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Relative productivity potentials of Dutch verbal inflection patterns

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Diachronic change regarding the Germanic verb shows a tendency away from strong and towards weak inflection, although the change is not unidirectional. Three production and acceptability experiments on nonce and existing verbs in Dutch unveil a clear hierarchy in potential productivity of inflection patterns. Weak inflection has the highest potential productivity; within strong inflection, Classes I, II and III outrank the others. Speakers also regularly employ a product-oriented schema based on the vowels /o/ and /ɔ/, as well as, although to a lesser extent, on /i/ and /ɪ/. We relate these findings to synchronic factors and to diachronic change.

Keywords: analogy, Dutch, morphology, productivity, verbal inflection

1. Introduction

During the festivities surrounding the inauguration of Willem Alexander, King of the Netherlands, on 30 April 2013, the recently abdicated Queen Beatrix prompted her successor son to wave (Dutch: *wuiven*) at the crowds. The next day, Genootschap Onze Taal, a society devoted to the Dutch language that, among other things, offers usage advice, published the following tweet, the first sentence of which is glossed in (1):

Woof de koningin naar de menigte, of wuifde zij? Lees er hier meer over:
[#taaltip](https://ow.ly/kAXwN) (@onzetaal, 1 May 2013, 09:42 CET)

- (1) *Woof de koningin naar de menigte, of wuifde zij?*
wave.PAST the queen to the crowds, or wave-PAST she?
'Did the queen wave (*woof*) to the crowds, or did she wave (*wuifde*)?'

While we do not attempt to answer in this article the question of how to form the past tense of the Dutch verb *wuiven*, we will discuss the reasons why the Dutch inflectional system can make past tense formation a problem, especially in cases like *wuiven*. The aim of this article thus is to establish the (synchronic) relative productivity potentials of the various past tense and past participle formation strategies in Dutch by means of three experiments. In doing so, we hope to clarify particular patterns of language change in this area.

Germanic languages broadly speaking have two ways of forming the preterite and past participle of verbs. So-called weak verbs use a dental suffix for both forms, as in (2), while strong verbs¹ do not use a dental suffix; instead they use a nasal suffix in the past participle, and may or may not show vowel alternation (3).² Within the ‘weak’ and ‘strong’ groups, there may be various sub-groups, among them most notably the Germanic ablaut classes in strong verbs. Various processes of change may give rise to deviations from these basic inflection patterns, see (4).

(2)	a.	<i>kok-en</i>	<i>kook-te</i>	<i>ge-kook-t</i>	Dutch
	b.	<i>koch-en</i>	<i>koch-te</i>	<i>ge-koch-t</i>	German
	c.	<i>kók-a</i>	<i>kók-að</i>	<i>kók-að</i>	Faroese
		cook-INF	cook-PST.SG	(PTCP-)cook-PTCP	
		‘cook’	‘cooked’	‘cooked’	
(3)	a.	<i>rijd-en</i>	<i>reed</i>	<i>ge-red-en</i>	Dutch
	b.	<i>reit-en</i>	<i>ritt</i>	<i>ge-ritt-en</i>	German
	c.	<i>ríð-a</i>	<i>reið</i>	<i>rið-in</i>	Faroese
		ride-INF	ride.PST.SG	(PTCP-)ride-PTCP	
		‘ride’	‘rode’	‘ridden’	
(4)	a.	<i>vrag-en</i>	<i>vroeg</i>	<i>ge-vraag-d</i>	Dutch
		ask-INF	ask.PST.SG	PTCP-ask-PTCP	
		‘ask’	‘asked’	‘asked’	

¹ Especially in non-academic discourse, the terms ‘regular’ and ‘irregular’ are often used for ‘weak’ and ‘strong’, respectively. As will be clear from our demonstration, there is a great deal of regularity in strong inflection, while there are also irregularities in weak inflection; we therefore prefer the terms ‘weak’ and ‘strong’ over allusions to regularity. On the history of this terminology, see Schultink (1989, 1993).

² North Germanic distinguishes between the past participle, with a nasal suffix, and the supine, which is based on the singular neuter form of the past participle, and therefore appears with a dental suffix; cf. Faroese supine *riðið* ‘ridden’ with the participle *riðin* in (3c). In many Mainland Scandinavian varieties, the supine form has completely replaced the past participle, leading to dental suffixes throughout the verbal paradigm.

b.	<i>kom-a</i>	<i>kom</i>	<i>kom-in</i>	Faroese
	come-INF	come.PST.SG	come-PTCP	
	'come'	'came'	'come'	
c.	<i>dive</i>	<i>dived/dove</i>	<i>dived</i>	English (US/Canada)
	(English example taken from Chambers 1998: 19–22)			

The literature has long noted an asymmetry in diachronic change (van Haeringen 1940). It is considerably more common for originally strong verbs to become (partially) weak than for originally weak verbs to become (partially) strong; the weak pattern is therefore seen as more productive than the strong patterns or even as the only pattern worthy of the label 'productive' (but see Section 2.4 on productivity). However, it is not unreasonable to assume that within strong inflection, there are differences between inflection classes as well: to use the obvious pun, some strong classes may be stronger than others. Given the slow rate of change and the low number of relevant tokens – at most a handful of new strong forms appear in a given century – diachronic data unfortunately does not give much insight into the relative productivity of strong inflection classes. In this article, we therefore present an overview of relative productivity potentials of strong verbal inflection patterns in Dutch based on three production and acceptability experiments.³

The structure of the article is as follows. In Section 2 an overview of historical changes in strong verbal inflection patterns in the history of Dutch is given, and previous experimental work on the productivity of strong and weak verbal inflection in the language is reported on. In Sections 3–5 we describe the set-up of the study, present the method used and results from the three experiments, and review the main experimental findings. The amalgamated results are then discussed from both a synchronic and diachronic perspective in Section 6. We conclude with some remarks on productivity and an outlook for further study in Section 7.

2. Background

2.1. Dutch verbal inflection from a Germanic perspective

Unlike some other (mainly North-)Germanic languages, which have retained multiple weak inflection classes (for Frisian, see Tiersma 1999:

³ Our use of the term 'potential productivity' differs from that in Baayen (2009); see Section 2.3.

62–65; for Norwegian, Faarlund et al. 1997: 481–486, 492–500; for Swedish, Hultman 2003: 156–160; for Danish, Hansen & Heltoft 2011: 650–653; for Faroese, Thráinsson et al. 2004: 134–141; and for Icelandic, Kress 1982: §§283–316), Dutch has only one single weak inflection class (ANS §8.3.3). The weak past tense is formed with a suffix *-te* or *-de* (plural *-ten* or *-den*), while the past participle features a *ge-* prefix and a *-t* or *-d* suffix. The choice of suffix depends on the (underlying) voicing of the final stem consonant, so that we get *koppen–kopte–gekopt* in contrast to *tobben–tobde–getobd*. Because of word-final consonant devoicing in Dutch, the difference between the suffixes is neutralised in the past participle, unless it is used as an inflected adjective. Recent research has shown, however, that there is extensive variation in production and perception of these suffixes, and that the prescriptive distinction between suffixes is not completely well rooted in language use (Ernestus & Baayen 2003, 2004; De Schryver et al. 2013; Sebregts & Strycharczuk 2012).

