

Morphological effects of lexical aspect*

Oele Koornwinder and Henk Verkuyl

Utrecht University/UiL OTS, Utrecht University/UiL OTS

1. Introduction

In this article we present the results of an investigation into the interaction between lexical aspect and derivational morphology. It is focussed on the distinction between stative and dynamic verbs, which plays an important role in the aspectual theory of Verkuyl (1972, 1993). We try to find morphological evidence for the assumption that dynamicity is a property of the verbal stem. For this purpose we made a list of 50 true stative verbs and also 50 true dynamic verbs. For each of these verbs we constructed a derivational paradigm by using Van Dale's morphological database (which covers a large dictionary of Dutch). By inspecting the paradigms, we found out that both prefixes and suffixes seem to be sensitive to the dynamicity parameter. We also looked at native verbs in general. Here we found that prefixation has an interesting effect on suffix selection. In the present article we will explain these statistic results by arguing that affixes which are sensitive to the dynamicity parameter refer to dynamic properties of the verb.

2. Background

2.1 Aspectual features

In the Slavic tradition aspectuality has been considered a verbal matter. In a Russian sentence like *Ja napisal pismo* 'I wrote a letter' the verb *napisal* was taken to express perfective aspect due to the presence of the prefix *na-*. Semantically, a perfective verb could be taken as expressing that the event described by the sentence is presented as completed. In this respect, the sentence is to be distinguished from *Ja pisal pismo* 'I was writing a letter'/'I was working at a letter', where *pisal* is taken as an imperfective verb, enabling the sentence to pertain to an incomplete event. Aspectuality is a more complex matter than can be sketched in one paragraph, but

the example just given suffices to illuminate the point at issue in this paper.

In the compositional approach adopted in Verkuyl (1972), aspectuality in Germanic languages is not taken as a feature of the verb. Rather, the completedness of a sentence like *I wrote a letter* is attributed to the combination of semantic information scattered over the sentence and present in the NP *I*, in the V *wrote* and in the NP *a letter*. The nominal information connected with the two NPs is labelled [+sQA] (Specified Quantity), which stands for a quantized portion of the world, so to say. The verbal information is called [+ADDT0], which stands for a sort of dynamicity (Additivity) conveyed by the verb. This dynamicity is connected with the fact that the verb in question expresses progress in space and/or time. A [-ADDT0]-feature as attributed to verbs like *hate*, *want*, etc. yields a non-completion interpretation in sentences like *I hated that letter*. The verb *hate* does not express any time structure in the sense that some development, however short, characterizes the event in question. In fact, it does not even make sense to speak of an event in the latter case, whereas in *I wrote a letter* this notion comes up quite naturally.

It is with respect to the [\pm ADDT0]-feature that we would like to use the term lexical aspect. In fact we apply the term to the semantic contribution of the verb to the sentential aspectuality. The semantic information involved is quite complex: a [+ADDT0]-verb introduces Path structure which plays a role in the composition of aspectuality (Verkuyl 1993). We will not go into the formal machinery necessary to define Path structure. For convenience, we will speak about dynamic verbs if they receive a [+ADDT0]-feature and about stative verbs if they have a [-ADDT0]-feature. We will leave the features behind us, observing that they abbreviate complex semantic information, and restrict ourselves to the bipartition of the class of verbs. It should be observed that the bipartition is not without its problems, as the aspectual literature shows. In the theoretical discussions about the semantic factors that do play a role in aspectual composition, the number of verbs used to make the points at issue is quite restricted. Therefore the present paper purports to extend the scope of the discussion by enlarging the domain of verbs considerably. We have chosen two sets of verbs: (in our view) clear cases of dynamic verbs as opposed to (in our view) clear cases of stative verbs. The bipartition was made on semantic grounds only: their behaviour in aspectual tests, their appearance in the literature and their meaning.

