

*M-selection and phrasal affixation**

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Abstract

In this paper we argue that selectional properties of affixes should be distributed across a morphosyntactic AFFIX and a morphophonological /affix/. The AFFIX selects a node with particular categorial features, but it does not specify an X-bar theoretical level. The /affix/ selects a head (or more precisely phonological word), but it does not care about syntactic category. Traditional m-selection (that is, selection of a head of a particular category) can only obtain if the AFFIX corresponds to an /affix/. In other circumstances, the AFFIX may freely attach to a syntactic phrase. This gives some insight into effects of zero affixation, certain types of bracketing paradoxes and so-called ‘mixed categories’.

1 Distributed selection

Phonology is not the derivational continuation of syntax. As is well known, phonological representations are not isomorphic to syntactic representations, and phonological and syntactic primitives are members of disjoint sets. A simple example illustrating this, borrowed from Jackendoff (1997:26), is given in (1). In syntax, *a big house* is a DP that consists of a determiner and a complex NP complement; in phonology, it consists of two phonological words: the first of which is formed by the determiner and the adjective. So, both constituency and labels differ.

- (1) a. [DP a [NP [AP big] house]]
b. [_φ [_ω a big] [_ω house]]

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There does not seem to be a plausible derivation that connects (1a) to (1b) - familiar derivations operate under informational monotonicity: by hypothesis they can add, but not destroy or change structure and labels.

A conclusion often drawn from these considerations is that syntax and phonology are autonomous generative systems whose outputs are related through a set of mapping rules. Such rules, which state that particular syntactic objects have particular phonological counterparts, have been central to much work on the syntax-phonology interface (Selkirk 1984, 1986, Nespor & Vogel 1986, Inkelas & Zec 1990, amongst others). There is mounting evidence that separate syntactic and phonological representations must also be assumed for words (Marantz 1984, Sproat 1985, Ackema & Don 1992, Anderson 1992, Halle & Marantz 1993, Beard 1995 and many others). This assumption is crucial to this paper.

Lexical items contain both syntactic and phonological information. In the Chomskyan tradition, it is usually assumed that these two types of information are indivisible properties of a single element, which is 'inserted' (in GB-terms) or 'merged' (in minimalist terms) in syntax. This idea is necessary if PF is an interpretive system, taking syntactic surface representations as its input and deriving phonological representations. We just noted, however, that such derivations are implausible. In addition, the standard view of lexical insertion implies that the syntax carries along features which are irrelevant to it.

In the alternative, 'separationist' view, no joint insertion of syntactic and phonological features takes place. Instead, syntactic information is only present in syntax, whereas phonological information is only present in phonology, and the two are related by correspondence rules. In other words, a lexical item is nothing but a minimal, idiosyncratic, version of such a rule, as argued at some length by Jackendoff (1997).¹

On this view, the lexical entry for a verb like *read* minimally contains the information in (2a). Similarly, the lexical entry for an affix like *able* must at least contain the information in (2b). (Of course, lexical items also contain semantic information, but this is not relevant to the claims made in this paper).

(2) a. [+V,-N] ↔ /ri:d/

¹ There are precursors of this view in structuralist grammar, see for instance Hockett 1954. Also, as Jack Hoeksema (personal communication) points out, Montague grammar (Montague 1973) can be regarded as a model of this type. We may also note that the notion of correspondence rules is rather more common in other generative paradigms, in particular LFG (Bresnan 2000) and HPSG (Pollard & Sag 1994).

b. [+V,+N] ↔ /ebl/

A difference between affixes and free morphemes not reflected by (2) is that affixes have morphological selectional (henceforth: m-selectional) properties. For example, *able* must be attached to a verb. The question arises, then, how this should be encoded on a separationist view, given that *able* consists of two distinct parts associated by correspondence rules. In principle, both of these parts can impose their own selectional requirements. The fact that *able* selects a verbal host rather than an adjectival one must presumably be stated in its syntactic specification. However, the fact that it attaches to words rather than phrases is most plausibly analyzed a property of its phonological part.

In other words, we propose that it is not only the representation of words and phrases themselves, but also the representation of their selectional properties that must be distributed over different modules. The aim of this paper is to show that this facilitates a straightforward analysis of phenomena which are rather out of the ordinary under more traditional views.

More specifically, we propose the following. The syntactic part of an affix, to which we will refer as AFFIX, selects a host of a certain lexical category, but it does not require this category to be of a particular bar level. The syntactic selectional requirement of *able*, for example, is simply that it must attach to a verbal node. As a result, *able* and other affixes may in principle attach to phrases. However, the defining characteristic of a phonological affix, to which we will refer as /affix/, is that it must attach to a word-level category. In turn, the /affix/ cannot require that this word is of a particular lexical category, assuming that there is no such thing in phonology.

The lexical entry for *able* in (2b) must therefore be extended, to include the affix's 'distributed' selectional properties. We will do so by treating affixes as operations, or rather a syntactic and phonological operation, which each require a particular input, namely the selected category, to deliver an output (Hoeksema 1984, Sproat 1985). The schema in (2b) should hence be specified as in (3). (This particular notation is not essential, but it facilitates the formulation of mapping rules between the inputs of the various operations, as well as between the outputs, something which will become relevant later on.)

(3) [+V,-N] ↔ /word/
 ↑ ↑
 [+V,+N] ↔ /word+ebl/

In the case of *able* the effects of distributed selection are equivalent to the more

familiar idea that there is one, undivided, affix which selects for a verbal word-level category. However, separating the selectional requirements of an affix opens up new possibilities, since there is no inherent necessity for an AFFIX to correspond in a one-to-one fashion to an /affix/. One prediction in particular will be crucial. If an AFFIX does not correspond to an /affix/, but rather to a /word/ or to nothing at all ('zero affixation'), there should not be a problem with attaching the AFFIX to a phrase. Put differently, morphological derivation of phrases should be possible when no overt /affix/ is present.

In effect, then, there is no syntactic difference between AFFIXes and other heads which have syntactic selectional properties (although we will keep on using the term AFFIX for convenience). The fact that affixes attach to words is a consequence of their phonological selectional properties only. This has a conceptual advantage. There is strong independent evidence for syntactic selection as well as for phonological selection. An element can impose syntactic requirements without imposing phonological requirements, and vice versa. A transitive verb, for example, takes a complement, but does not necessarily form (part of) a phonological word with it. Conversely, phonological clitics (or 'simple clitics' in Zwicky's (1977) terminology) can plausibly be analyzed as syntactically free elements whose correspondent in phonology has selectional properties. Our proposal implies that there is no need to distinguish a third type of selection: m-selection. Morphological selection is simply the combination of syntactic and phonological selection.

In section 2, we present some initial evidence for distributed selection based on adjectival suffixation and 'auto-referential' expressions in Dutch. In sections 3 and 4, we will use the acquisition of synthetic compounding and the derivation of subject names to motivate several correspondence rules that restrict the mapping between the syntactic and phonological structures of words. In conjunction with these rules, the hypothesis of distributed selection gives rise to some more fine-grained predictions. In particular, it turns out that under certain well-defined circumstances overt affixes can in fact be involved in phrasal derivation. This perhaps surprising result is discussed in sections 5, 6 and 7.

2 Affixes that aren't

It seems unlikely that a syntactic phrase can function as a morphological head. In X-bar theory, this follows from the assumption that a higher level node cannot project a lower level node. Thus, XP cannot project X in (4a). However, nothing rules out the appearance of a syntactic phrase as the nonhead of a morphological construct, as in (4b). The fact that YP is of a higher bar level than the node that dominates it is irrelevant,

because that node is not projected by YP.

- (4) a. $*[_x Y XP]$
 b. $[_x YP X]$

In complex words not derived by affixation (that is, in compounds), phrases can indeed appear productively as the nonhead. The following Dutch examples demonstrate that syntactic phrases can be part of nominal compounds (see also Hoeksema 1988 and Lieber 1992; Botha 1981 cites similar data from Afrikaans).