Strong verbs make up the other large cluster of inflectional classes. The overview of strong verb classes in modern standard Dutch set out in Table 1 was assembled on the basis of multiple sources (de Vriendt 1965; van Bree 1987) and, as a historicising overview, serves as a framework for discussing patterns of variation and change in the strong inflection system. The Dutch reference grammar ANS (§8.3.5.ii.a) departs from this traditional division into seven Germanic ablaut classes, and categorises them into 23 vowel

Table 1. Strong verb classes in modern standard Dutch

Class	Pattern	Example	<i>n</i> types in ANS
I	/εi–e–e/	<i>grijpen–greep–gegrepen</i> ‘grab’	55 (53 <i>ij</i> + 2 <i>ei</i>)
IIa	/i–o–o/	<i>liegen–loog–gelogen</i> ‘lie (tell untruths)’	13
IIb	/œy–o–o/	<i>zuigen–zoog–gezogen</i> ‘suck’	24
IIIa	/ɪ–ε–ɔ–ɔ/	<i>drinken–dronk–gedronken</i> ‘drink’	46 (26 <i>ɪ</i> + 20 <i>ε</i>)
IIIb	/ε–i–ɔ/	<i>sterven–stierf–gestorven</i> ‘die’	7
IV	/e–a–o/	<i>spreken–sprak–gesproken</i> ‘speak’	6
V	/e–ɪ–a–e/	<i>geven–gaf–gegeven</i> ‘give’	11 (8 <i>e</i> + 3 <i>ɪ</i>)
VI	/a–u–a/	<i>varen–voer–gevaren</i> ‘sail’	5
VIIa	X–/i/–X	<i>blazen–blies–geblazen</i> ‘blow’	11
VIIb	/a–ɪ–a/	<i>vangen–ving–gevangen</i> ‘catch’	2

Note: The phonemic transcription in this table and elsewhere in the article is based on Booij (1995).

alternation patterns. In keeping with the Dutch tradition (ANS §8.3.5), we give only the infinitive, the singular past tense, and the past participle forms. In the majority of classes, the plural past tense form has the same vowel as the singular, but in classes IV and V singular /a/ alternates with plural /a/.

In addition to the completely strong verbs, there are also verbs with a (synchronically) stable mixed inflection pattern (ANS §8.3.5.i). These come in two categories: verbs with a weak past and a strong participle, and verbs with a strong past and a weak participle. With one or two exceptions for the verbs listed in ANS, the past tense forms are historically innovations.⁴ A related category are mixed-inflection verbs that are not in stable use, but where the strong form, often the past participle, is used in 'non-neutral', that is, regional or jocular, language. An overview of these verbs is given in Table 2. Some of them, in particular *breien* and *erven*, which are mentioned in ANS, may be spreading and undergoing category change also in 'neutral' language use at the moment.

Finally, there is a category of verbs that could be called 'irregular', or 'stem-changing' (ANS §8.3.5.ii.b).⁵ Often these are previously regular verbs whose regularity has been obscured by sound change. This group contains both originally weak verbs (e.g. *kopen* 'to buy') and originally strong verbs (*slaan* 'to hit', *staan* 'to stand', *verliezen* 'to lose').

2.2. Diachronic change in verbal inflection patterns

The distribution of verbs across inflection patterns is liable to diachronic change. For Dutch, we can distinguish three types of change: strong-to-weak, weak-to-strong, and within-strong change. The first of these, origin-

⁴ Exceptions are *erven* 'inherit', where the strong participle *georven* is an innovation (although not listed in ANS, innovations in the past tense, *ierf* and *orf*, occur as well); *hoeven* 'need', with the strong participle *gehoeven* as an innovation; and *waaien* 'blow (wind)', originally strong with an invariable weak participle *gewaaid* since the Middle Dutch period, but continuing variation since the Early Middle Dutch period in the past tense between weak *waaide* and strong *woei* (Class VI) and earlier *wieu* (Class VII). The form *zei* for *zeggen* 'say', appears strong but is not based on (analogy with) an ablaut class. Rather, it reflects regular lenition from *zegde* > *zeide* > *zei*, with the older forms still in use in formal, archaic registers as well as in compounds. The loss of the dental suffix is not phonologically motivated; it occurs only in a few highly frequent verbs in Dutch, and is a result of the tendency of frequent verbs to irregularise and shorten; see Nübling (2000: 161–163).

⁵ For a discussion of verbal stem changes and what they express semantically, see Bybee (1985: 36–37, 64).

Table 2. List of 'non-neutral' strong forms of (mostly) weak verbs

Verb	Normal inflection	Non-neutral form
bellen	belde–gebeld	gebolen
breien	breide–gebreid	gebreeën*
erven	erfde–geërfd	georven*
geven	gaf–gegeven	gegoven
hangen	hing–gehangen	gehongen
inruilen	ruilde in–ingeruild	ingerolen
merken	merkte–gemerkt	gemorken
omruilen	ruilde om–omgeruild	omgerolen
opbellen	belde op–opgebeld	opgebolen
opvreten	vrat op–opgevreten	opgevroten
pijpen	pijpte–gepijpt	gepepen
reizen	reisde–gereisd	gerezen
rekken	rekte–gerekt	gerokken
ruilen	ruilde–geruild	gerolen
snappen	snapte–gesnapt	gesnopen
uitleggen	legde uit–uitgelegd	uitgelegen
uitrekken	rekte uit–uitgerekt	uitgerokken
uitvreten	vrat uit–uitgevreten	uitgevroten
vegen	veegde–geveegd	gevogen
verhuizen	verhuisde–verhuisd	verhoken
verwennen	verwende–verwend	verwonnen
vreten	vrat–gevreten	gevroten
zweven	zweefde–gezwefd	gezwoven

Source: *Onze Taal* (<http://www.onzetaal.nl/taaladvies/advies/erven-geerfd-georven/>, accessed 7 Oct. 2013). Forms given in *ANS* as non-neutral alternatives are marked with an asterisk.

ally strong verbs taking on a weak inflection pattern, is the most frequent type, as may be gathered from the fact that Seebold (1970) lists approximately 500 strong verbs for Proto-Germanic, while present-day Dutch has only around 210 strong verbs (De Backer 2013: 104).⁶ It is less common for originally weak verbs to take on a strong inflection pattern, or for strong

⁶ This is not to say that almost 300 Proto-Germanic strong verbs have become weak in Dutch. A fair number of verbs in Seebold (1970) has never been attested in Dutch at all, while others are no longer in use in present-day Dutch but were still strong at their latest attestation (e.g. *vlaen* 'flay', *dwaen* 'wash'). With those caveats, however, the numbers do seem to indicate a clear strong-to-weak tendency.

verbs to take on a different strong pattern; nevertheless, these are by no means sporadic events. All these changes, it seems, spread relatively slowly through both the system and the community, and we find extensive variation and many mixed patterns. In order to gain better understanding of these developments, each of the changes will be discussed in more detail in the following paragraphs.