2.2 Argument frames

In order to account for the aspectual behaviour of verbs as related to their arguments, Verkuyl (1993: Ch. 14) makes a distinction between *verbal stems* and the *argument frames* they appear in. For example, look at the sentences in (1):

- (1) a. John walked
- b. John walked a mile

Sentence (1a) has a durative meaning (accepting modification by *for hours*), while (1b) is terminative. This cannot be explained in terms of $[\pm\text{sQA}]$, as (1a) does not contain an internal argument at all. Instead, it is proposed to assign different argument frames to the stem *walk*. These frames can be chosen from the (simplified) options below:¹

Argument frames

1. dynamic-transitive: $V(i)(Y)(X)$
2. dynamic-ergative: $V(i)(Y)$
3. dynamic-unergative: $V(i)(X)$
4. stative: $V(X)$

One should notice that these argument frames refer to conceptual structures. This implies that verbs which are transitive from a syntactic point of view need not be dynamic-transitives; they could be statives as well. In the dynamic frames X corresponds with the verb's external argument (which usually has an agent role), while Y corresponds with the verb's internal argument, which typically is a path restrictor (e.g. the theme, but it can also correspond with a goal PP). Only dynamic-transitives (for example *John walked a mile*) realize both roles. In ergatives (c.q. unaccusatives) only Y is realized (for example *John died*), while in unergatives (like *John walked*) only the X is realized. These argument frames abstract from arguments without aspectual consequences (like *in his chair* in *John was reading in his chair*). This also motivates the frame assigned to stative verbs (for example *John was sitting*), which only contains an X , whether the corresponding verb is transitive or not. It also lacks an index i , which means that they cannot specify progress. In this respect, statives differ from dynamic verbs, which use i (to be chosen from N , the set of natural numbers) to count the number of completed subevents. As this number is dependent on the quantity of Y , the index of unergative verbs (which lack the Y) has an unlimited range $\{0, 1, 2, 3, \dots\}$. In the formal representation, $Y(i)$, the sequence of indices i associated with a verb, expresses the (dynamic) process part of an event. It results in a terminated path if Y is $[\pm\text{sQA}]$.

In this article we will try to find out whether affixes are sensitive to the argument frame of the stem, and whether they can alter this argument frame. In the case of ambiguous verb stems, we expect that affixes can force a choice between the available argument frames. We will call this the Adaptation Principle:

Adaptation Principle

If a verb stem allows for several argument frame, affixes may force a choice.

A similar effect can be seen with particles, like in *push away*. For example, *John pushed his bike* does not imply that John finished this activity; but *John pushed his bike away* does. This can be explained by assuming that the particle *away* forces the verb *push* to exhaust the internal argument. This necessarily leads to a telic interpretation.

3. Aspect and morphology

3.1 Suffix selection

The Morphological Handbook (De Haas en Trommelen 1993) gives a detailed overview of Dutch morphology. Table 1 summarizes the Handbook descriptions of some very productive, native, verb selecting suffixes, using the terminology of Verkuyl (1993).

Table 1. Properties of native suffixes

suffix	productive functions	selection restrictions
<i>-ing</i>	N, referring to the process {i1,i2...} or result Y(i) of the event expressed by V	prefers transitive verbs
<i>-er/-aar</i>	N, referring to the (agentive) X of a dynamic V, if available; otherwise referring to Y or V itself;	prefers transitive verbs; blocks ergatives, psych verbs and reflexives
<i>-ster/-es</i>	<i>-ster</i> and <i>-(ar)es</i> denote female X.	
<i>-erij/-arij</i>	N, expressing repetitive realization of Y(i) or denoting branch/place where V is practiced	not specified; probably preference for activities
<i>-baar</i>	A, expressing the possibility that V denotes a terminated path Y(i)	prefers prefixed verbs that are transitive
<i>-end</i>	present participle, denoting process {i1,i2...}; also used for lexicalized adjectives	maximally productive in the participle use

Except for *-end*, all these suffixes refer to the path structure of the verb in order to specify the function of the suffix. In other words, these suffixes presume dynamic verbs. Generalizing over all verbal suffixes we thus expect²

HYPOTHESIS 1: Verbal suffixes presume path structure

If a verb can obtain both a stative and a dynamic meaning, we expect verbal suffixes to select the frame with path structure, as predicted by the adaptation principle. Hypothesis 1 seems to be confirmed by the LCS-based analysis of Lieber and Baayen (1998), although they are not concerned with selection criteria. In general they assume that the meaning of (English) nominalizations can be defined by relating the R-argument of the derived noun to one of the arguments of the LCS of the verb. As they only present examples with nominalizations of dynamic verbs, it is not clear whether the corresponding suffixes also allow for stative verbs; only in the case of *-ing*, which is assigned a “dynamic” meaning, this option clearly is excluded.