- (5) a. een $[_N [_{NP} \text{ijs met slagroom}]]$ fobie
an ice-cream with whipped-cream phobia
 ‘an abhorrence of ice cream with cream’
 b. een $[_N [_{CP} \text{doe dat nou niet}]]$ houding
a do that now not attitude
 ‘a discouraging attitude’
 c. Ik prefereer $[_N [_{PP} \text{uit je bol}]]$ muziek
I prefer out-of your head music
 ‘I prefer music that thrills’

Given the option of incorporating a phrase into a compound, we might also expect phrases to show up as the nonhead in derived words. As noted above, there is no reason why AFFIXES should not attach to phrases. If an AFFIX corresponds to an /affix/, however, the selectional requirements of the latter rule out this possibility. Indeed, overt affixation in Dutch normally requires a word-level host:

- (6) a. een $[_N [_N \text{bloem}]]$ ist]
a flower ist
 ‘a florist’
 a’. $*\text{een } [_N [_{NP} \text{bloemen uit Aalsmeer}]]$ ist]
a flowers from Aalsmeer ist
 ‘some who sells flowers from Aalsmeer’
 b. een $[_N [_N \text{gitaar}]]$ ist]]
a guitar ist
 ‘a guitarist’

- b'. *een [_N [_{NP} gitaar met een wah-wah pedaal] ist]
a guitar with a wah-wah pedal ist
 'someone who plays a guitar with a wah-wah pedal'

It is not necessary, however, for an AFFIX to correspond to an /affix/. It may be, for example, that its phonological counterpart happens not to have selectional properties: although it spells out an AFFIX, it is not an /affix/, but a word-like element. Arguably, this is the case for the Dutch suffixes *achtig* 'like' and *loos* 'less'. These seem to have selectional properties in syntax, given that they cannot occur as free forms:

- (7) a. Vind jij dat groen? *Nou, hooguit achtig.
Find you this green? Well, at-best like
 'Do you think that is green? Well, somewhat like it at best.'
 b. Staat er een panfluit op deze CD? *Nee, hij is godzijdank loos.
Are there pan pipes on this CD? No, it is mercifully less.
 'Does this CD contain pan pipes? No, thank god it is without them.'

On the other hand, Van Beurden (1987:24) notes that "words derived by *achtig* and *loos* share characteristics with compounds rather than affixed structures". In particular, (i) *achtig* and *loos* are not stress-attracting, in contrast to the other adjectival suffixes in Dutch (Van Beurden 1987, De Haas & Trommelen 1993:312 ff.), (ii) they do not trigger resyllabification like other adjectival suffixes do, with the consequence that they feed final devoicing of their host (Booij 1977), and (iii) like the right-hand part of compounds, but unlike suffixes, they allow a preceding diminutive or a linking *s* (Van Beurden 1987:25). Some examples are given in (8).

- (8) *Stress shift with adjectival suffixes, but not with achtig and loos*
- | | | | |
|----|----------------|--------------------|---------------------|
| a. | víjand | vijándig | víjandachtig |
| | <i>enemy</i> | <i>enemy-y</i> | <i>enemy-like</i> |
| | 'enemy' | 'hostile' | 'enemy-like' |
| | hártstocht | hartstóchtelijk | hártstochtsloos |
| | <i>passion</i> | <i>passion-ate</i> | <i>passion-less</i> |

Resyllabification with adjectival suffixes, but not with achtig

b.	[σ rood] <i>red</i>	[σ roo] [σ dig] <i>red-y</i>	[σ rood] [σ ach] [σ tig] <i>red-like</i>
	[σ vlees] <i>meat</i>	[σ vlee] [σ sig] <i>meat-y</i>	[σ vlees] [σ loos] <i>meat-less</i>

Final devoicing before achtig and loos, but not before other adjectival suffixes

c.	roo[t] <i>red</i>	ro[d]ig <i>red-y</i>	roo[t]achtig <i>red-like</i>
	vlee[s] <i>meat</i>	vle[z]ig <i>meat-y</i>	vlee[s]loos <i>meat-less</i>

Diminutive forms possible before achtig and loos, but not before other adjectival suffixes

d.	vogeltjes <i>bird-DIM-PL</i>	*vogeltjes-ig <i>bird-DIM-PL-y</i>	vogeltjes-achtig <i>bird-DIM-PL-like</i>
	koekjes <i>cookie-DIM-PL</i>	*koekjes-elijk <i>cookie-DIM-PL-y</i>	koekjes-loos <i>cookie-DIM-PL-less</i>

Linking s possible before achtig and loos, but not before other adjectival suffixes²

e.	toon <i>tone</i>	*twaalftoon-s-ig <i>twelve-tone-s-y</i>	twaalftoon-s-achtig <i>twelve-tone-s-like</i>
	hartstocht <i>passion</i>	*hartstocht-s-elijk <i>passion-s-ate</i>	hartstocht-s-loos <i>passion-s-less</i>

If *achtig* and *loos* are indeed to be characterized as words rather than affixes, phonologically speaking, it follows from our view of m-selection that these suffixes should attach freely to phrases. This turns out to be true, as illustrated in (9).

- (9) a. zo'n [_A [_{CP} waar gaat dat heen] achtig] gevoel
such a where goes that to like feeling
 'a somewhat worried feeling'

² Note that the *s* in the examples is not a plural *s*: the plurals of *toon* and *hartstocht* are formed with *en*.

- b. een [_A [_{PP} uit je bol] achtig] gevoel
a out-of your head like feeling
 ‘a rather euphoric feeling’
- c. een [_A [_{NP} ijs met slagroom] loos] bestaan
a icecream with whipped-cream less existence
 ‘a life without icecream with cream’
- d. een [_A [_{NP} dames met schoothondjes] loze] omgeving
a ladies with lap-dog-DIM-PL less environment
 ‘an environment without ladies with little lap dogs’

So, Dutch adjectival suffixation provides a first illustration of the usefulness of distributed selection: attachment of an AFFIX to a phrase is allowed if its correspondent in phonology does not have selectional properties, for instance because it is a /word/ rather than an /affix/.

An obvious further testing ground for the hypothesis of distributed selection is provided by cases in which an AFFIX does not have a phonological correspondent at all. It is predicted that ‘zero’ affixes should be able to take phrases as their input, since an /affix/ must be present if phonological selectional requirements are to be imposed. One phenomenon that bears out this prediction involves the semantic operation through which an expression becomes a name for itself. We will refer to this operation as ‘auto-reference’. As the following Dutch examples show, almost any syntactic phrase can be turned into an auto-referential expression:

- (10) a. Het wat is er nou weer aan de hand dat altijd uit zijn kantoor schalt werkt op m’n zenuwen
the what is there now again on the hand that always from his office sounds works on my nerves
 ‘The “now what?” that can always be heard coming from his office irritates me’
- b. Men kon het drie bossen tulpen voor een tientje al van verre horen.
one could the three bunches tulips for a tenner already from afar hear
 ‘One could hear the “three bunches of tulips for a tenner” from afar’

Auto-referential expressions are not marked as such by an /affix/. However, there is a strong case for analyzing the operation that derives them as attachment of an AFFIX (see also Kruisinga 1932). First, compositionality requires that the change in semantics is structurally encoded, which means that some head must be present in the morphosyntax.

This conclusion is corroborated by the fact that Dutch auto-referential expressions uniformly take the neuter determiner *het*, which can be seen as selected by the head involved. Second, the operation involves a change in syntactic status. Its input is a syntactic phrase, but its output consistently shows the distribution of a nominal head. As the example in (11) shows, it can be accompanied by the same kind of material as regular nouns.

- (11) a. [DP Dat [NP eeuwige [N' [N wat is er nou weer aan de hand] van Jan]]] werkt op m'n zenuwen
that eternal what is there now again on the hand of John works on my nerves
 'John's eternal "now what?" irritates me'
- b. [DP Dat [NP eeuwige [N' [N hoestje] van Jan]]] werkt op m'n zenuwen
that eternal cough-DIM of John works on my nerves
 'John's eternal cough irritates me'

As opposed to syntactic complementation, the morphological operations of compounding and affixation derive heads. However, compounding never involves null heads and its semantics varies wildly. The formation of auto-referential expressions must hence be a case of zero affixation. This implies that the examples in (10) bear out the prediction that AFFIXes may attach to phrases if not spelled out.

Further confirmation of this prediction comes from language acquisition, as we will argue in the next section.

3 The acquisition of synthetic compounds

In nonseparationist theories of affixation, one cannot make a distinction between the acquisition of an overt affix and the acquisition of its syntactic properties. For example, the syntactic and semantic properties of the English agentive suffix *er* cannot be acquired prior to the acquisition of *er* itself. Things are different if the process of affixation is distributed amongst different components. The option of forming subject names may well be universal, given its existence in a wide range of languages. In other words, the availability of a morphosyntactic agentive AFFIX, call it ER, may well be part of the initial stage. However, the phonological form that corresponds to this AFFIX clearly varies per language. This implies that children go through an acquisitional stage in which they have the option of forming subject names - they can attach the relevant AFFIX to a verbal

category - even if they have not acquired the associated /affix/ of the adult language yet. We predict that children at that stage can produce subject names on the basis of syntactic phrases, whereas adults who spell out the agentive AFFIX cannot.

That this is indeed the case is apparent from the acquisition of agentive synthetic compounds in English. As shown by Clark, Hecht & Mulford (1986), children use the VO order typical of English syntax in such compounds before they start using the /affix/ *er*. (That children have not mastered *er* yet during this early stage is shown by Clark & Hecht (1982): children initially produce forms like *wash-man* and *open-man* when asked to form a simple agentive noun on the basis of verbs like *to wash* and *to open*).³ During this early stage, the forms that are produced when synthetic compounds are elicited are as in (12).