Strong verbs becoming weak are a common occurrence in the history of the Germanic languages, and Dutch is no exception (van Haeringen 1940: 226–229). Such changes generally go unremarked upon in the literature, because there seems to be an expectation that it is natural for a verb system to gradually move towards a higher degree of ‘regularity’. Recent research has increasingly turned to the role of frequency in determining the rate at which strong verbs become weak. Lieberman et al. (2007), for instance, show a direct correlation between the token frequency of an English strong verb and its resistance to regularisation. While Carroll et al. (2012) criticise some methodological aspects in Lieberman et al.’s study, they come to the same conclusion for German. Research on processing differences between high and low frequency verbs in Dutch will be reviewed in section 2.4, below.

Changes from weak to strong are also attested throughout the written history of Dutch, although many of these ‘new’ strong verbs appear in the Early Modern period.⁷ In Heinsius’s (1897: 56–65) treatment of Early Modern Dutch and the language of the 1637 *Statenbijbel* Bible translation, we find the following examples: into Class I, *lijken* ‘seem’, *belijden* ‘confess’, *prijzen* ‘praise’ (a loan word from French), *wijzen* ‘point’ (we add *stijven* ‘stiffen’); into Class IIb, *fluiten* ‘whistle’; into Class IIIa, *zenden* ‘send’, *schenden* ‘violate’, *schenken* ‘donate’, *(ver)schrikken* ‘scare (trans., intrans.)’; into Class VI, variably, *vragen* ‘ask’, *jagen* ‘hunt’ (we add *zwaaien* ‘wave’). It is striking that large numbers of words enter Classes I and IIIa, the largest classes to begin with in Dutch (Table 1) and Proto-Germanic (De Backer 2013: 88).

In addition to the weak-to-strong changes attested in written standard Dutch, we find many strong forms of prescriptively weak verbs in non-standard language. Examples are given in Table 2, but this is by no means

⁷ Of course the increase in attested ‘new’ strong verbs in the Early Modern period may be an artefact of the greater number of texts surviving from that time, but on the other hand the Early Modern period does seem to have been a time of significant linguistic change. For example, Carroll et al. (2012) show that the Early Modern period was a time of great upheaval for the verb system of German, with many class shifts taking place. For more general comments on the rate of language change in Early Modern English, see Nevalainen (2000: 261).

a comprehensive list: many other such forms, including past tenses, can be found on the internet. Genootschap Onze Taal, the compilers of this list, describe these forms as ‘non-neutral’. From the description it appears that this is meant to read ‘regional’ in some cases, ‘jocular’ in others (cf. the jocular reading of past tense *wung* for *to wing* in Bybee 1996: 280). We return to this issue in our discussion below (Section 6), and restrict ourselves here to stressing two features in this list: firstly, the fact that all ‘non-neutral’ forms are given in the past participle only, and secondly, the fact that the vast majority of these forms employ a vowel change to *o*, that is, /o/ or /ɔ/.

Finally, a number of strong verbs have changed their vowel alternation patterns despite remaining strong. This, in combination with phonological changes applying only to some verbs, has given rise to a number of highly idiosyncratic patterns: 11 of the 23 patterns listed in ANS apply to only one or two verbs. A full treatment of these patterns is not possible, but we would like to discuss one noticeable development that is typical for Dutch: the appearance of /i/ in the past tense of Class-IIIb verbs. This development has been investigated only sporadically, but there is convincing evidence for a spread from the formerly reduplicating verbs in Class VII (van den Berg 1957; de Vriendt 1965: 59–62). Their analysis, however, fails to account for an earlier spread of /i/ to some Class-VI verbs such as *biek* < *boek* for *bakken* ‘bake’ or *wiesch* < *woesch* for *wasschen* ‘wash’.⁸ An in-depth discussion of the spread of /i/ across strong verb classes in Early Modern Dutch lies outside the scope of this article; we hope to be able to present more research in the future.

2.3. Regularity, defaultness, and productivity

Our preference for the terms ‘weak’ and ‘strong’ over ‘regular’ and ‘irregular’ is partly to avoid a number of assumptions that come with allusions to regularity, in particular regarding the nature of regularity and its link to productivity. Although we do not attempt to solve these issues here, it nevertheless seems appropriate to provide working definitions of the terminology used and to highlight some areas of interest here. A fuller

⁸ The spread of /i/ to the past tense of *wasschen* ‘wash’ and *wassen* ‘wax, grow’ (past tense *wies* < *woes*; we use the antiquated spelling for ‘wash’ to distinguish the two verbs) had happened by the thirteenth century; for *bakken*, by the late fourteenth century. *Heffen* ‘raise’ (past tense *hief* < *hoef*) retains its original past tense form into the fifteenth century. The relative chronology of the changes in these verbs and those in Class IIIb verbs, which spread north from the Antwerp area in the sixteenth to eighteenth centuries, means that we are most probably dealing with two separate changes.

discussion of different approaches to productivity and their theoretical background can be found in Barðdal (2008: 9–54) and Baayen (2009).

We see regularity quite literally as a morphological process that can be expressed as a, preferably slightly generalised, rule or schema in a speaker's mental grammar. In this view, strong verbs are no less regular than weak verbs; the rules that express strong inflection merely have a more restricted scope in terms of the verbs they may apply to (note that this restriction refers to type frequency, as the token frequency of strong verbs tends to be relatively high; see Nübling 2000: 47).

When the scope of a rule expands to include newly-formed words, there is reason to call this rule 'productive'. For example, the productive plural morpheme in English is *-s*. Although other morphemes exist, for example *-en*, newly formed words take *-s* plurals, as in *selfie ~ selfies*. Change in existing nouns shows a similar direction, as in *egg ~ eyren > eggs* (or, for those so inclined, *ćicēn ~ ćicēnu > chickens*). Productivity is not a unique property of a single form within a morphological category, however, as the form *octopi* for *octopuses* shows. In this article, therefore, we see as 'productive' any form or pattern that attracts new members, whether they are newly formed words, loans, or have changed from a different form or pattern (Bybee 1996: 250). This means that productivity, in our usage, is a gradual and relative concept: *-s* and *-i* are both productive plural morphemes in English, although *-s* is considerably more productive than *-i*.