3.2 Prefix selection

According to the right hand head rule, prefixes cannot function as the head of a morphological constituent. But as Trommelen and Zonneveld (1986) showed, it is not clear whether this claim holds for Dutch, because the facts show that the stem of prefixed verbs not always is a verb. We will leave this debate for what it is, however, and only assume that prefixes can modify the thematic and aspectual properties of the verb, given a verbal stem. This assumption is justified by the Morphological Handbook (Chapter 2, Section 1.4.3, p. 43), which reports that innate prefixes can alter the syntactic argument frame of a verb. However, it depends on the syntactic frame³ of the original ([−prefix]) verb stem what frames can be assigned to the derived ([+prefix]) stem. As Table 2 shows, prefixation of any kind of verb can lead to a transitive verb. For transitive verbs this even is the only option. Ergatives, however, prefer to remain in the same class, while unergatives can choose between three options. This derivational asymmetry indicates that there is a deep correlation between prefixation and transitivity: generally it leads to argument creation (but cf. Neeleman and Schipper (1992), who claim that prefixes only can introduce a Y argument). As a consequence, prefixation never leads to the creation of unergatives.

Table 2. Relation between syntactic verb type and prefixation

	+prefix	Transitive	Ergative	Unergative
−prefix				
transitive		+	−	−
ergative		(+)	+	−
unergative		+	+	+

The transitive effects of (native) prefixation seem to be related to the dynamic presuppositions of verbal prefixes, as can be seen by inspecting the following summary of the descriptions in the Morphological Handbook:

Table 3. Function of native prefixes

Prefix	Productive meaning	Argument frame
<i>be</i>	to focus on Y (often turns PP into NP)	transitive or ergative
<i>ver</i>	to change, damage or loose Y by doing V	transitive
<i>ont</i>	to initiate or undo V or to get away by doing V	transitive or ergative
<i>her</i>	to repeat the realization of Y(i)	original frame
<i>ge</i>	often leads to a solemn meaning aspect	transitive frame

All of these prefixes, except for *ge-*, are very productive in Dutch. They usually presume path structure (as follows from the reference to *Y* and from words like *change*, *initiate* and *repeat* etc.), which may denote both active and passive actions. Therefore, we expect them to prefer dynamic verb stems:

HYPOTHESIS 2: Verbal prefixes presume path structure

This also follows from the fact that prefixed verbs have a preference for transitivity. Again the Adaptation Principle predicts that prefixation of verbs which are ambiguous between stative and dynamic use will force the stem to select the dynamic use. According to Lieber and Baayen (1993), however, the prefixes *ver-*, *be-* and *ont-* can combine with any verb stem, as these prefixes would introduce an LCS (a kind of path structure) that is so flexible that any verb stem can be accommodated (by assigning it a source role). Although their analysis supports the idea that prefixes express dynamic aspect, we think their claim is too strong.

3.3 Interactions between prefixes and suffixes

Given the hypotheses of the previous sections, we also expect that prefixed verbs will be suffixed more often than bare verbs, as prefixed verbs usually have path structure:

HYPOTHESIS 3: Prefixed verbs are suffixed more often than bare verbs

4. The database

A few years ago Van Dale Lexicografie started with the development of a morphological database for Dutch.⁴ This database is not finished yet, but it can already be used for large-scale analysis of morphological properties. In its present state the database assigns a fine-grained morphological structure to a set of 80.000 word parts, which covers the complete Grote van Dale (a Dutch dictionary with a quarter million words, apart from inflection). The morphological representations make use of an empirically based set of small semi-morphological⁵ roots and affixes. They consist of two layers, one giving the morpheme's spelling form and one giving its underlying (basic) form, which generalizes over small vowel and consonant alternations. Below, some examples are given for the verb stem *grijp* 'to grab'; the prefixed verbs *begrijpen* 'to understand' and *vergrijpen* 'violate' are only formally related to the stem *grijp*.