- (12) *Stage I (around age 3): VO order, no overt affix*
- | | | |
|----|---------------|------------------------------|
| a. | a kick-ball | (someone who kicks a ball) |
| b. | a build-wall | (someone who builds a wall) |
| c. | a bounce-ball | (someone who bounces a ball) |

As noted by Clark et al. (1986:22), “essentially, what children at this stage appear to do is nominalize the VERB PHRASES in the descriptions they hear” (their emphasis). These data thus confirm the view that AFFIXES, like agentive ER, can attach to phrases as long as they have no overt correspondent.

The data in acquisitional stage I support the view of m-selection defended in this paper. However, the relevance of Clark et al.’s data is not limited to this. Subsequent stages of development allow us to formulate a set of mapping rules, which in turn make available further ways to test the thesis of distributed selection.

Let us begin by considering what children must learn in order to reach the adult stage. As will be clear, they must acquire the phonological form of ER. We believe that in addition a process of compounding must be introduced into their grammar. Following Lieber (1983), we have argued elsewhere that the adult language is best characterized by an analysis in which agentive synthetic compounds are derivatives of N-V compounds. *Truck driver* is assigned the following syntactic structure:

³ That is, children do not show any consistent use of *er* in their production. Of course, this does not necessarily mean that they have not acquired passive knowledge of it. This is irrelevant for the point we want to make here, however. The crucial thing is whether or not the children use the overt /affix/ in their own utterances. Obviously, the /affix/ can only induce selectional requirements when used.

(13) [_N [_V TRUCK DRIVE] ER]

An obvious counterargument to this view, namely that *truck-drive* does not occur as an independent compound in English, is addressed in Ackema 1999b and Ackema & Neeleman 2000.⁴ It should be noted, however, that English does have N-V compounds. Some examples are given below:

(14)	to breast-feed	to hand-make
	to play-act	to air-condition
	to window-shop	to c-command
	to base-generate	to chomsky-adjoin
	to head-adjoin	to head-govern

So, in order to reach the adult stage, children must not only learn the overt counterpart of ER, but also that English has the option of N-V compounding.⁵ This process is not

⁴ The arguments given there are based on Dutch, where similar facts hold. A theoretical argument in favor of an [N-V]-suffix analysis over an N-[V-suffix] analysis for this type of synthetic compound, which equally holds for English, can be given as well. This is based on the idea that thematic roles must be discharged in a way that accords with a thematic hierarchy (see for instance Baker 1988, Grimshaw 1990, Jackendoff 1990 for various versions of this idea): a theta-role lower on the hierarchy must be discharged before (that is, to a lower position in the structure) a higher theta-role. Since the agentive suffix binds the verbs external theta-role, its internal theta-role must already have been discharged before this suffix is attached, otherwise this role cannot be discharged any more and a violation of the theta-criterion results. This means that *truck driver* must have an [[N-V]-er] structure and cannot have an [N [V-er]] structure. The possibility of *driver of trucks* is not incompatible with this idea if it is assumed that the thematic hierarchy must be obeyed within a component, but not necessarily across components (see also Ackema 1999a:30-31). Since in *driver of trucks* one of the verb's theta-roles is discharged in morphology (it is bound by *er*) and the other in syntax the thematic hierarchy is not violated.

⁵ Note that compounding is not a universal option in the way that some morphological operations encoded by AFFIXES (like the derivation of subject names) may be. Even in a language that has compounding, there can be seemingly arbitrary gaps. English, for example, has both compounds with verbs as left-hand part (e.g. *swearword*) and compounds with adjectives as right-hand part (e.g. *honey-sweet*), but it nevertheless lacks V-A compounds (Selkirk 1982:15). V-A compounding also is not universally impossible, however; Dutch, for example, has compounds like *fonkelnieuw* 'shine-new' and *druipnat* 'drip-wet'. It is not very surprising that compounding is not universal, as it is not the expression of a semantically regular operation as opposed to the operation that relates a predicate to a subject name.

available in stage I, given that children do not produce subject names like *a ball-kick* in addition to the ones in (12) - such forms would result from attaching ER to a compound verb while not spelling out the AFFIX.

There are two reasons for assuming that children face more difficulties in learning that English has N-V compounding than in learning that /er/ is the phonological realization of ER. First, whereas the existence of ER may trigger a search for an appropriate spell-out, no such trigger exists in the case of compounding. Second, whereas *er* is a productive suffix and consequently relatively frequent in the child's input, compounds like those in (14) are infrequent. What we expect, then, is that after stage I there will be a stage in which /er/ is available to the child, but the operation of N-V compounding is not.

Clark et al. (1986:25) show that a second acquisitional stage starts around the age of four. As expected, ER is spelled out in this stage, but the verb and its object still show up in the head-first order typical of English syntax. Children produce forms as in (15a-c) (in order of decreasing frequency).

- (15) *Stage II (around age 4): VO order, overt affix on either V, N or both (in order of frequency)*
- | | | |
|----|-----------------|-------------------------------|
| a. | a giver-present | (someone who gives a present) |
| b. | a dry-hairer | (someone who dries hair) |
| c. | a mover-boxer | (someone who moves boxes) |

The fact that such a variety of forms is attested suggests to us that the child's syntactic representation cannot be mapped straightforwardly onto a phonological representation. More specifically, we assume that each mapping available to the child violates a correspondence rule. Thus, we will use the data in (15) to motivate three such rules.

If children in stage II indeed lack N-V compounding, subject names must be assigned the morphosyntactic structure in (16a) (as was the case in stage I); (16b) is still unavailable.

- (16) a. $[_N [_{VP} KICK_V [_{NP} BALL]]] ER]$
 b. $[_N [_V BALL_N KICK_V] ER]$

However, ER has a phonological correspondent in stage II. Given the phonological selectional requirements imposed by /affix/es, (16a) can be mapped onto (17a), (17b) or (17c), but not onto (17d), where /er/ is not attached to word.

See Ackema & Neeleman 2000 for some more discussion on this issue.

- (17) a. $[[_{\omega} \text{kick er}] [_{\omega} \text{ball}]]$
 b. $[[_{\omega} \text{kick}] [_{\omega} \text{ball er}]]$
 c. $[[_{\omega} \text{kick er}] [_{\omega} \text{ball er}]]$
 d. $*[[_{\phi} [_{\omega} \text{kick}] [_{\omega} \text{ball}]] \text{er}]$

So, (17a-c) illustrate the best possible ways for a child to incorporate the /affix/ in a synthetic compound, given the morphosyntactic operations available at stage II (which include complementation in syntax, but not N-V compounding). However, given that all three realizations are ruled out in the adult language, we must assume that they violate a mapping principle that operates between morphosyntax and morphophonology.

The mapping principle violated by (17a) can informally be stated as saying that there should not be crossing correspondences between morphosyntactic and morphophonological structures (Marantz 1984, Sproat 1984, 1985). More precisely, we assume that correspondences between such structures are subject to the constraint below (cf. Sproat 1985:82).

(18) *Linear Correspondence*

- If X is structurally external to Y,
 X is phonologically realized as /x/, and
 Y is phonologically realized as /y/
 then /x/ is linearly external to /y/.

(17a) violates this principle because ER is external to the VP KICK BALL, while /er/ is not linearly external to its phonological realization: it shows up between /kick/ and /ball/.

In (17b), on the other hand, /er/ is linearly external to the phonological realization of KICK BALL. The problem here is that the input for ER in syntax is the VP projected by KICK, whereas the input for /er/ in phonology is /ball/. We assume that this violates the condition in (19).

(19) *Input Correspondence*

- If an AFFIX takes a head Y or a projection of Y as its input,
 the AFFIX is phonologically realized as /affix/, and
 Y is phonologically realized as /y/,
 then /affix/ takes /y/ as its input.

Note that (17a) in turn does not violate this condition: ER takes a projection of KICK as its input, and indeed /er/ attaches to /kick/ in that structure. Input correspondence is a

principle that will play an important role in the remainder of this paper, as it dictates which word an /affix/ should attach to. Phonological selectional features cannot be satisfied by just any adjacent word; they must be satisfied by the correspondent of the AFFIX's input. This means that we should refine our explanation of the ungrammaticality of (6a', b'). In these examples, /ist/ could attach to an adjacent word in phonology (giving rise to [_ω Aalsmeer ist] and [_ω pedaal ist], respectively). But since these words are not the phonological correspondents of the head of the phrase that IST takes as its input, input correspondence is violated.