This approach to productivity is much less restrictive than, for example, that of Dik (1981: 39–40), whose definition of productivity requires (a) unrestricted potential application of the rule, and (b) non-intentionality. With this definition, Dik categorises the patterns that can be found in language data into three types:

Type I patterns are those that can be discovered by a linguist, without the possibility of proving that the pattern has psychological reality for the speaker. Type II comprises regularities that, while unproductive, can be applied to new cases incidentally or with specific stylistic intent. We must assume the speaker has abstracted these patterns from the data somehow. Type III are productive rules that can be applied freely to new cases without this leading to results that are remarkable in any way. (Dik 1981: 41–42)

In our view, by virtue of being applied to new cases, Dik's 'unproductive regularities' (Type II) are also productive, but to a lesser degree than Type III rules, which may be termed 'default' (see Bybee 1995: 438). A description of Type II rules, then, necessarily includes a discussion of the constraints – linguistic, stylistic, or otherwise – on its application.

2.4. Relative productivity of Dutch weak and strong inflection

There is no previous experimental research into the relative productivity of Dutch verbal inflection patterns, but a series of psycholinguistic studies from the 1990s may be of relevance. Lalleman & van Santen (1993, see also van Santen & Lalleman 1994) found differences in production time between strong and weak past tense forms for both L1 and L2 speakers of Dutch. The production time of weak inflection is not influenced by lemma frequency, but that of strong inflection is, which indicates two different mechanisms in production – according to the authors, rules versus stored forms (see also Moder 1992 for English, and Clahsen 1997 for German).

Furthermore, L2 speakers produced a number of strong forms for prescriptively weak verbs, these almost exclusively showed /e/~o/ or /e/~a/ alternations in verbs with monosyllabic stems (Lalleman & van Santen, 1993: 180–182). Such monosyllabic stems with /e/, /ε/ or /œy/ are seen as ‘atypical’ for weak verbs, and the occurrence of non-prescriptive strong forms may point to some awareness of this in the minds of speakers. One wonders, though, why /εɪ/ is not in this list, given the large number of strong verbs with this stem vowel.

A final experimental result (van Santen 1997, on L1 speakers) points at an inverse relationship between frequency and the production of weak forms for prescriptively strong verbs, suggesting again that weak forms are computed while strong forms are learned. As young speakers produced more weak forms than older speakers in the experiment, we may conclude that weak inflection is becoming increasingly more productive.

As becomes clear from this discussion, the focus in Lalleman & van Santen’s research was on differences in processing between strong and weak verbs – rules, storage of forms, or a dual mechanism – whereas their findings on productivity were only secondary. In contrast, our interest here is exactly the productivity of strong and weak forms, regardless of any possible processing differences in production and perception.

2.5. Research questions and hypotheses

The aim of the present study is to quantify the relative productivity of the default weak inflection compared to strong inflection (a Type-II pattern in Dik’s categorisation), as well as the relative productivities of the individual strong inflection patterns. We hypothesise that, as the default, weak

inflection will be overwhelmingly more productive than strong inflection, although given the productivity of strong inflections in the history of Dutch, we do not expect the default to be the only productive pattern. Within strong inflection, we expect the patterns with a high type frequency – in particular, Classes I, IIb, and IIIa – to show higher potential productivity than other patterns; this would, then, also match historical linguistic data.

3. Overview of the study

In the study, three experiments aiming to discover different aspects of the productivity of (strong) verbal inflection were run. In the first of these, identical to that in Moder (1992), preterite forms and participles of nonce verbs were elicited. This experiment gives us an overview of the full range of inflection strategies at the disposal of Dutch native speakers, and already suggests which patterns may be more productive than others. The second experiment was an acceptability judgment on given strong and weak preterite forms and participles of nonce verbs. The acceptability of different patterns, and of different verbs within classes, is another measure of productivity and lets us investigate some further phonological constraints. Finally, in the third experiment strong preterite forms and past participles of existing weak verbs were elicited. By removing weak forms from the equation, this experiment provides us with a measure of the relative strength of strong inflection patterns.

4. Experiments

4.1. Eliciting nonce inflections

4.1.1. *Method*

For the first experiment, we presented participants with the infinitives of twenty nonce verbs and asked them to supply past tense (by default, singular) as well as past participle forms for these verbs. Since most strong inflection patterns have a limited input scope, the majority of prompts were designed as to resemble existing strong verbs, so that strong inflection would at least be an option. Past tense and past participle forms were

elicited on separate pages of an online form, and in different orders so as to avoid priming effects from participants becoming aware of full paradigms. The results of this experiment, run in March 2013, fed hypotheses and focus points for the second and third experiments. Those later experiments, however, laid bare a number of shortcomings of the first; in particular, the choice and range of prompts was insufficient to test emerging patterns with this type of production data. We therefore re-ran the experiments with a larger and more systematically selected set of nonce verbs in October 2013 (thirty verbs). The results from this second version are consistent with the first; for reasons of brevity, only the results from the second run are presented here.

Throughout the experiments, obvious spelling variants were collapsed together, and no difference was made between the prescriptively correct or incorrect choice of dental suffixes in the weak inflection. We have chosen to do this because – apart from the fact that our respondents were overall poor spellers – this reduces the noise and allows larger patterns in the data to appear more clearly.⁹

4.1.2. *Results*

For this experiment, 216 unique responses were collected. Of these, 45 (21%) were from Belgium, a larger proportion than for the other two experiments. However, there were no significant differences between the results of the Flemish and Netherlandic Dutch speakers, the results will therefore be presented as if from a homogeneous group.

Contrary to expectation, we did not find near-universal application of the supposedly default weak inflection: almost a third (32.5%) of the forms supplied were non-weak (see Table 3). The percentage of weak forms supplied for the past tense and perfect of each individual verb was very highly correlated ($r = 0.92$), but there were large differences between the individual verbs that could give clues about the relative productivity of strong verb classes and further constraints on the possible productivity of verbal inflection strategies. For this discussion, we now shift our focus to the percentage of forms given according to the expected strong inflection patterns for verbs with that root vowel (the ‘canonical strong form’ in Table 3).

⁹ We considered all participants’ responses that were interpretable and did not discard any of the prescriptively misspelled responses. In this, our treatment of the data differs from that in Ernestus & Baayen (2003, 2004).