basic form	spelling form	stem	word
be[griɪp]en	be[griɪp]en	griɪp	begrijpen
[griɪp]en	[griɪp]en	griɪp	grijpen
[griɪp]er	[griɪp]er	griɪp	grijper
[griɪp]bAr	[griɪp]baar	griɪp	grijpbaar
on;be[griɪp]lijk	on;be[griɪp]e:lijk	griɪp	onbegrijpelijk
on[griɪp]bAr;heid	on[griɪp]baar;heid	griɪp	ongrijpbaarheid
ver[griɪp]en	ver[griɪp]en	griɪp	vergrijpen

If a morpheme has different spelling forms, the underlying suffix abstracts away from this alternation. The suffix *-lijk* for example refers both to *-lijk* and *-e:lijk*, and *-bAr* to *-baar* and *-bare*. It is also possible to stack affixes, like in *ongrijpbaarheid*. Table 4 presents some important facts about the current database.

Table 4. Facts about the morphological database

Types	Basic form	Spelling form	Form entries
Stems	19034	23788	25590
Prefixes	301	469	517
Suffixes	539	1279	1365

The morphological database can be useful for doing morphological research, as it can put together words with the same formal stems. In this way each stem can be assigned a *derivational paradigm*, i.e. the complete set of possible derivations. By constructing these paradigms for a certain class of stems one can find out whether the shared property has systematic effects on the morphology.

5. The selection of stative and dynamic verbs

There are a number of syntactic tests to distinguish between statives and dynamic verbs (given an argument frame). These can be found in Verkuyl (1972:88–97). Four of them are given below (in an adapted form). The tests differ with respect to the aspectual distinction they capture, which we will refer to as *f*-properties (where *f* is a semantic feature which may be either simple or complex).

Aspectual tests

1. If *NP V*'s can be modified by *in een uur* 'in an hour', then *V* is dynamic.
2. If *NP V*'s can be modified by *verder* 'further', then *V* is dynamic.
3. If *NP V*'s can be modified by *(een eind) door* 'go on', then *V* is dynamic.
4. If *NP V*'s can *not* be modified by *een uur* 'for an hour', then *V* is dynamic.

The first test detects verbs which always correspond with completed events (property f1), which implies dynamicity. The second and third test are equivalent: they detect dynamic verbs which do not imply completion of the event (property f2), presuming that the modified event can be continued after a break. The fourth test detects dynamic verbs by checking for durativity (f3). If a sentence fails this test, this is an indication that the verb expresses dynamic aspect. For example, take the verb *struikelen* ‘to stumble’. As this verb is telic (thus dynamic), “Jan struikelde urenlang” can only express forced repetition. As a consequence it fails the test. Together these tests constitute a reliable tool for classifying predicates as stative or dynamic. One way to interpret the meaning of the corresponding features is given below.

Features underlying lexical aspect:

- f1 = dynamic and non-continuous (test 1)
- f2 = dynamic and continuous (test 2/3)
- f3 = continuous (test 4)

One can derive the lexical aspect of a verb stem by abstracting from the argument frames it can appear in. For this purpose one needs to list the aspectual properties of its argument frames. If the verb never takes a (dynamic) complement, for example *kletsen* ‘to chatter’, then the aspectual properties of the syntactic verb are identical to those of the lexical stem. The same is true for verbs which always take a path specifying complement, for example *iets kopen* ‘to buy something’. But many verbs can be used both as an intransitive verb and as a transitive verb, taking an NP or PP complement. In those cases the verb stem should list the aspectual properties of all related argument frames. More in particular, a verb like *lopen* ‘to walk’ should list both the feature settings in the VP *lopen* and in the VP *naar huis lopen* ‘to walk home’. When these tests are carried out for a lot of verb stems, five main categories arise, as shown by Table 5:⁶

Table 5. Relation between tests and aspectual categories

Test	stat1 f3	stat2 (f1, f2), f3	dynam1 f2, f3	dynam2 (f1), f2, f3	dynam3 f1
test 1	–	– (+)	–	– (+)	+
test 2/3	–	?	+	+ (–)	–
test 4	+	+ (–)	+	+ (–)	–

We assume that the first two categories (stat1 and stat2) correspond with stative verbs and the other three with dynamic verbs. Probably one could derive even more categories with additional tests. The stat2 verbs behave unclear with respect to test 2: they feel like statives, but they sometimes allow for transitive usage (like *hangen*, ‘to hang’), and they often allow for the modifier *verder*. In the category dynam2 all

verbs have an optional Y, thus allowing both for an intransitive and a transitive argument frame. To distinguish the different argument frames, the transitive properties and the corresponding features are put between parentheses (as the transitive frame seems to be secondary).