We believe that (17c) violates neither linear correspondence nor input correspondence. Since the AFFIX is spelled out twice in this structure, its two realizations can each satisfy one of these constraints: the outermost satisfies (18), while the innermost satisfies (19). Of course, this analysis is based on a particular interpretation of the proposed correspondence rules, namely as requiring a particular locus of realization, rather than blocking alternative loci. Note, however, that this interpretation does not affect the analysis of either (15a) or (15b). What is wrong with (15c), we propose, is simply that one syntactic AFFIX is realized more than once in phonology:

(20) *Quantitative correspondence*

No AFFIX is spelled out more than once.

In sum, although the three phonological realizations of (16a) in (17a-c) satisfy the condition that an /affix/ be attached to a word, they each violate one mapping principle. Since (17a) occurs more often than (17b), while (17b) appears more frequently than (17c) it seems that some ranking of the three mapping rules is necessary, with linear correspondence as the most easily violable one. This is not something we will elaborate on, but we should perhaps point out that attachment of ER to a phrase and subsequent violation of linear correspondence by children is also apparent from data reported by Randall (1982). Randall shows that children can interpret *writer with a candy bar* as 'someone who writes with a candy bar', that is, as corresponding to a morphosyntactic structure [[WRITE WITH A CANDY BAR] ER].)

Problems with the mapping principles in (18)-(20) disappear when the child acquires the process of N-V compounding. This process makes available the morphosyntactic structure in (16b), which can be mapped onto (21). In (21) /er/ is attached to a word without violating either linear, quantitative, or input correspondence: /er/ is linearly external to /ball kick/, as required by (18), /er/ is attached to /kick/, as required by (19) and ER is spelled out no more than once, as required by (20). This phonological realization hence becomes the norm in stage III, the adult state.

(21) [[_o ball] [_o kick er]]

Interestingly, infrequent forms of the type produced in stage I survive in the adult language. There is some idiomatic variation as to how ER is spelled out. Of course, the regular realization of [VERB ER] is /verb/-er/, but there are lexical exceptions. In (22a), for example, ER is spelled out as *ist*, in (22b) it is not spelled out, while (22c) is perhaps a case of complete suppletion.

- (22) a. [TYPE ER] ↔ /type+/ist/
 b. [COOK ER] ↔ /cook/
 c. [STEAL ER] ↔ /thief/

This means that in cases of synthetic compounding as well, we may expect there to be exceptions to the way ER is spelled out. The interesting case from our present perspective is that in which it idiosyncratically fails to be mapped to any overt /affix/. The prediction the theory makes is that in such cases ER can be attached to a phrase without this leading to problems with the mapping to the corresponding structure in the phonological module. This turns out to be correct. Some examples from English are given in (23). A similar observation can be made for Dutch, as (24) illustrates.

- (23) a. scare crow
 b. pick pocket
 c. know nothing

- (24) a. weet al
know everything
 ‘wise guy’
 b. spring in ’t veld
jump in the field
 ‘madcap’
 c. sta in de weg
stand in the way
 ‘obstacle’

To summarize, Clark et al.’s data are relevant for two reasons. First, as predicted by distributed selection, the acquisition of an /affix/ ultimately triggers a shift in the type of host the corresponding AFFIX takes. Once the overt affix is acquired, the option of

attaching ER to a syntactic phrase disappears (except for idiosyncratic cases like (23)). Second, variation in the intermediate acquisitional stage II motivates three mapping rules that hold between the syntactic and phonological structure of words. The effects of these mapping rules will be further explored in section 4.

4 Subject names in the adult language

Given the right circumstances, we may expect more productive instances of acquisitional stage I and stage II to occur in the adult language; more productive, that is, than (23). Recall that stage II arises as the result of the unavailability of a particular type of N-V compounding to the child, while the phonological counterpart of ER, /er/, has already been acquired. Consequently, if certain types of verbal compounding are absent in the adult language, so that the corresponding semantics can only be expressed syntactically, we expect subject names to pattern with stage II, rather than stage III.

An example of this are subject names derived from verb-particle combinations, as discussed by Sproat (1985). Although a particle and a verb can be combined syntactically, yielding verb-particle order, it is impossible to combine them in a Prt-V compound in English:

- (25) a. to throw away
 a'. *to away-throw
 b. to stand in
 b'. *to in-stand
 c. to let down
 c'. *to down-let

To be sure, English does have complex words that seem to consist of a preposition and a verb, but these are not related to the verb-particle construction. Examples are *outperform*, *overact* and *underfeed* (cf. Selkirk 1982:15). These are clearly not morphological instantiations of the (nonexisting) verb-particle combinations **to perform out*, **to act over*, and **to feed under*. Indeed, verbs of this type do not even seem to be compounds; they rather appear to be derived by prefixation. First, they do not have compound stress (on the left), but share the rightward stress pattern of other prefixed verbs. Second, they have a specialized semantics, often associated with degree. Such specialization is typical of affixes, while the semantic relation between the head and nonhead of a compound is unpredictable. Third, not every preposition can occur in the

preverbal position. As far as we know, there are no P-V complexes with for instance *away*, *in*, *about* and *across*. Such restrictions suggest that preverbal prepositions are listed as such, in contrast to the left-hand parts of compounds. It is reasonable to claim, then, that English lacks P-V compounds.

If so, the formation of subject names based on verb-particle combinations should be problematic in the adult language in the same way that synthetic compounding is during acquisitional stage II. Given a morphosyntactic structure in which ER is attached to for instance CUT UP (cf. (26a)), the morphophonological structures in (26b-d) are available. Like (17a-c), (26b-d) violate linear correspondence, input correspondence and quantitative correspondence, respectively. Indeed, forms of this type are attested in adult English (see Sproat 1985).

- (26) a. [[CUT UP] ER]
 b. [[_ω cut er] [_ω up]]
 c. [[_ω cut] [_ω up er]]
 d. [[_ω cut er] [_ω up er]]

There is, in fact, a fourth way of realizing a syntactic structure in which ER is attached to a verb-particle combination. If the SUFFIX is not spelled out, on a par with acquisitional stage I, neither of the mapping principles formulated so far is violated. This is illustrated by *stand in*, the subject name derived from the particle verb *to stand in*. Since ER does not have a correspondent in (27b), all conditions on the placement of such a correspondent are satisfied vacuously.

- (27) a. [[STAND IN] ER]
 b. [[_ω stand] [_ω in]]

Indeed, syntactic verb-particle combinations productively undergo V to N conversion. As we have seen before, those AFFIXES for which no phonological realization is listed in the lexicon can be attached to phrases without problems:

- (28) a. The [_N make up] she wears is mostly purple
 b. That was a real [_N let down]
 c. Please perform one hundred [_N push ups]
 d. The last question was a complete [_N give away]
 e. Is there a [_N hand out]?

However, a phonological realization *is* listed for ER. It is plausible, then, that (27) violates a fourth mapping principle, which puts it on a par with (26b-d). The mapping principle in question simply says that if an /affix/ is available, it should be used:

(29) *Lexical faithfulness*

If X is associated with /x/ in the lexicon, and
 X occurs in the morphosyntactic representation,
 then /x/ must occur in the morphophonological representation.

Children during stage I do not violate lexical faithfulness with respect to ER, as they lack the corresponding /affix/. In stage II, forms like *kick ball* would go against (29), but since all possible realizations of the syntactic structure in (16a) violate a mapping principle, we expect such forms to still occur next to forms like *giver-present*, *dry-hairer* and *mover boxer* in the same way that *stand in* occurs in the adult language. Clark et al. (1986:16) indeed found two instances of the *kick ball* type during this stage. The fact that so few examples of this type are attested during this stage may be the result of certain preference strategies when one of the mapping principles must be violated, as already suggested in connection to (18), (19) and (20) above. Apparently, for children during stage II the least desirable option is to violate (29).⁶

An interesting contrast exists between English and Swedish with respect to the way subject names of verb-particle combinations are formed. As in English, there are syntactic verb-particle combinations in Swedish, showing the expected head-first order (cf. (30)). However, there is also an option of combining verb and particle in a compound, so that the verb follows the particle (cf. (31)).

- | | | | | |
|------|----------------|-------------------|-----------------|------------------|
| (30) | stiga upp | resa av | låna ut | somna in |
| | <i>rise up</i> | <i>travel off</i> | <i>lend out</i> | <i>sleep in</i> |
| | 'to rise' | 'to depart' | 'to lend out' | 'to fall asleep' |

⁶ As suggested by Jason Merchant (personal communication), the difference between Stage I and Stage II may actually be that children systematically violate the faithfulness condition in (21) during Stage I but not Stage II, rather than not having knowledge of *-er* at all in Stage I. This would be in line with the view in the optimality theoretic acquisition literature, according to which faithfulness conditions start out at the bottom of the ranking; see for instance Smolensky 1996. As remarked in footnote 2, the exact reason for why children do not use *er* is not relevant for the point we want to make here, which is that phrases can freely be used as input to ER when the overt correspondent does not occur.