Table 3. Overview of responses for Experiment 1 (n=216)

Class	Infinitive	Past tense				Past participle			
		Weak	%	Strong	%	Weak	%	Strong	%
I	plijken	plijkte	55%	pleek	30%	geplijkt	54%	gepleken	28%
	dijmen	dijmde	74%	deem	14%	gedijmd	81%	gedemen	5%
	keiten	keitte	67%	keet	19%	gekeit	77%	geketen	6%
IIa	buinen	buinde	87%	boon	11%	gebuind	87%	gebonen	3%
	kruiven	kruifde	56%	kroof	36%	gekruifd	68%	gekroven	22%
IIb	plieren	plierde	75%	ploor	14%	geplierd	86%	geploren	5%
	brieten	briette	41%	broot	36%	gebriet	57%	gebroten	27%
	schiegen	schiegde	38%	schoog	50%	geschiegd	40%	geschogen	39%
IIIa	wrinken	wrinkte	44%	wronk	51%	gewrinkt	44%	gewronken	47%
	minden	mindde	68%	mond	28%	gemind	67%	gemonden	15%
	blemmen	blemde	79%	blom	16%	geblemd	87%	geblommen	3%
IIIb	schilpen	schilpte	67%	scholp	24%	geschilpt	63%	gescholpen	25%
	lerven	lerfde	71%	lierf	9%	gelerfd	71%	gelorven	17%
	krelten	kreltte	75%	krolt	16%	gekrelt	76%	gekrolten	6%
IV	melen	meelde	79%	mal	7%	gemeeld	76%	gemelen	7%
	schomen	schoomde	80%	scham	3%	geschoomd	83%	geschomen	4%
	dreken	dreekte	40%	drak	17%	gedreekt	32%	gedreken	24%
V	gleten	gleette	34%	glat	18%	gegleet	18%	gegleten	62%
	kneven	kneefde	72%	knaf	4%	gekneefd	55%	gekneven	20%
	pregen	preegde	57%	prag	15%	gepreegd	56%	gepregen	17%
VI	blaven	blaafde	70%	bloef	6%	geblaafd	75%	geblaven	14%
	smagen	smaagde	43%	smoeg	17%	gesmaagd	60%	gesmagen	6%
	slaren	slaarde	65%	sloer	21%	geslaard	68%	geslaren	13%
VII	dallen	dalde	94%	diel	3%	gedald	91%	gedallen	2%
	gouwen	gouwde	86%	gieuw	13%	gegouwd	78%	gegouwen	13%
	spangen	spangde	37%	sping	10%	gespangd	38%	gespangen	24%
	stoepen	stoepde	92%	stiep	6%	gestoept	91%	gestoepen	1%
	klaten	klaatte	63%	kliet	7%	geklaat	67%	geklaten	11%
None	plieuwen	plieuwde	90%	N/A		geplieuwd	90%	N/A	
	schakken	schakte	93%	N/A		geschakt	90%	N/A	
	teuken	teukte	88%	N/A		geteukt	84%	N/A	

Note: Only the percentage of responses of the (regular) weak form and the canonical strong form is given.

Note: Other responses given relatively often are, for the past tense, *lerven~lorf* 12%, *kneven~knoof* 10%, *blaven~blief* 13%, *spangen~spong* 53%; for the past participle, *dreken~gedroken* 18%, *kneven~geknoven* 16%, *spangen~gespongen* 32%.

We find relatively high proportions of canonical strong forms in Classes I (an average of 17% of strong /e/ forms across verbs and forms), II (an average of 24% of strong /o/ forms) and IIIa (an average of 26% of

strong /ɔ/ forms). The other classes show much lower average percentages of canonical strong forms. For the three ‘strongest’ classes, it is conspicuous that the percentage of canonical strong forms is higher in the past tense than in the perfect; for other classes, Class V for instance, this is exactly the opposite. As the percentages of weak forms supplied for both forms of each verb were very similar, the difference in percentages of canonical strong pasts and perfects is indicative of the amount of variation in the replies, and therefore of the strength of the individual forms.

Although there appears to be a ‘strength’ hierarchy of classes when taking the averages of all the verbs, there are notable differences between individual verbs in these classes. Of particular interest are the differences between *plijken* and *dijmen* in Class I, *buinen* and *kruiven* in Class IIa, and *plieren* and *schiegen* in Class IIb. From this we may hypothesise that the consonants in the stem coda have an influence on the strength of the verb, with plosives and fricatives being more conducive to strong inflection than nasals and liquids. Of course, this matches the stem consonantism of existing verbs in these classes: the *-ijk-* pattern has several strong analogues (*blijken*, *kijken*, *lijken*, *strijken*, etc.), whereas the *-ijm-* pattern has none and *-ijn-* has only two (*schijnen*, *verdwijnen*). If we see schemas as generalisations over existing patterns, it is clear that the /ɛɪ–e–e/ schema should be more applicable, and therefore potentially more productive, before *k* than before *m* (on the influence of type and token frequency on such generalisations, see Nübling 2000: 226–228).

In addition to the expected weak and canonical strong forms, two other types of forms that appeared regularly in the results deserve special mention. The first of these are weak-like forms with a shortened vowel (e.g. *smagen*: *smagde* 20%, *gesmagd* 20%).¹⁰ These may be an artefact of our written survey: if the infinitive ending *-en* is removed from the *written* form of the word and a past tense ending appended, the result is indeed something like *smagde*, *gesmagd*. However, if this were to be read /smaydɔ/ (expected weak past) rather than /smaydɔ/ (expected pronunciation of written form), this would be in such blatant contravention of Dutch spelling rules, which would require *smaagde*, *gesmaagd*, that we choose to see these forms as different from the expected weak past.

¹⁰ The other relevant verbs are *dreken* (*drekte* 10%, *gedrekt* 15%), *klaten* (*klatte* 9%, *geklat* 11%), *melen* (*melde* 8%, *gemeld* 3%), *pregen* (*pregde* 7%, *gepregd* 6%), and *schomen* (*schomde* 13%, *geschomd* 7%). No forms with a shortened vowel were given for *blaven*, *gleten* and *kneven*, nor for verbs with /i/ (*brieten*, *plieren*, *schiegen*) where Dutch spelling rules make such a switch less likely.

Table 4. Percentage of responses with /o/ and /ɔ/ vowels in Experiment 1

Class	Infinitive	Pst	Ptcp	Class	Infinitive	Pst	Ptcp
I	plijken	11%	8%	V	gleten	14%	12%
	dijmen	5%	2%		kneven	10%	18%
	keiten	2%	4%		pregen	10%	8%
IIa	buinen	11%	8%	VI	blaven	6%	5%
	kruiven	36%	25%		smagen	15%	8%
IIb	plieren	14%	7%	VII	slaren	5%	6%
	brieten	37%	31%		dallen	1%	1%
	schiegen	51%	43%		gouwen	1%	1%
IIIa	wrinken	52%	51%	None	spangen	53%	34%
	minden	29%	20%		stoepen	2%	4%
	blemmen	18%	7%		klaten	7%	4%
IIIb	schilpen	24%	26%		plieuwen	4%	2%
	lerven	13%	18%		schakken	5%	4%
	krelten	18%	11%		teuken	8%	6%
IV	melen	3%	5%				
	schomen	N/A	N/A				
	dreken	16%	20%				

Note: Verbs for which this vowel can be expected on the basis of canonical strong inflection patterns are given in bold. These percentages include all responses with /o/ and /ɔ/, both strong and mixed (vowel change plus dental suffix) inflections.

