophthongised to /o/, giving modern standard French /ʃəvo/. Words like *bals* did not undergo the process of l-vocalisation, but have lost the final /s/ in the pronunciation, so that the singular and plural are homophonous as /bal/. To summarise:

Table 1.1: *Historical development of* chevaux *and* bals

	ʃəval + s	bal + s
l-vocalisation	ʃəvau + s	–
monophthongisation	ʃəvo + s	–
loss of final /s/	ʃəvo	bal

According to Mayerthaler (1977: 109), the last noun to be taken into French and to make its plural like *chevaux* was *original*, in about 1600. Even *original* shows variation between *originaux* and *originals*. Nouns which have come into French since 1600 all have a regular *-s* plural. However, even today, there are more common nouns listed in dictionaries of standard French which make their plural like *chevaux* than like *bals* (Mayerthaler 1977: 105), and if adjectives are considered, too, there are considerably more that have *-aux* plurals than have *-als* plurals (1977: 106). We thus have a situation where in the fifteenth century there was only one way to make nouns ending in *-al* plural, and that was by changing

the *-al* to *-aux*. In the sixteenth century, starting about 1530 (Mayerthaler 1977: 109), the alternative of adding *-s* to new nouns ending in *-al* is introduced. In the seventeenth century, the only possibility with new nouns is to add *-s*. The result of this is that there are two classes of noun ending in *-al*, one that makes its plural in *-aux*, the other that makes its plural in *-als*. This is the current situation in standard French, though non-standard French frequently does away with the *-aux* class completely, and makes nouns like *cheval* take a regular *-s*-plural (Mayerthaler 1977: 110).

This process can be reformulated as follows: in the fifteenth century there was one productive method of making nouns in *-al* plural; in the sixteenth century a change took place so that this method was no longer productive, and a different method became productive. In other words, there was a diachronic change in what was productive with this phonologically-defined set of nouns. Moreover, this change cannot have been directly linked to the number of possible models for parallels, since even in the seventeenth century there were more common nouns which used the (then unproductive) *-aux* than used the (newly productive) *-als*. The change in productivity appears to be independent of the change in frequency.

Now consider the case of the suffix *-ment* in English. In Bauer (1983: 76) I commented that this suffix appears no longer to be productive. Certainly, if it is productive it is only marginally so. To trace the productivity of this affix, the following experiment was carried out. The electronic version of the second edition of *The Oxford English Dictionary* was searched for words which have the notation *-ment* in the etymology. When irrelevant words have been deleted this leaves 1,110 words containing the affix *-ment*. Unfortunately, this is not an exhaustive list of words in *-ment* in *The Oxford English Dictionary*, since words which follow on in another entry are not picked up in this way (for example, under ENTWINE there is a note 'Hence *entwinement*', and my search did not find *entwinement*). However, it does give a large sample, and a sample which we may assume to be fairly representative. *The Oxford English Dictionary* also provides approximate dates of first use by giving the date of the first attested use of each word. If we plot the number of first attestations from any period against the year, we get the result shown in Figure 1.1. The productivity of *-ment* peaks twice: first in the early seventeenth century and again in the early nineteenth century, but tails off rapidly in the twentieth century; from 1950 onwards the dictionary lists only one appropriate word: *underlayment* from 1956.

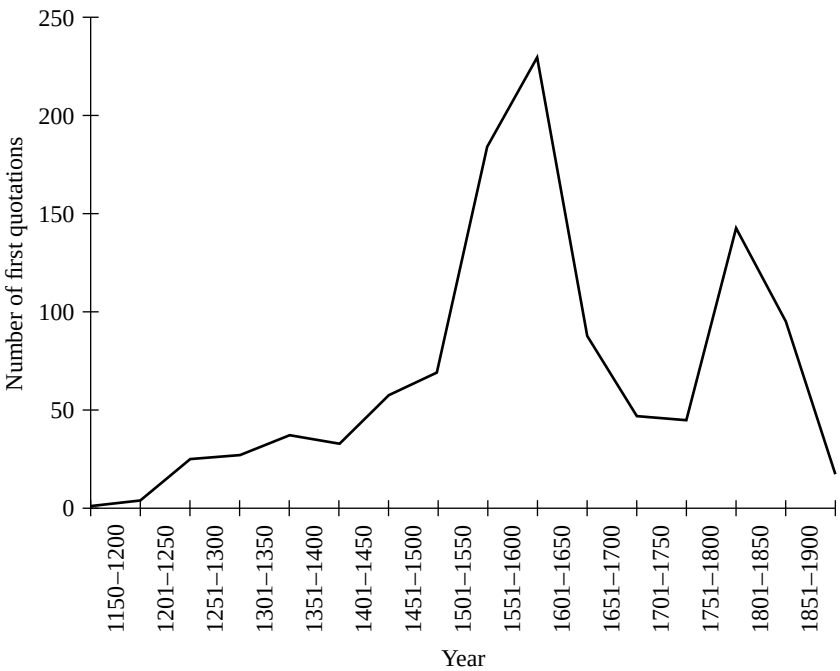

Figure 1.1: Productivity of *-ment* (based on *The Oxford English Dictionary*)

Figure 1.1 gives a picture of an affix which varies in productivity over time. The drop in productivity of this affix between approximately 1650 and 1800 cannot have been due to any loss of clarity of the meaning of the affix, or it would not have recovered again in the first half of the nineteenth century. Nor, on the face of it, can it be due to lack of suitable bases (although a separate study would be required to check that the number of new verbs did not also drop in the appropriate period). Indeed, there is no obvious reason for the observed fluctuations in productivity; we merely observe that productivity appears to change. That being the case, whether or not a particular morphological process is productive, or to what extent it is productive, is an important question which needs to be answered in giving a full synchronic description of the morphology of any language, and the variation in productivity should be considered in any diachronic description. The implication here seems to be that productivity is in itself an important part of a linguistic description, and that it cannot necessarily be reduced to other factors such as frequency,

input classes or clarity of meaning. This point, too, will be taken up in more detail later in chapter 3.

1.3 Summary

In this chapter it has been indicated that the potential for the creation of new words may be considered to fall within the purview of the design feature of language known as 'productivity' or 'creativity'. It has been shown that in some cases the potential for a new word derives automatically from the presence of an appropriate word in an input class (where input classes may or may not be in competition with each other). In other cases there appears to be variation in the degree to which the potential to make new words is exploited, such that the variation is not determined by the input class. In this latter case we have also seen that the degree to which the potential is exploited can vary diachronically, apparently without reference to such factors as the size of the input class or the semantic coherence of the output.

In the process of dealing with these matters I have raised a number of potential problems to which I will return in subsequent chapters. The questions, some raised explicitly, a few only implicitly, include:

(a) Is it useful to distinguish between 'productivity' and 'creativity' in morphology, and if so in what way?
(b) Are there several meanings for the term 'productivity', and if so do they conflict?
(c) Is productivity a yes/no matter or is it a matter of gradient?
(d) If it is a matter of gradient, does this imply that it is measurable on some scale?
(e) Is there a difference in kind or just a difference in degree between the new use of rare patterns to create words like *Vaxen* and the new use of normal patterns to create words like *laptops*?
(f) Does the use of unproductive processes lead to ungrammaticality?
(g) Is the answer to question (f) determined by specific constraints which may have been broken, and does it vary diachronically?
(h) What factors influence productivity if – as was suggested here – neither frequency nor semantic coherence do?