- (31) uppstiga avresa utlåna insomna
up-rise *off-travel* *out-lend* *in-sleep*
 ‘to rise’ ‘to depart’ ‘to lend out’ ‘to fall asleep’

That the forms in (31) are compounds is apparent from three properties in which they contrast with English preposition-verb combinations (analyzed above as prefixed verbs). First, the forms in (31) display the stress pattern of compounds rather than prefixed verbs: stress falls on the particle (Gunlög Josefsson, personal communication). Second, the particles in (31) do not make a systematic contribution to the semantics of the particle-verb combination. This kind of semantic unpredictability is typical of compounds as opposed to prefixed verbs. Third, the range of prepositions that may precede the verb in structures like (31) is identical to the range of prepositions that may function as syntactic particles. This lack of restrictions is as expected of the left-hand part of compounds, while the set of prefixes is limited.

Given the availability of compounds of the type in (31), we expect subject names of verb-particle combinations to pattern with the English synthetic compounds discussed in section 3. If ER is attached to a particle-verb compound, as in (32a), no principles are violated in the mapping to the phonological representation in (32b).

- (32) a. [[PRT V] ER] ↔
 b. [[_ω /prt/] [_ω /v/ /are/]]

Indeed such forms occur, as (33a) shows. Moreover, we expect that the patterns found in English, which all violate a mapping principle, are ruled out in Swedish. The ungrammaticality of (33b-e) bears out this prediction.

- (33) a. angripare utgivare
 on-clutch-er *out-give-er*
 ‘attacker’ ‘publisher’
 b. *gripanare *givutare
 clutch-on-er *give-out-er*
 c. *gripare an *givare ut
 clutch-er on *give-er out*
 d. *gripare anare *givare utare
 clutch-er on-er *give-er out-er*
 e. *gripan *givut
 clutch-on *give-out*

We finally predict that Swedish children will go through an acquisitional stage comparable to the steady state for subject names of verb-particle combinations in English, namely when they have acquired the /affix/ that spells out ER but not the option of forming particle-verb compounds. As far as we know, however, there is no detailed study of the acquisition of subject names in Swedish, so that we do not know whether this prediction is borne out. However, the acquisition of participials indicates that the prediction may be on the right track. Before particle-verb compounding is acquired, children produce participles as in (34) (from Håkansson 1998:42), in violation of input correspondence. (The adult forms, after acquisition of particle-verb compounding, are the expected *uppättna* and *inlästa*)

- (34) a. ätuppna
 eat-up-PART
 b. låstinda
 verb-particle-PART

In sum, we have argued that the mapping between the syntactic and phonological structure of words is restricted by four mapping principles. Three of these - linear correspondence, quantitative correspondence and lexical faithfulness - are general constraints which require parts of a complex word to be spelled out once in the appropriate linear position. The fourth mapping principle - input correspondence - is relevant to structures involving affixation. This requirement gives rise to two further predictions which we will test in the remaining sections.

Before we do so, however, we should briefly clarify an issue left unaddressed above. When do violations of mapping principles lead to ungrammaticality? As the examples in (22) illustrate, regular mappings can be overruled on an idiosyncratic basis. That is, general mapping principles seem to be elsewhere conditions that must be obeyed unless more specific rules apply. This means that violations of mapping principles differ from violations of syntactic or phonological constraints: whereas the latter invariably lead to ungrammaticality, otherwise illegal mappings can be grammatical if the lexicon contains a more specific rule. **Drivist* is ruled out, but the parallel *typist* is ruled in

Of course, idiosyncratic mappings are exceptional: examples like *typist* are few and far between compared to the large number of regular /verb-/er/ forms. The interesting property of subject names derived from verb-particle combinations is that every possible form is an exception: no form satisfies all mapping principles. It is for this reason that speakers of English classify the various realizations of [[CUT UP] ER] in (26) - a nonexistent word - as deviant but possible. Once a specific mapping is listed, however,

alternative forms are judged ungrammatical. The lexical entry for [[PASS BY] ER], for example, states that /er/ need not satisfy linear correspondence. Consequently, *passer by* is the only acceptable form; **pass byer*, **passer byer* and **pass by* are ruled out as violations of input correspondence, quantitative correspondence and lexical faithfulness, respectively.

5 Phrasal /affixation/

We have argued that AFFIXes in syntax can take a phrase as their host; it is their phonological counterpart, the /affix/, that selects a word. But not any word will do: by input correspondence, the word to which an /affix/ attaches corresponds to the category selected by the AFFIX, or to its head if the selected category is a phrase. It is the fact that /affix/es care about what word they attach to that ultimately rules out ungrammatical cases of phrasal affixation. Mappings like (35) are ruled out.

- (35) a. $[_Y [_{XP} X WP] AFFIX] \leftrightarrow$
 b. $*/x/-/wp/-/affix/$

Interestingly, the phonological representation in (35b) is not ruled out across the board. Although it violates input correspondence if associated with (35a), no mapping principles are violated if prior to the attachment of the overt affix a process of zero derivation takes place. In other words, the syntactic structure in (36a) can successfully be mapped onto the phonological one in (36b).

- (36) a. $[_Z [_Y [_{XP} X WP] AFFIX-1] AFFIX-2] \leftrightarrow$
 b. $/x/-/wp/-/affix-2/$

It should be evident that the mapping in (36) does not violate linear correspondence, lexical faithfulness or quantitative correspondence: linear correspondence is satisfied because /affix-2/ appears external to the material contained in Y; lexical faithfulness is satisfied because no phonological correspondent is listed for AFFIX-1, while all other elements are spelled out; quantitative correspondence is satisfied because no element is spelled out more than once. The crucial mapping principle, then, is input correspondence. For convenience, we repeat this principle in (37).

(37) *Input Correspondence*

- if X is an AFFIX which corresponds to an affix /x/,
 X takes a head Y or a projection of Y as its input, and
 Y corresponds to /y/,
 then /x/ takes /y/ as its input

AFFIX-2 in (36a) takes as its input a projection of AFFIX-1. Hence, (37) dictates that /affix-2/ must attach to the phonological correspondent of AFFIX-1, if there is one (as stated in the "Y corresponds to /y/" clause). However, AFFIX-1 does *not* have a correspondent, which implies that (37) is satisfied vacuously. /Affix-2/ is consequently free to attach to any adjacent word.

We predict, then, that AFFIXes with an overt counterpart (which usually cannot attach to phrases) *can* take zero-derived phrases as their input. This prediction turns out to be correct. As (38a-c) show, the English plural SUFFIX and the Dutch diminutive SUFFIX, which both have an overt correspondent, can be attached to phrasal subject names in which ER idiosyncratically fails to be spelled out; (38d) gives a similar case involving conversion of V to N; in (38e-f), finally, autoreferential AFFIXation is followed by attachment of a progressive-like PREFIX and an overt agentive SUFFIX, which are again spelled out.⁷

- (38) a. [[[STAND IN] ER] PLUR] ↔
 a'. [[_ω stand] [_ω in s]]
 b. [[[SCARE CROW] ER] PLUR] ↔
 b'. [[_ω scare] [_ω crow s]]
 c. [[[SPRING IN HET VELD] ER] DIM] ↔
 c'. [[_ω spring] [_ω in 't] [_ω veld je]]
jump in the field DIM
 'little madcap'
 d. [[[PUSH UP] NOM] PLUR] ↔
 d'. [[_ω push] [_ω up s]]
 e. [PROG [[WAT IS ER NOU WEER AAN DE HAND] AUTOREF]] ↔

⁷ Since the prefix *ge* attaches to verbs, not nouns, (38e) must in fact involve two instances of zero derivation before prefixation takes place: the nominal head derived by the autoreferential AFFIX undergoes N-to-V conversion first. The verb thus derived indeed exists, witness an example like *zit toch niet de hele tijd zo te wat-is-er-nou-weer-aan-de-hand-en* 'don't what now all the time' (lit. 'sit not the whole time to what-is-there-now-again-on-the-hand-INF'). A similar line of argumentation may apply to (38f,f'), since ER usually attaches to verbal categories.

- e'. $[[_{\omega} \text{ge wat}] \text{ is er nou weer aan de hand}]$
GE what is there now again on the hand
 'continuous saying "now what?'"
- f. $[[[\text{BAN DE BOM}] \text{ AUTOREF}] \text{ ER}] \leftrightarrow$
- f'. $[[_{\omega} \text{ban}] [_{\omega} \text{de bom er}]]$
ban the bomb ER
 'someone who adheres to the "ban the bomb" slogan'

Some evidence that the phonological structures are as indicated comes from English progressive assimilation. The pronunciation of the plural morpheme in examples like (38a',b',d') depends on whether the preceding consonant is voiced (cf. (39a,b)). Since such assimilation does not take place across word boundaries (cf. (39c)), the suffix must be part of the preceding phonological word.