By applying the above method to native, non-prefixed verbs, we collected 50 statives and 50 dynamic verbs. The selection was not without problems, as many verbs have different meanings, and allow for a lot of syntactic frames. Table 6 lists a lot of representative examples, ordered by aspectual category.⁷

Table 6. Aspectual classification of native verb stems

stat1	stat2	dynam1	dynam2	dynam3
blinken	denken	babbelen	breien	botsen
deugen	hangen	blazen	gieten	breken
heersen	huren	dragen	knippen	doden
heten	kleven	fietsen	lezen	kopen
kosten	klemmen	kletsen	maaien	prikken
kunnen	ruiken	lopen	schillen	raken
stinken	stralen	vechten	snoeien	scoren
willen	wachten	waken	wassen	sluiten
zitten	wegen	zwemmen	zagen	winnen

For each of the underlying stems we constructed a *derivational paradigm* (the set of formal derivations) by using the morphological database. The paradigms were filtered for disturbing factors like unproductive prefixes (we only took into account *be-*, *ver-*, *ont-* and *her-*) and semi-compounds. It was not yet possible to distinguish between word entries that correspond to independent words and entries that only exist as part of larger words. This leads to a certain amount of noise; the word entry *denking* ‘thinking’ for example, only appears in prefixed words like *overdenking* ‘overthinking’. Nevertheless, we will use these paradigms to carry out some computational analyses.

6. Morphological effects of dynamicity

6.1 Dynamicity effects on suffix selection

We start our analysis of the present derivation paradigms by focusing on the distribution of suffixes. Table 7 shows the available suffixes in order of decreasing contrast. The frequency countings are based on non-prefixed derivations. The last column gives the difference between the -dynamic value and the +dynamic value.

Table 7. Relation between lexical aspect and suffix selection

Suffix	–dynamic	+dynamic	Difference
-er	58%	86%	– 28%
-erij	13%	40%	– 27%
-ster	19%	40%	– 21%
-end	45%	26%	+ 19%
-baar	13%	30%	– 17%
-ing	45%	61%	– 16%
-tje	23%	38%	– 15%
-lijk	11%	25%	– 14%

Table 7 reveals that most suffixes, namely *-er*⁸, *-erij*, *-ster*, *-baar*, *-ing*, *-tje* and *-lijk* have a preference for dynamic verb stems. This is in accordance with hypothesis 1:

HYPOTHESIS 1: Verbal suffixes presume path structure > confirmed

This hypothesis only fails for the suffix *-end*. Probably this is due to the fact that *-end* is extremely productive in the meaning “while he/she/it V-ed”. But sometimes it also allows for adjectival use with a lexicalized meaning, like *klemmend* (not ‘clasping’ but ‘oppressive’), *hangende* (not ‘hanging’ but ‘pending’), *stralend* (not ‘shining’ but ‘radiant’). Probably only the lexicalized adjectives will be mentioned in the dictionary. As stative verbs have much in common with adjectives, they more easily allow for the adjectival use of *-end*. But this does not explain everything, because adjectives like *lopend* ‘running’ and *pakkend* ‘catching’ are derived from dynamic verb stems (‘walk’ resp. ‘catch’). They still have a dynamic flavour, however, which suggests that *-end* has no aspectual consequences at all, but always respects the aspect of the underlying stem. This is not true for the other suffixes, however, because they cannot be used productively with stative verbs. Nevertheless, they do not exclude stative verb stems completely; *-ing* for example can be found in *deining*, *derving*, *klemming*, *leuning*, *mening*, *weging*, *woning* en *zitting*. Two of them, *klemming* and *weging*, express dynamic aspect. This can be explained by the Adaptation Principle, because *klemmen* ‘clasp’ and *wegen* ‘weigh’ are verbs which allow both for stative and transitive usage. The other derivations with stative verbs always have a lexicalized meaning, for example *mening*, *zitting*, *leuning*, *woning*, *zitting*. Usually they refer to a thing or concept which is related to the verb, but never to a process or a human involved in that process.