The other unexpected forms that appear regularly are non-canonical strong forms, especially with /o/ – where phonotactically appropriate, /ɔ/ – but to a lesser extent also with /i/. In cases where such forms were given relatively often, they have been indicated in Table 3; see also Table 4. It is clear that such forms are only unexpected in verb classes that do not have /o/ or /ɔ/ as their canonical strong inflectional vowel, but note that the popularity of /o/ and /ɔ/ outside their own Classes II and III matches the relatively high proportion of strong verbs in exactly these classes. We return to this point in the discussion below.

4.2. Judging nonce inflections

4.2.1. Method

In the second experiment, we asked for acceptability judgments for past tense and past participle forms of 92 nonce verbs. The verbs were created by the software programme Wuggy (Keuleers & Brysbaert 2010), and again

the majority of prompts were selected to resemble existing strong verbs. Participants were presented with an infinitive and a weak and a strong form in either the past tense or the past participle, e.g. *gruiven*: *gruifde* ~ *groof*, and were asked to indicate their preference for either form on a seven-point Likert scale. We constructed strong forms according to the results from the initial run of the first experiment. Two versions of the online form existed: verbs for which the past tense was judged in one version were judged on the past participle in the other, and vice versa. The order in which weak and strong forms were presented varied randomly.

4.2.2. Results

A total of 111 respondents completed either one of the versions of the questionnaire. The polarity of the acceptability judgments was normalised, so that 1 meant 'only the weak form is acceptable' and 7 meant 'only the strong form is acceptable'; averages for each verb form were then calculated. As there did not appear to be any meaningful differences between past tense and past participle forms, we conflated those into average scores for each verb, and also calculated averages for each group of verbs. These results can be seen in Table 5.

Table 5. Average acceptability judgments for each verb class

Class	Example of presented pattern	Score
I	vrijgen–vreeg–gevregen vrijgen 4.88–gijden 4.75–drijzen 4.66–vijken 4.31–brijzen 4.11 –spijmen 2.80–hijnen 2.73–kijmen 2.64	3.86
(ø)	geuven–goof–gegeven reupen 3.81–geuven 3.64–bleuken 3.25–teumen 2.72	3.35
IIa* (y)	fuven–foof–gefoven fuven 3.62–gruden 3.62–kwuten 3.60–spuren 2.33	3.29
I* (ei)	pleipen–pleep–geplepen pleipen 3.86–zeipen 3.81–kleiten 3.41–weilen 1.97	3.26
V	preten–prat–gepreten preten 4.12–gezen 3.46–wregen 3.46–deven 3.35–hegen 3.20– megen 2.92–meven 2.91	3.23
IIa	gruiven–groof–gegrogen gruiven 3.99–vuiten 3.79–struiden 3.37–guiden 3.28– guimen 2.33–kuinen 2.00	3.13

IIb	mieden–mood–gemoden tiegen 4.78–riezen 3.54–mieden 3.45–plieken 2.71–biesen 2.26–biepen 1.81	3.09
IIIa	vlenken–vlonk–gevlonken vlenken 4.30–strempen 3.53–bengen 3.10–mimpen 3.08– vimpen 3.07–brempen 2.75–denzen 2.29–lensen 2.05	3.02
IIIb	derzen–diers–gedorzen strechten 3.42–derzen 3.25–krelten 2.92–lelgen 2.86– zergen 2.75–pelken 2.73–melsen 2.56–bechten 2.53	2.88
IIa* (u)	roeven–roof–geroven goeten 3.15–zoegen 2.90–hoelen 2.71–roeven 2.67– woeken 2.48–smoeppen 2.13	2.67
(ou)	rouden–rield–gerouden rouden 3.24–louden 2.68–dauden 2.36–nauden 2.32	2.65
(short V)	spurven–sporf–gesporven spurven 3.07–smillen 2.92–strellen 2.40–gorsten 2.00	2.60
(o)	rogen–rieg–gerogen rogen 3.40–broten 3.08–mozen 2.83–koden 2.38–ronen 2.03– smooien 1.72	2.57
IV	leten–lat–geloten leten 3.64–pleren 2.69–veken 2.57–prenen 2.23–stemen 2.20– krelen 2.09	2.57
VI	faven–foef–gefaven faven 2.63–zwaven 2.56–praven 2.44–zaren 2.36–nagen 2.27– daren 2.16–katen 2.06–paten 2.04–zasen 1.92–spamen 1.63	2.21

Note: Classes are listed in decreasing order of acceptability. Judgments are on a seven-point Likert scale, normalised so that 1 means ‘only the weak form is acceptable’ and 7 means ‘only the strong form is acceptable’. Average judgments for individual verbs are given for each class. Classes indicated with an asterisk are variations of existing strong classes.

One of the most eye-catching results at class level is the clear hierarchy of inflectional classes. Although the ratings indicate that weak inflection is preferred overall – the average ratings for all classes are below 4 – Class I inflection is clearly the most acceptable, whereas Class VI is clearly the most disliked. It is also striking that many classes that use /o/ in past tense and past participle forms are rated relatively highly, even if the stem vowel in the infinitive never occurs in existing strong verbs (/ø/ or /y/).

We find an effect of spelling in the data, as homophonous vowels with different spellings (<ij> and <ei> for /ei/, <ou> and <au> for /ou/) receive different ratings. On the other hand, we did not find a dialectal effect,

which we might have expected to find: many of our respondents are from areas where the Class-IIa vowel /œy/ corresponds to dialectal /y/ or /u/, but the scores for the ‘altered’ Class IIa verbs did not cluster together at all.

In personal communication after completing the experiment, some respondents indicated that they would have preferred a past tense with /i/ for verbs such as *gorsten*, *spurven*, and *strellen*, which are similar to Class-III or Class-VII verbs in terms of their stem consonants.

As in Experiment 1, the hierarchy of verb classes obscures an at times very wide range of scores between individual verbs within a verb class. The pattern that may be gleaned from these individual scores is parallel to that in the previous experiment: strong forms are more acceptable if the stem ends in a (voiced) stop or fricative, and less acceptable when the stem-final consonant is a liquid or a nasal. This generalisation excludes Classes IIIa and IIIb, where the nasal or liquid in the coda cluster is a defining class characteristic.

4.3. Forcing strong inflections

4.3.1. Method

In the final experiment, we elicited strong inflections of existing weak verbs, in order to hone in on the relative productivity of strong inflection classes without any influence from weak inflections. Twenty verbs were presented to participants in an online form; this time, past tense and past participle forms were elicited together.¹¹ The verbs were selected to match the most interesting results from the acceptability experiment.