- (39) a. stand in[z], scare crow[z]
 b. push up[s], pick pocket[s]
 c. Sheryl Crow [s]aid [s]omething

The combination of facts discussed so far strongly supports a separationist view of selection. Phrasal affixation is allowed either if the AFFIX does not correspond to an /affix/ or if the head of the selected category is not spelled out. Such sensitivity to the phonological realization of material cannot be expressed in nonseparationist frameworks, since zero morphemes and overt morphemes have exactly the same m-selectional properties.

6 Phrasal AFFIXATION

The examples in (38) illustrate what one could call phrasal /affixation/: the phonological counterpart of a syntactic phrase hosts an /affix/. Still, due to the intermediate step of zero derivation, the examples do not involve phrasal AFFIXATION: AFFIX-2 in (36) combines with a syntactic head derived by AFFIX-1. There are circumstances, however, in which the mapping principles allow phrasal derivation by an overt affix. The mapping in (35) is ungrammatical because /wp/ intervenes between /x/ and the /affix/. This implies that if the derived phrase is head-final, the mapping to phonology should be unproblematic:

- (40) a. $[_Y [_{XP} \text{ WP X}] \text{ AFFIX}] \leftrightarrow$
 b. /wp/-/x/-/affix/

It will be obvious that (40) satisfies linear correspondence, lexical correspondence and quantitative correspondence. It also satisfies input correspondence if /x/ and /affix/ form a phonological word.

The grammaticality of (40) explains a number of apparent bracketing paradoxes which span morphology and syntax (Pesetsky 1985, Sproat 1985, Di Sciullo and Williams 1987 and Spencer 1988). Some English examples are given in (41). In all these cases, the /suffix/ combines with the phonological correspondent of the head of the syntactic phrase that its syntactic counterpart combines with (this analysis echoes earlier work by Sproat (1985)).

- (41) a. [[ATOMIC SCIENCE] IST] ↔
 a'. [[_ω atomic] [_ω scient ist]]
 b. [[GENERATIVE SYNTAX] IST] ↔
 b'. [[_ω generative] [_ω syntac tician]]

Although supported by the interpretation of the examples at hand, it may not be immediately obvious that the syntactic bracketing is as indicated. The analyses advanced by Williams (1981) and Spencer (1988) assume that *atomic* and *generative* modify *scientist* and *syntactician* respectively, on a par with examples like *crazy scientist* and *lazy syntactician*. The semantics of the examples in (41) is due, on this view, to a rule of lexical association.

Such an analysis is implausible for comparable bracketing paradoxes in Dutch, as we will now argue. The cases we will look at are given below.

- (42) a. [[KLASSIEK GITAAR] IST] ↔
 [[_ω klassiek] [_ω gitaar ist]]
classical guitar ist
 b. [[TRANSFORMATIONEEL GENERATIEF] IST] ↔
 [[_ω transformationeel] [_ω generativ ist]]
transformational generative ist
 c. [[FINANCIEEL ADVIES] ER] ↔
 [[_ω financieel] [_ω advis eur]]
financial advice er

The property in which Dutch crucially differs from English is the existence of declension for prenominal modifiers. In certain contexts, for instance if they are part of a definite DPs, prenominal modifiers must end in a declensional schwa. The phenomenon is demonstrated in (43).

- (43) a. de beroemd*(-e) gitarist
the famous(-DECL) guitarist
 b. de productief*(-e) generativist
the productive(-DECL) generativist
 c. de onbetrouwbaar*(-e) adviseur
the untrustworthy(-DECL) adviser

In other contexts, such as the ones in (44), insertion of a declensional schwa is impossible:

- (44) a. Hij speelt klassiek(*-e) gitaar
he plays classical(-DECL) guitar
 b. Zijn onderzoek is transformationeel(*-e) generatief van aard
his research is transformational(-DECL) generative in character
 c. Hij geeft financieel(*-e) advies
he gives financial(-DECL) advice

The competing analyses of bracketing paradoxes make different predictions about the distribution of the declensional schwa in examples like (42). Analyses based on Williams 1981 or Spencer 1988 would assign these examples and the ones in (43) identical syntactic representations. Such analyses hence predict that the adjectives in (42) must carry a declensional schwa in definite contexts. The analysis proposed here assumes that the adjective is part of an NP that does not host prenominal declension elsewhere (as (44) shows), and therefore no such declension is expected, not even when a definite determiner takes the entire structure as its complement. The data in (45) bear out the latter prediction and thus confirm that overt suffixes may attach to head-final phrases.⁸

- (45) a. de klassiek(*-e) gitarist
the classical(-DECL) guitarist
 b. de transformationeel(*-e) generativist
the transformational(-DECL) generativist
 c. de financieel(*-e) adviseur
the financial(-DECL) adviser

⁸ If a declensional schwa is added, the adjective must modify the combination of noun and affix. Thus, *de klassieke gitarist* is only ungrammatical under the intended reading that gives rise to the bracketing paradox. It is grammatical in the reading that the guitarist is classical (regardless of the type of guitar he is playing).

Further support for the option of overt suffixation of head-final phrases comes from the Dutch examples in (46). Although unusual, these examples are grammatical, a fact which can only be understood if their syntactic representations are as indicated. The point is that verbs follow, while nouns precede, their complements in Dutch. Consequently, the word order in (46a) and (46b) strongly suggests that the agentive AFFIX is attached to a VP.

- (46) a. [[_{VP} AAN DE WEG TIMMER] ER] ↔
 a'. [[_ω aan] [_ω de weg] [_ω timmer aar]]
on the road hammerer
 'careerist'
- b. [[_{VP} VAN MUGGEN OLIFANTEN MAAK] ER] ↔
 b'. [[_ω van] [_ω muggen] [_ω olifanten] [_ω maak er]]
from gnats elephants maker
 'someone who makes a fuss about little things'

The proposed analysis of (41), (42) and (46) yields bracketing paradoxes of the relevant type impossible if the derived phrase is not head-final (cf. (35)). It is therefore correctly predicted that examples like those in (46) will not occur in a VO language like English. It is also predicted that examples like (41) and (42) will be ungrammatical if the head of the NP that hosts the AFFIX is followed by a PP. As shown by (47), this is true.

- (47) a. [[HISTORY OF SCIENCE] IST] ↔
 a'. *[[_ω history] [_ω of] [_ω scient ist]]
 b. [[AUTONOMY OF SYNTAX] IST] ↔
 b'. *[[_ω autonomy] [_ω of] [_ω syntac tician]]

In this light, it is interesting to compare the examples in (46) to the cases in (24). Deverbal AFFIXES can in principle attach to either VPs or CPs. Since Dutch is a verb-second language with head-final VPs, word order will be different in the two cases: verb-final and verb-initial, respectively.⁹ This has direct repercussions for the realization of ER. As predicted, mapping to an /affix/ is unproblematic if ER has attached to a VP, but if it is attached to a CP, spell-out will violate either input correspondence or linear correspondence. It is no coincidence, then, that cases of idiosyncratically suppressed spell-out typically involve head-initial structures. Compare for instance (24b), repeated here as (48), with (46).

⁹ In the examples in (24) the verb is uninflected, but V-to-C is not in general a prerogative of verbs with finite inflection (see Johnson & Vikner 1994, Hoeksema 1998 and Hoekstra 1997 for discussion).

- (48) a. [[_{CP} SPRING IN HET VELD] ER] ↔
 b. [[_ω spring] [_ω in 't] [_ω veld]]

To be sure, an AFFIX attached to a head-initial phrase could be spelled out as a /prefix/ without violating any mapping principle. However, it is a pervasive property of category-changing affixes, such as the ones under discussion, that they are realized as /suffix/es. The right-hand head rule is valid for a large number of languages and most potential counterexamples have received alternative explanations (see Neeleman & Schipper 1992 and references mentioned there). In all languages in which the right-hand head rule holds, then, the mirror image of (40) cannot exist. Of course, things should be different in languages with left-headed morphology, but it would take us to far afield to address this issue here.

The general prediction spelled out in section 1 can be sharpened in view of the above. AFFIXes spelled out as /suffix/es cannot attach to phrases, unless the phrase is head-final. Zero phrasal derivation, on the other hand, may apply to head-initial phrases as well. These more detailed predictions are borne out by the behaviour of mixed categories, as we will show in the next section.

7 Mixed categories

Although AFFIXes may in principle attach to syntactic categories of different levels, they often bring along semantics requirements that restrict this freedom. The AFFIX that derives subject names, for example, must bind the external θ -role of the head of its host. It can therefore not attach to verbal projections in which this role is already satisfied, as illustrated in (49).