Something similar can be said for derivations with *-er* and *-baar*. Applied to dynamic verbs *-er* usually refers to the external argument X. The word *lezer*, for example, is a nominalization of the verb *lezen* ‘to read’, meaning “someone who is reading”. If no agent is available, a derivation with *-er* sounds less natural, because

-er cannot be used in its productive meaning. In such cases, *-er* is forced to select another (non-dynamic) role. Applied to the statives *blijven* ‘to stay’, *liggen* ‘to be laying’ and *hangen* ‘to be hanging’, for example, it can denote the X, that is, the individual who is in the category of staying (as opposed to the leaving persons), laying or hanging. But often such words only allow for a lexicalized meaning.

As for *-baar*, with dynamic verbs it expresses the possibility that the verb denotes a terminative path. The NP *een leesbaar document* ‘a readable file’ for example can mean that a certain file is accessible for the text editor one works in, thus implying that it can be successfully read by this text editor. With statives, no transition is defined, so it cannot be successful either. If they nevertheless select *-baar*, the resulting derivation asserts that the verb denotes a (lexically specified) state which applies or can apply to an internal argument, e.g. *kenbaar* ‘knowable’, referring to a possible state of knowledge), *schijnbaar* (‘seemingly’, with the implication that there are clear indications), *kostbaar* (‘costly’; with the implication that “it” costs a lot).

6.2 Dynamicity effects on prefix selection

Table 8 gives the absolute frequency of prefixes in the paradigms of both stative and dynamic verb stems.

Table 8. Relation between lexical aspect and prefix selection

Prefix	–dynamic	+dynamic	Difference
[–]	50	50	0
<i>ver-</i>	23	27	– 4
<i>be-</i>	19	26	– 7
<i>ont-</i>	5	16	– 9
<i>her-</i>	2	7	– 5
Total	99	126	–27

The frequencies in Table 8 are based on complete paradigms (i.e. not abstracting from suffix clusters), so many prefixes will have been counted twice or more per selected stem. The prefix entry [–] corresponds with non-prefixed stems. Table 8 suggests that dynamic verbs allow for prefixation more easily than statives do, no matter what prefix is used. This pattern is not significant, however, so hypothesis 2 cannot be confirmed:

HYPOTHESIS 2: Verbal prefixes presume path structure > not confirmed

Table 8 further shows that the prefixes *ver-* and *ont-* are much more popular than the other two, which we will not try to explain here (perhaps *her-* almost never occurs with a lexicalized meaning, as it usually means ‘again’). To verify the hypothesis that prefixes may induce dynamic aspect, we again have to look at the paradigms. They reveal that most statives cannot be prefixed without obtaining a lexicalized meaning.

There are some exceptions, like *verblinken*, *verhuren*, *beklemmen*, *verkleven*, *betreuren* and *bewonen*. Sometimes they correspond with verb stems that also allow for a dynamic interpretation, e.g. *verhuren* ‘to lease out’, *beklemmen* ‘to jam’. In that case the prefix always prefers the dynamic option, as predicted by the Adaptation Principle. In other cases the prefix adds a dynamic property, for example *verblinken* ‘to loose its glow’, *verkleven* ‘to stick together’. But in the case of *betreuren* ‘to regret’ and *bewonen* ‘to live in’, the stative meaning appears to survive prefixation, which is a problem for our hypothesis.

7. Interactions between prefixation and suffixation

7.1 Dynamicity effects on the interaction between prefixes and suffixes

Table 9 shows the effect of prefixation on suffix selection, both for stative and dynamic verbs. It reports about the total number of stems that allows for the suffix *-ing* or *-er*, and also about the number of stems accepting neither of these or both. These frequencies are given as a percentage of the total number of inspected stems (given in the first column).

Table 9. Relation between lexical aspect, prefixation and *-ing/-er* selection

	Total	[–]	<i>ing</i> -total	<i>er</i> -total	<i>ing</i> & <i>er</i>
–dynamic					
– prefix	50	27%	45%	61%	33%
+ prefix	50	53%	39%	20%	12%
+dynamic					
– prefix	50	8%	63%	84%	55%
+ prefix	76	67%	30%	17%	16%

It can be concluded that prefixation of verbs generally leads to a significant growth of the [–] category, which is the category of verbs that select neither *-ing* nor *-er*. Within the remaining group of verbs, the *-ing* suffix appears to become more popular than the *-er* suffix, which is independent of dynamicity. Furthermore the number of verb stems which select both *-ing* and *-er* (last column) decreases

radically. This is not in accordance with hypothesis 3, which predicts that prefixed verbs will treat *-ing* and *-er* equally. We will return to this problem shortly.