4.3.2. Results

This experiment was completed by 151 participants. Despite the explicit instruction to produce strong forms, 3% of the responses were weak inflections. This percentage was similar for all verbs, and for past tenses and participles alike.

Our first analysis, presented in Table 6, concerned the percentage of responses according to the strong classes we expected the verbs to pattern

¹¹ The results are based on eighteen verbs. Due to the fact that one of the stimuli had a strong participle, it was excluded from the analysis from the start. The spelling of the other, a loan word from English, appears to have confused our participants: the results were so erratic that we decided to exclude this word as well.

Table 6. Percentage of responses in Experiment 3 according to the expected canonical verb classes

Class	Infinitive	Past tense	%	Participle	%
I	prijken	preek	66%	gepreken	56%
	rijpen	reep	74%	gerepen	76%
	schreien	schree(d)	64%	geschre(d)en	61%
II	geschieden	geschood	44%	geschoden	43%
	getuigen	getoog	89%	getogen	84%
	opruimen	room op	49%	opgeromen	44%
	stuiten	stoot	59%	gestoten	59%
III	hechten	hocht	51%	gehochten	50%
	pimpen	pomp	56%	gepompen	46%
	pingen	pong	82%	gepongen	66%
IV/V	vegen	vag	7%	gevegen	10%
		voog	56%	gevogen	63%
	vrezen	vras	30%	gevrezen	16%
		vroos	34%	gevrozen	56%
VI	paaien	poei	28%	gepaaien	14%
	uitdagen	doeg uit	37%	uitgedagen	13%
VII	knallen	kniel	22%	geknallen	21%
	rouwen	rieuw	60%	gerouwen	29%
None	beuken	book	61%	geboken	66%
	scheuren	schoor	39%	geschoren	42%

with based on their stem phonology. Although the results for individual verbs are highly variable, the overall patterns of class ‘strength’ that we have come to expect after the first two experiments can be discerned: verbs are readily inflected according to Classes I, II and III, but other classes, in particular Class VI, appear to be less strong models to follow.

The popularity of unexpected /o/ and /ɔ/ forms that was found in Experiment 1 is shown in this experiment as well (Table 7). Of course, Classes II and III have large proportions of forms with /o/-type vowels, but they can be found across the board, with the only exception of Class-I verbs. Here, the canonical /ɛi/-/e/-/e/ patterns seem strong enough to block unexpected /o/ forms. In Class VI, on the other hand, the /a/-/u/-/a/ pattern has weakened to such an extent that /o/ forms were more frequent in both the past tense and the perfect participle.

In this experiment we found extension outside of canonical classes not only of /o/ and /ɔ/, but also of /i/ and /ɪ/ (Table 7). Two aspects of these /i/

Table 7. Percentage of responses in Experiment 3 with /o/ and /i/ vowels

Class	Infinitive	% Past (o)	% Perf (o)	% Past (i)	% Perf (i)
I	prijken	10%	23%	15%	8%
	rijpen	3%	12%	21%	4%
	schreien	4%	2%	23%	17%
II	geschieden	45%	44%	5%	7%
	getuigen	93%	94%	2%	1%
	opruimen	64%	67%	16%	8%
	stuiten	59%	62%	26%	13%
III	hechten	51%	59%	21%	11%
	pimpen	60%	62%	7%	12%
	pingen	84%	87%	3%	8%
IV/V	vegen	56%	66%	15%	4%
	vrezen	35%	59%	25%	8%
VI	paaien	37%	41%	10%	7%
	uitdagen	46%	52%	4%	1%
VII	knallen	47%	36%	28%	12%
	rouwen	10%	13%	61%	34%
none	beuken	66%	78%	14%	2%
	scheuren	42%	51%	31%	15%

Note: This includes long and short vowels, and strong inflections as well as weak inflections with a vowel change.

forms are striking: firstly, they tend to occur only in the past tense, and not nearly as frequently in the past participle. However, this need not be surprising, as the analogical examples for /i/ are only in the past tense of Classes IIIb and VII, and not in any past participles (cf. also Table 1). The second striking aspect about the /i/ forms is that their occurrence appears complementary to /o/: for Class I as a whole, but also for individual verbs throughout, verbs with a higher percentage of /i/ forms have lower percentages of /o/ forms.

A final striking pattern that emerged from these results was that of past participles formed by prefixing *ge-* to the unchanged infinitive, in other words, an ABA pattern (Table 8). This pattern is found in the paradigm in Classes V, VI and VII, and it is in these classes that we find the highest percentages of such forms in the experiment – although it must be said that they are especially frequent in Class VII. This is not necessarily unexpected, as verbs in Class V may just as likely be inflected according

Table 8. Percentage of responses in Experiment 3 with participles according to the *ge*+infinitive schema

Class	Infinitive	% <i>ge</i> +INF	Class	Infinitive	% <i>ge</i> +INF
I	prijken	3%	IV/V	vegen	10%
	rijpen	2%		vrezen	16%
	schreien	10%	VI	paaien	14%
II	geschieden	4%	VII	uitdagen	13%
	getuigen	1%		knallen	21%
	opruimen	4%		rouwen	29%
	stuitten	11%	none	beuken	7%
III	hechten	7%		scheuren	12%
	pimpen	7%			
	pingen	4%			

Note: Verbs for which these results may be expected on the basis of canonical strong inflection patterns are given in bold.

to Class IV, with /o/ in the participle, and the Class VI pattern is relatively weak throughout.

5. Discussion of experimental findings

Combining the results from our three experiments, it is clear that weak inflection is more productive in the Dutch verbal system than strong inflection, as expected on the basis of comparable previous research. The great majority of elicited forms in the first experiment was formed with a dental suffix, weak forms received higher acceptability ratings in the second experiment for almost all verbs, and despite explicit instructions to produce strong forms in the third experiment, participants sometimes still provided weak forms instead. If this finding seems predictable, we may mention that the preference for weak inflection is not as overwhelming as was initially expected.

More interestingly, perhaps, the three experiments show a clear and consistent hierarchy within strong inflection patterns. This hierarchy is led by Class I (/eI/-e/-e/), with the largest proportion of strong forms in the elicitation experiments and by far the highest average acceptability rating. This is true for verbs with an *ij* root vowel – the original vowel in this class – but to a lesser extent also for verbs with the homophonous *ei*

root vowel.¹² The difference that still exists between the results for *ij* and *ei* verbs suggests that participants were influenced by spelling; had the experiments been done orally, we would expect this difference to disappear. The strength of this class comes as no surprise, as it has by far the highest type frequency of the individual classes (cf. Table 1).