- (49) a. *a he-knows-all
 b. *een zij-springt-in-het-veld
a she-jumps-in-the-field

A similar requirement is imposed by the AFFIX that corresponds to /able/, which only takes inputs headed by verbs that have an unsaturated internal θ -role. The autoreferential AFFIX, finally, combines with phrases in which all θ -roles are assigned (as expected given its function):

- (50) Het ban *(de bom) was al van verre te horen
the ban (the bomb) was already from afar to hear
 ‘One could hear the "ban the bomb" from afar’

Restrictions of this type are not expected of AFFIXes that are thematically neutral. As long as the various mapping principles are satisfied, projections of various levels should be able to combine with AFFIXes that do not impose thematic requirements. As we will now argue, this prediction is correct. It provides a straightforward account of so-called mixed categories.

A mixed category is a phrase whose categorial features appear to change at some point in its projection line (cf. Jackendoff 1977, Abney 1987, Reuland 1988, Bresnan 1997, among many others). One example is the Dutch ‘nominal infinitive’ (cf. Van Haften et al. 1986, Hoekstra & Wehrmann 1985, Hoekstra 1986). This construction is headed by an apparently verbal form, the infinitive. It has the internal syntax of a VP up to a certain point, above which it behaves like an NP.

The distinctive feature of the construction is that the point at which its syntax switches from verbal to nominal can be located anywhere in the projection line:

- (51) a. Deze zanger is vervolgd voor dat stiekeme jatten van succesvolle liedjes.
This singer is prosecuted for that sneaky pinch-INF of successful songs
 b. Deze zanger is vervolgd voor dat stiekeme succesvolle liedjes jatten.
This singer is prosecuted for that sneaky successful songs pinch-INF
 c. Deze zanger is vervolgd voor dat stiekem succesvolle liedjes jatten.
This singer is prosecuted for that sneakily successful songs pinch-INF

In (51a) the verbal projection is nominalized at the lowest level. Its head behaves like a noun in three respects: (i) it precedes its internal argument, which is a prepositional phrase, (ii) it is modified by an adjective (as is shown by the declensional schwa on *stiekem*, which never occurs on adverbs), and (iii) it follows a determiner. In (51b), the internal argument is a DP in pre-head position, the typical realization of the internal argument of a verb. It seems, then, that nominalization takes place after merger of the object. From this point upward, however, the phrase shows the same nominal characteristics as before. In (51c) nominalization takes place at yet a higher level, as indicated by the fact that the argument-verb combination is now modified by an adverb rather than an adjective (as is shown by the absence of the declensional schwa on *stiekem*).

Note that an analysis in terms of a projection that switches category predicts that no nominal elements are to be found below the level at which nominalization appears to

take place; that is, below the level that still shows verbal syntax. Conversely, we do not expect *verbal* elements to be found *above* a level at which nominalization already appears to have taken place. Borsley & Kornfilt (2000) argue extensively that this prediction is correct. It is easy to illustrate it for the nominal infinitive. Once the projection is nominalized, as indicated by the presence of an adjective, subsequent merger of adverbials is barred (Hoekstra & Wehrmann 1985):

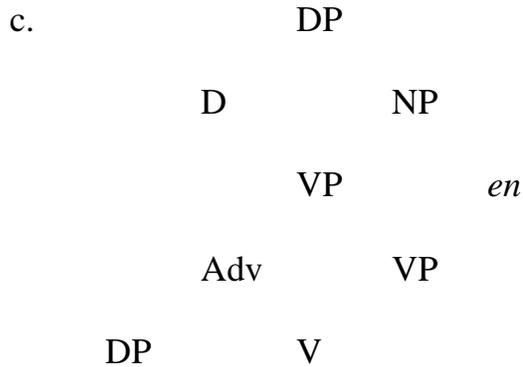
- (52) a. Deze zanger is vervolgd voor dat constante stiekeme liedjes jatten.
This singer is prosecuted for that constant sneaky songs pinch-INF
- b. Deze zanger is vervolgd voor dat constante stiekem liedjes jatten.
This singer is prosecuted for that constant sneakily songs pinch-INF
- c. *Deze zanger is vervolgd voor dat constant stiekeme liedjes jatten.
This singer is prosecuted for that constantly sneaky songs pinch-INF
- d. Deze zanger is vervolgd voor dat constant stiekem liedjes jatten.
This singer is prosecuted for that constantly sneakily songs pinch-INF

So, an analysis of mixed categories in terms of a category change at variable levels is attractive enough. One of the first to propose such an analysis was Jackendoff (1977), who introduced a ‘deverbalizing rule scheme’ like in (53).

$$(53) \quad N^i \rightarrow V^i \text{ affix}_N$$

An important feature of most analyses based on something like (53) is that they identify ‘ affix_N ’ with the overt affix that shows up on V. Thus, *en* is seen as the relevant affix in Dutch nominal infinitives, which implies that the following structures hold of the examples in (51) (cf. Van Haaften et al. 1986, Hoekstra 1986):

- | | | | | | |
|---------|----|-----------|----|----|-----------|
| (54) a. | DP | | b. | DP | |
| | D | NP | | D | NP |
| | | AP | | AP | N' |
| | | N | | PP | V' |
| | | | | | <i>en</i> |
| | V | <i>en</i> | | DP | V |



Although possible, this is not a very likely analysis. The point is that *en* exists independently as a *non*-category-changing infinitival marker. It only shows apparent nominal properties in the construction under discussion. This means that a nominalizing and nonnominalizing variant of *en* would have to be assumed which otherwise have identical properties. Both would have to select verbal categories, for example. (See Schoorlemmer 1999 for similar argumentation).

If the overt affix is not responsible for the category change, but we do want to maintain the analysis of the nominal infinitive as derivation at various levels of the projection, the most straightforward conclusion is that the construction involves a zero affix.¹⁰ Hence, we analyze the examples in (51) as below.

¹⁰ The literature contains at least three alternative lines of analysis. The first has it that in mixed categories a single affixed head projects an ambiguous set of categorial features (Van Haaften et al. 1986) or two different sets of categorial features (Reuland 1988), contra to what is usually assumed about projection. The second denies that mixed categories are derived by affixation. Pullum (1991) proposes that in gerunds the projection changes category ‘by itself’, on the basis of gerund-specific projection rules. Spencer (1999) develops a variant of this analysis in terms of argument structure. Since the properties of a mixed category can no longer be derived from the material it dominates, such analyses would seem to violate compositionality (if the change is semantic) or inclusiveness (if it is syntactic). The third line of analysis is based on the idea that functional structure usually associated with one category appears on top of another (Marantz 1997, Schoorlemmer 1999 and Borsley & Kornfilt 2000). Although such analyses satisfy inclusiveness, they have to relax a basic premise concerning functional structure, namely that it is tied to a particular lexical category. In addition, approaches of this type do not allow nominalization at intermediate levels: only full VPs can be the complement of a nominal functional head. Hence, examples like (51b) and (52b) would appear to be unexpected. This problem can be solved at the cost of a sufficient number of verbal functional projections, namely one per XP that may accompany the verb (Alexiadou 1997 and Cinque 1999). It is not obvious that such a proliferation of functional structure is desirable.

- (55) a. DP
 D NP
 AP N'
 N PP
 V-*en* AFF V' AFF
 DP V-*en*
- b. DP
 D NP
 AP N'
 N PP
 V-*en* AFF V' AFF
 DP V-*en*
- c. DP
 D NP
 VP AFF
 Adv VP
 DP V-*en*

Our view of m-selection makes clear predictions about the languages in which the AFFIX involved in the derivation of a mixed category can be spelled out. Recall from sections 5 and 6 that the mapping in (56) violates input correspondence while the mapping in (57) does not.

- (56) a. $[_Y [_{XP} X WP] \text{AFFIX}] \leftrightarrow$
 b. */x/-/wp/-/affix/
- (57) a. $[_Y [_{XP} WP X] \text{AFFIX}] \leftrightarrow$
 b. /wp/-/x/-/affix/

What we expect, then, is that mixed categories can involve overt suffixation of head-final syntactic phrases, while they must involve zero affixes in case the syntax is head-initial (assuming a head-final morphology throughout). Of course, head-final languages may also employ zero affixes (as is the case in the Dutch nominal infinitive), but they do not have to.

These predictions seem to be correct. Mixed categories in head-initial languages appear systematically to be derived through zero affixation. Perhaps the best-know mixed

category is the English gerund, for which Jackendoff originally proposed the deverbalizing rule scheme.¹¹ As expected, gerunds are not marked by an overt nominalizing suffix.