HYPOTHESIS 3: Prefixed verbs are suffixed more often than bare verbs > false

As we already observed, the number of prefixed forms is larger for the dynamic verbs, and the same holds for the number of suffixations with the non-prefixed stems. But after prefixation the latter contrast vanishes. This is an indication that prefixation neutralizes the lexical aspect of the original verb stem, transforming it into a transitive verb with dynamic aspect. Indeed, inspection of the paradigms points out that prefixation of stative verb stems often leads to transitive frames with dynamic aspect (like predicted by the not yet confirmed hypothesis 2). As a consequence these verbs allow for derivations like *herdenking*, *verhanging*, *herkenning*, *verkenning*, *bestraling* and *bewoning*. These (regular) derivations are not possible with the bare counterparts of these verbs, which (again) confirms hypothesis 1.

7.2 Interaction effects for native verbs in general

To learn more about the effects of prefixation, we also looked at the effects of prefixation on native verbs in general. For this purpose we selected all infinitives which do not end in the foreign suffix *-eren*, as in *regeren* and *repareren*.⁹ To obtain more transparant results we removed derivations with prefixes other than *be-*, *ver-*, *ont-* and *her-* as well as compound verbs. This gave us 5414 different stems, among which 3592 bare stems and 1822 prefixed stems. For these infinitives we counted the number of derivations with *-ing* and *-er* in the same way as before.

Table 10. Relation between prefixation and *-ing/-er* selection

General	Total	[-]	<i>ing</i> -total	<i>er</i> -total	<i>ing</i> & <i>er</i>
– prefix	3592	58%	25%	30%	13%
+ prefix	1822	65%	33%	12%	9%
total	5414	60%	28%	24%	12%

Table 10 reveals that 60% of the infinitives lacks a derivation with *-ing* or *-er*, which indicates that most verbs do not like to be suffixed at all. Within the remaining group however, again a prefixation effect is visible: bare stems have a slight preference for derivations with *-er*, while prefixed verbs have a clear preference for *-ing*, also compared to non-prefixed stems. So we can safely conclude that prefixation leads to a significant shift from *-er* to *-ing* derivation. Probably the absolute decrease

of derivations with *-er* can be explained by the observation that derivations with *-er* like to express habituality. The default meaning of *zetter* ‘someone who puts’, derived from the verb *zetten* ‘to put’, for example, is ‘compositor’; but the word *verzetter*, which can be derived from the verb *verzetten* ‘to shift’, sounds odd, because it is hard to see how one could move things at the habitual level; this problem does not arise with *verhuizen* ‘to move to a new home’, for which task one can call in specialized companies. So, probably we are confronted here with the lexicographic basis of the database: it only lists words which are worth describing. The morphological database can help to fill such gaps.

Table 11 gives more detailed information about the relation between prefixation and selection of suffixes. The last column specifies the total number of stems that selected at least one of the suffixes we searched for, split out for prefixed and non-prefixed verbs. These totals are the basis for the derivation fractions in the other columns.

Table 11. Relation between prefixation and suffix selection

Relative	[ing]	[er]	[baar]	[erij]	[erig]	Max
–prefix	33%	39%	7%	12%	9%	2752
+prefix	64%	22%	13%	1%	0%	940
Totaal	41%	35%	9%	9%	7%	3692

Table 11 shows that only *-ing* and *-baar* prefer prefixed verbs; the other suffixes prefer bare verbs. This effect is the same for all prefixes. So again hypothesis 3 is falsified, although it holds for certain suffixes.