Clearly at the bottom of the hierarchy is Class VI (/a/–/u/–/a/), incidentally also the class with the lowest type frequency. Strong forms according to this pattern received the lowest acceptability ratings of all, and rather than following this pattern, potential Class-VI verbs often received /a/–/o/–/o/ strong inflections in the elicitation experiments. This finding is remarkable insofar as there is existing variation in (non-standard) Dutch in this class, and a number of verbs with an /a/ root vowel receive non-standard strong inflection in the dialect of one of the authors. We suggest now that exactly this variation is a cause of the low ratings and low productivity of Class-VI forms: as potentially salient non-standard forms, this pattern may be subconsciously avoided by respondents.

The most important finding from the experiment is the strong pattern used instead of Class VI: the /o/ vowel appears to have spread beyond its original home in Classes II and IIIa and the past participles of Classes IIIb and IV (all with relatively high type frequencies among existing verbs) to become, as it were, an inflectional multi-tool. Class-II forms, especially those from Class IIa, appear high up in the hierarchy of strong inflection patterns, but they are outperformed by verbs with root vowels that do not normally occur in strong verbs – /ø/ and /y/ – and that have selected /o/ as the vowel for past tense and past participle forms. As /o/ is so widely applicable outside existing inflection classes, we see this pattern as a ‘product-oriented’ schema: the iconicity of /o/ as a past tense marker is so strong that it may be applied regardless of the stem vowel. As such it is parallel to e.g. past tense /ʌ/ in English (*struck*, *snuck*, *drug*, etc.; cf. Bybee & Slobin 1982: 285). Given this function of /o/, one may wonder whether the high scores for Class-IIa verbs in the experiments are due to the strength of Class IIa as such, or to these verbs selecting /o/ as the inflectional vowel.

A similar quasi-universal applicability was found for /i/ in the past tense, and *ge*+infinitive in the perfect participle. These, however, are much less frequent than /o/, and only achieve appreciable levels of frequency in

¹² On the merger of *ij* (from WGmc. **i*;) and *ei* (from WGmc. **ei* in umlaut position) in Early Modern Dutch, see Howell (2006: 218–219).

our responses when the highly frequent weak inflection is taken out of the equation.

6. Discussion

Our results show that speakers of Dutch have multiple rules or schemas at their disposal for the formation of past tense and past participle verb forms: weak forms, canonical strong forms, and strong-like forms with /o/. In everyday speech, each verb is clearly linked to a particular weak or canonical strong form, but in an experimental setting – as in speech errors, learner errors and intentionally non-standard speech (cf. below) – alternative rules surface that otherwise remain hidden. How such rules are stored and selected is beyond the scope of this study; the focus is therefore on the potential productivity of these rules, which can be defined as the ease with which alternative rules may be selected and applied. As expected, the potential productivity of weak inflection is clearly very high, but it is clear that we can posit constraints on which phonological contexts are most conducive to strong inflection: both the present-tense vowel and the stem consonantism influence the selection of either a canonical strong inflection pattern or the product-oriented schema with /o/.

Potential productivity may not tell us anything about language change per se; after all, there is no guarantee language users will treat existing verbs in the same way as non-existing ones. However, the rules or schemas used by our participants to generate new forms are based on the existing Dutch inflections; the only difference is that their application to non-existing verbs is not constrained by additional factors, such as verb frequency or social factors, that influence inflection of existing verbs. If we invoke the uniformitarian principle (Labov 1994: 21–23), we must assume that similar types of preferences and dispreferences must have existed in the past. This could perhaps help explain why, firstly, inflectional change is not always towards weak verbs, and secondly, why certain types of strong inflection appear to have been particularly productive in different periods and regions – for Dutch, we can mention the spread of /i/ across strong inflection classes in the Early Modern period, or the extension of strong preterites according to Class VI dialectally (e.g. *klagen*, *waaien*, *zwaaien*).

It is important to stress here the temporary and local nature of such preferences. The historical development of Dutch suggests that /i/ was once

a popular candidate as a general-purpose preterite marker, as witnessed by its spread to Class IIb, but the evidence in the data is much weaker and at best shows some traces of this earlier productivity. For the /a/ ~ /u/ alternation, also productive in the past, the data even suggest the pattern is currently dispreferred. As for the geographical dimension, the /i/ pasts should be mentioned again, the spread of which is specific to Dutch and did not occur in other Germanic languages including West Frisian. A parallel to the current popularity of /o/ in Dutch may be found in a past stage of Luxembourgish, where /ou/, also originating from Class II, has spread to the preterite of all strong verb classes (Werner 1990; Nowak 2010).

Although patterns in potential productivity have been uncovered in the present study, the mechanisms through which such potential productivity results in language change are still unclear. The existence of a wide range of non-neutral forms in accordance with these patterns, as in Table 2, suggests that the actuation of such a change may well be intentional (cf. Thomason 2007), in this case especially for humorous effect. In addition to the non-serious forms from Table 2, some of the informants also supplemented their responses with a comment like *haha*. Bybee (1996: 280) and Enger (1998: 124) similarly provide examples of non-standard strong forms in 'jocular' use. But the intentionality of the change is only partial: a speaker may be deliberately funny by using a strong form instead of a standard weak one, but the form they use is *not* random, and *not* deliberate: it is an expression of the potential productivity of patterns inherent in the grammar, when the first (standard-language) choice is infelicitous (for various reasons, in this case expression of humour).

7. Conclusion

Our results show that potential productivity can be measured using elicitation and judgment experiments. These experiments lay bare rules and/or schemas that *could* be used to generate new forms, even if they are only rarely called upon in practice. We do not claim our results are identical with expected *real* productivity – in strong-to-weak changes, for example, the token frequency of the verb certainly plays a role (Lieberman et al. 2007; Carroll et al. 2012), and Baayen (2009: 908–909) shows that there are also stylistic differences in productivity, which makes the extension of experimental findings on nonce words to language change in the real

world *a priori* problematic. However, there are certainly parallels: the results match some of the general tendencies observable in the history of Dutch verbal inflection, such as the overall dominance of weak inflection, and the preference for certain patterns of strong inflection, such as generalised /o/ and /i/, over others.

In the future, we aim to expand our studies to include other Germanic languages. Comparing the underlying potential productivities of verbal inflection patterns in different languages may help answer the question of whether these depend on synchronic analogy with the existing system or whether, as with Dutch /i/, there are sub-surface vestiges of diachronic change – Sapir’s (1921: 150) ‘drift’ (see also, e.g., Britain & Sudbury 1998; Trudgill et al. 2000). Moreover, we aim to engage with Baayen’s comment and investigate under which circumstances the potential productivities we have uncovered may indeed surface in language change. Building on Thomason (2007), we believe that the actuation of change in some cases may well be intentional, and we think that a study of jocular language use and language games can offer valuable insights into the process through which potential productivities become reality.

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