- (58) a. John's constant singing of the Marseillaise
 b. John's constantly singing the Marseillaise

Like Dutch *en*, the suffix *ing* only shows nominal properties in the construction at hand. Elsewhere it is the suffix that marks the present participle. In order to analyse nominal gerunds as involving overt affixation, a nominalizing and nonnominalizing variant of *ing* with otherwise identical properties would have to be assumed. Moreover, *ing* seems to appear internal to the phrase it supposedly nominalizes in (58b). Following Yoon (1996), we therefore conclude that the construction is more plausibly analyzed as involving a zero nominalizing affix.

A second example is the Spanish nominal infinitive. As in English, verbal projections can be nominalized at various levels in Spanish without there being an overt nominalizing suffix:

- (59) a. El tocar de la guitarra de María me pone nervioso
the play-INF of the guitar of Maria me makes nervous
 'Mary's playing of the guitar makes me nervous'
 b. El tocar la guitarra de María es muy elegante
the play-INF the guitar of Maria is very elegant
 'Mary's playing the guitar is very elegant'
 c. El cantar yo La Traviata traerá malas consecuencias
the sing-INF I La Traviata will-lead bad results
 'my singing La Traviata will have bad consequences'

¹¹ A curious property of the English gerund is that the equivalent of (51b) appears to be impossible. If the nominalization involves more than just the head, modification by an adjective is impossible: *John's *constant/constantly singing the Marseillaise is terrible* (cf. Pullum 1991). Wescot (1994) and Malouf (1998) note, however, that until the beginning of the 20th century examples like *the untrewē forgyng and contryvyng certayne testamentays* and *my wicked leaving my father's house* are in fact attested. We do not know why these have disappeared, but speculate that it might be related to ease of parsing. Upon hearing *John's constant singing*, the hearer will analyze *singing* as a noun. The following DP is consequently unexpected and necessitates reanalysis of the head as verbal. This problem does not arise in an OV-language like Dutch, where the DP appears before the head; that is, before the hearer has to decide whether this is a verbal or a nominal head.

The suffix *ar* that accompanies the verb in the examples in (59) is an infinitival marker elsewhere. This implies that analyzing the structure as involving overt affixation would again require unwarranted ambiguity. Other problems that arise are that *ar* appears internal to the phrase it nominalizes in (59b,c) and that the forms derived by *ar* do not behave like nouns in certain respects. The head of a Spanish nominal infinitive, for example, hosts verbal clitics (Yoon & Bonet-Farran 1991, Yoon 1996):

- (60) Nuestro cantar-las le irrita
our sing-them him irritates
 ‘Our singing them irritates him’

The pattern observed in English and Spanish contrasts with the one found in head-final languages. In mixed categories in such languages, the nominalizing suffix is frequently spelled out. For example, as noted by Yoon (1996:333), "in Korean, there is a dedicated nominalizing element (a suffix) used in phrasal nominalizations, which is also the affix found in (certain types of) lexical nominalizations". This is the suffix *um*, as illustrated below. Crucially, this suffix does not have a verbal use in the language, in contrast to English *ing* and Spanish *ar*.

- (61) [[John-uy [chayk-ul ilk]-**um**]-i] nolawu-n sasil-i-ta
John-GEN book-ACC read-NOMINAL-NOM surprise-V.PRENOM fact-be-PRES-DECL
 ‘John’s reading the book is a surprising thing’

Similarly, Turkish nominalized phrases contain suffixes which Borsley & Kornfilt (2000:108) describe as "the realization of a nominal mood category". An example adopted from Erguvanli 1984:75 is given below. The relevant suffix is *me*:

- (62) On-dan [[dogru-yu söyle]-**me**-sin-i] bekle-r-di-m
he-ABL truth-ACC tell-NOMINAL-POSS3-ACC expect-AOR-PST-1SG
 ‘I (would have) expected him to tell the truth’

Basque, a head-final language, spells out the nominalizing suffix as *ari* in the example below (cf. Hornstein & San Martin 2000):

- (63) Nik [anaia neskekin ibiltze]-**ari** ondo deritsot
I-ERG brother-ABS girls-with go out-NOMINAL.DET.DAT well consider-I
 ‘I think that my brother going out with girls is ok’

Quechua mixed categories as described by Lefebvre & Muysken (1988:20-21) further strengthen the argument. Quechua is a language which has three (semantically distinct) spelled-out nominalizing AFFIXes in mixed categories, one of which is *sqa*. In main clauses, the object can occur both to the right and to the left of the verb (cf. 64), but in mixed categories the verb always has to be in final position, that is, adjacent to the nominalizing suffix (cf. 65). This is exactly what one would expect under the present analysis.

- (64) a. Xwan papa-ta mikhu-n
Juan potato-ACC eat-3
 ‘Juan eats potatoes’
 b. Xwan mikhu-n papa-ta
Juan eat-3 potato-ACC
 ‘Juan eats potatoes’
- (65) a. Xwan papa-ta mikhu-**sqa**-n-ta yacha-ni
Juan potato-ACC eat-NOMINAL-3-ACC know-I
 ‘I know that Juan eats potatoes’
 b. *Xwan mikhu-n papa-ta **sqa**-n-ta yacha-ni
Juan eat-3 potato-ACC eat-NOMINAL-ACC know-I
 ‘I know that Juan eats potatoes’

We conclude that mixed categories bear out the predictions spelled out at the end of section 6: they instantiate phrasal zero derivation in VO languages, but allow overt phrasal derivation if the verb follows its objects.

In fact, the theory makes a further, negative, prediction. Suppose that a language is like Korean, Turkish, Basque and Quechua in having an /affix/ that corresponds to the nominalizing AFFIX employed in mixed categories. Suppose furthermore that it is like English and Spanish in having head-initial verbal projections and head-final morphology. Mixed categories in such a language would necessarily violate either linear correspondence or input correspondence (or another mapping principle). The structure in (66a) cannot be mapped to either (66b) or (66b’).

- (66) a. $[[_{VP} V DP] AFF] \leftrightarrow$
 b. $*/v/-/dp/-/aff/$
 b’. $*/v/-/aff/-/dp/$

We have seen earlier that mapping principles can be violated if there is no grammatical alternative. Nominalizations of English verb-particle structures exemplify this. However, in the case of mixed categories, there *is* a grammatical alternative, namely one in which the nominalization takes place at the head level. The mapping from (67a) to (67b) is unproblematic.

- (67) a. $[_{NP} [_N V \text{ AFF}] PP] \leftrightarrow$
 b. $/v/-/aff/-/pp/$

The prediction, then, is that languages which have VO order and spell out the relevant AFFIX will not have mixed categories. This prediction seems to be correct. As Helge Lødrup (personal communication) informs us, in Norwegian the affix used in productive nominalizations, *ing*, has no other functions in the language (unlike its homophonous English counterpart). As expected, the structures it derives have the external and internal syntax of NPs, rather than the mixed behaviour found in English. The crucial example in (68) is ungrammatical.

- (68) a. den ulovlige kopieringen av populaere sanger
that illegal-DEF copying-DEF of popular-PL songs-PL
 b. *den ulovlige kopieringen populaere sanger
that illegal-DEF copying-DEF popular-PL songs-PL

Nonseparationist theories of morphology cannot very easily capture the bracketing paradoxes discussed in the previous section and the distribution of overt affixes in mixed categories. Only if a difference is made between the selectional properties of AFFIXes and /affix/es is it possible to make sense of the fact that linear adjacency and spell out influence the grammaticality of phrasal derivation.

8 Concluding remarks

In this paper we have argued that m-selection does not exist as a phenomenon separate from syntactic selection (instantiated by c-selection and the like) and phonological selection (instantiated by phonological clitics). Rather, m-selection occurs if syntactic and phonological selection are combined. In a distributed morphology, an element with m-selectional properties is just a pair of an AFFIX and an /affix/. We have shown that this reduction is not only conceptually desirable, but also yields empirical results. It explains under which circumstances affixation may take a phrase as its host.

At first sight, this model has some affinity with theories in which affixation is the result of head-to-head movement in syntax. In such theories, too, a distinction is made between the syntactic selectional features of an affix and the requirement that it attaches to the head of the selected category (the stray affix filter).

There are several differences, however. The type of selection expressed by the stray affix filter, m-selection, must be syntactic in nature, given that it triggers syntactic movement. This implies that a reduction of m-selection to a combination of syntactic and phonological selection is impossible. There must be three types of selection: selection by a syntactic head, selection in phonology and a distinct type of m-selection, which also operates in syntax.

More seriously, there is an awkward distinction between m-selection and syntactic selection proper. Whereas syntactic selection can only hold between chain roots (Brody 1995, Jackendoff 1997), m-selection can be satisfied by the head of a chain (Lieber 1992, Ouhalla 1991). In our view, such a distinction is unnecessary: there is only one type of syntactic selection, which must be satisfied directly by merger (see Ackema (1999a:7 ff.) for more discussion).

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