8. Conclusion

In this article we have studied the interaction between dynamicity and derivational morphology. According to Verkuyl (1972, 1993) only dynamic verbs may contribute to terminative readings. A lot of verbs can be used both stative and dynamic, however. This problem can be solved by assuming that verbal stems can choose different argument frames, which have different aspectual properties. Affixes might put restrictions on the possible argument frames. Assuming this framework, we formulated three hypotheses. We checked these hypotheses by analysing the derivational paradigms of 50 stative verbs and 50 dynamic verbs, using a morphological database to construct these paradigms. Given these paradigms we conclude that only the first hypothesis (that suffixes presume path structure) is confirmed, although it only describes a tendency (as is usual in derivational morphology). The

second hypothesis (that prefixes also presume path structure) is not really confirmed. The third hypothesis (that prefixed verbs more often attract suffixes) turned out to be false. Instead we found that prefixation leads to a shift from *er-* to *ing-* suffixation. This might have to do with the lexicographic basis of our database. Nevertheless, we think that our pilot study shows that lexical aspect might be one of the factors that influence derivational morphology. But to verify this claim, our survey should be repeated at a larger scale.

Notes

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1. As these argument frames correspond with type-logical representations, the arguments are given in reverse order. So $V(i)(Y)(X)$ is equivalent to $V(X, Y, i)$. But one should keep in mind that Y is processed before X , so that Y can be made dependent on the index i .

2. In the nonnative domain we expect similar selection restrictions for suffixes like *-or/-eur*, *-atie/-ering* and *-abel/-eerbaar*. Verbs ending in *-iseren* are good candidates for such suffixes, as this ending seems to guarantee path structure (cf. Plag 1997, who gives a generalized account of the verbal suffix *-ize*, the English counterpart of *-iseren*).

3. Note that this is not the same as the verb's conceptual argument frame.

4. Part of this project is being carried out by the first author.

5. In the present stage of development the "morphemes" have a semi-morphological status, as they are assigned on grounds of formal analogy rather than semantic function.

6. Lieber and Baayen (1998) present an aspectual classification of English verbs that also is based on dynamicity. It leads to other results, however, because they use a different definition of dynamicity (based on a non-linguistic criterion) and they work with other tests (e.g. the progressive test, which doesn't work for Dutch). In their classification dynamic verbs are subdivided by means of the parameter IEPS, which corresponds with an inherent change of state. According to us, this criterion is not very reliable, however. We prefer to distinguish verbs in terms of inherent telicity, recognizing the fact that this property partly depends on the choice of the argument frame.

7. These verbs (going top-down, starting at the left row) can be translated as follows:

- shine, be good, rule, be called, cost, be able, stink, want, sit
- think, hang, rent, stick, clasp, smell, radiate, wait, weigh
- chatter, blow, carry, cycle, chatter, walk, fight, watch, swim
- knit, pour, cut, read, mow, peel, prune, wash, saw
- collide, break, kill, buy, prick, hit, score, close, win

8. As most verbs were monosyllabic, the allomorph *-aar* almost never occurred.

9. Verb stems ending in schwa + /r/, however, were included, e.g. *sudder*, *kletter*.

References

- De Haas, Wim en Mieke Trommelen (1993) *Morfologisch Handboek van het Nederlands. Een Overzicht van de Woordvorming*. SDU, Den Haag.
- Lieber, Rochelle and Harald Baayen (1993), *Verbal prefixes in Dutch: a study in lexical conceptual structure*. Yearbook of Morphology, p. 51–78. Kluwer Acad. Publ.
- Lieber, Rochelle and Harald Baayen (1998), *Nominalizations in a calculus of lexical semantic representations*. Yearbook of Morphology, p. 175–197. Kluwer Acad. Publ.
- Neeleman, Ad and Joleen Schipper (1992), *Verbal prefixation in Dutch: thematic evidence for conversion*. Yearbook of Morphology, p. 57–92. Kluwer Acad. Publ.
- Plag, Ingo (1997), *The polysemy of -ize derivatives: On the role of semantics in word formation*. Yearbook of Morphology, p. 219–242. Kluwer Acad. Publ.
- Trommelen, Mieke and Wim Zonneveld (1986), *Dutch morphology: Evidence for the Righthand Head Rule*, Linguistic Inquiry 17, p. 147–170.
- Verkuyl, Henk J. (1972) *On the Compositional Nature of the Aspects*. Diss. Utrecht 1971. Reidel, Dordrecht.
- Verkuyl, Henk J. (1993) *A Theory of Aspectuality. The Interaction between Temporal and Atemporal Structure*. Cambridge Studies In Linguistics 64. Univ. Press.