Blends at the intersection of addition and subtraction: Evidence from processing[1]

Natalia Beliaeva, Victoria University of Wellington

The present paper argues that blends (e.g. predictionary ← prediction + dictionary) *and clipping compounds* (e.g. finlit ← financial + literacy) *exemplify a more general morphological phenomenon, mainly, a continuum of formations driven by two counteracting processes: compounding and clipping. In particular, clipping compounds are likely to be formed from words that co-occur in speech comparatively frequently, while blends, on the other hand, tend to be formed from semantically and phonetically similar words in such a way that the source words remain recognisable (Gries, 2006). This paper demonstrates that the formal differences between blends and clipping compounds result in differences in the processing of these lexemes by language users. The results of a psycholinguistic experiment combining an identifying and production task with a lexical decision task show that blends with higher degree of formal transparency better prime their source words in a lexical decision task than blends with lower degree of formal transparency or clipping compounds. These results uphold the claims in Gries (2006, 2012) and shed light on the findings in Lehrer (1996, 2003) using a revised methodology and recent lexical data.*

Keywords: *blends, clipping compounds, word processing, mental representation, lexical decision task, priming*

1. Introduction

Would you easily guess that a *negatude* is a *negative attitude*? It is likely that to unpack the blend *negatude* would be less difficult than to decompose the clipping compound *finlit* into its constituents *financial* and *literacy*. This difference can be explained by the fact that clipping compounds combine fragments of words which are too short to ensure the recognisability of their full counterparts (Gries 2006, 2012).

The representation of morphologically complex words has been conducted on material of various morphological categories. When we come across a compound word, even one we have never seen before, we can relate its meaning to the meanings of its constituents (e.g. predict that the meaning of *juice bar* has to do with *juice* and *bar*). When we come across a word which was formed with some degree of shortening of the constituents, the same task may become a lot more difficult. In fact, various situations are possible. On the one hand, two words, e.g. *blizzard* and *disaster*, can be blended together, as in *blizzaster*, so that some of the phonological and graphical material is lost and only SPLINTERS (in this case *blizza-* and *-aster*) are retained in the blend, or sometimes words can be blended by overlapping, as in *predictionary ← prediction + dictionary*. On the other hand, there is a case

[1] This research was funded by the scholarship 'The Morphology of Current English' awarded as part of the grant from the Royal Society of New Zealand through its Marsden Fund to Professor Laurie Bauer. I am grateful to Laurie Bauer, Paul Warren and Anna Siyanova for their invaluable feedback on various stages of this study. I also thank two anonymous reviewers for their comments and suggestions.

of clipping compounds, such as *rumint* ← *rumour* + *intelligence*, in which the clipped versions of the constituents, i.e. their beginnings enter the new formation. In some publications on word formation (e.g. in Adams (1973), Berg (1998) and others) no explicit distinction is made between blends and clipping compounds. Many researchers (e.g. Cannon (1986), Bertinetto (2001), Bauer (2006, 2012), to name just a few) classify them as two different word formation types. Most often this distinction is based on formal criteria, but sometimes, as in Kubozono (1990), semantic relations between the constituents (henceforth SOURCE WORDS) of blends are taken into consideration.

This paper is in agreement with the idea suggested in Gries (2006) that blends and clipping compounds are formed according to different principles and differ in terms of similarity between the source words and their recognisability. This, in turn, suggests that novel words of these two categories should be processed differently. In Beliaeva (2014) a classification of such neologisms into several structural types was substantiated, and a differentiation between blends and clipping compounds was drawn on the basis of their semantics and origin. However, the differences in the recognisability of the constituents in blends and clipping compounds have not been tested experimentally. This paper reports on an experimental study in which blends and clipping compounds are compared in terms of the recognition and processing of their source words. Formal transparency (i.e. what portion and which part of the source words is preserved in the shortening) is studied as a factor determining the retrieval of the source words by the readers who are exposed to corresponding blends or clipping compounds.

Extensive experimental evidence for the storage and retrieval of words has been derived using the priming technique. In priming experiments, the response of participants to a stimulus referred to as the TARGET is studied in relation to another stimulus presented before the target, the PRIME. The relatedness of prime to target (that is, whether the prime is identical to the target, phonologically or graphically, morphologically or semantically related to it, or unrelated) is manipulated in order to detect whether the primes which are related to targets in a particular way enhance or inhibit the participants' reaction to targets (Neely 1991; Marslen-Wilson et al. 1994). The aim of the present experiment is to investigate whether blends with a higher degree of formal transparency (such as *predictionary* above) may produce stronger priming of their source words in a lexical decision task than either blends with a lower degree of formal transparency such as *blizzaster*, or clipping compounds such as *rumint*.

2. Experiment

2.1. Rationale and hypotheses

Evidence of associations between blends and their source words in language users' memories was sought in a series of experiments by Lehrer (1996, 2003, 2007) and Lehrer & Veres (2010). Blends of the following structural types were used as stimuli in their experiments:

1. SPLINTER (a part of word which is not a morpheme) + word, e.g. *qualatex* ← *qual(ity) + latex*;
2. word + splinter, e.g. *beermare ← beer + (night)mare;*
3. two splinters, e.g. *snizzle ← sn(ow) + (dr)izzle;*
4. complete overlap, e.g. *palimony ← pal + alimony.*

The researchers used an identification and a production task, and (Lehrer 2003) a priming task, where participants were shown blends for a fraction of a second before being exposed to the source words of blends as target stimuli. In the identification and production task blends consisting of two splinters were less often named correctly than the source words of other blends; this difference was, however, not statistically significant. In a masked priming experiment reported by Lehrer (2003, 2007), no priming effect of blends on the processing of source words was found and this result was reported as showing no effect of rapid automatic decomposition of blend words into their constituents.

Assuming that, indeed, blends "present a processing challenge" (Lehrer 2003: 379), I focussed not on automatic decomposition but on the effect of prior retrieval of the representation of the source words. Thus, it was decided not to use blends or clipping compounds as masked or unmasked primes in the lexical decision task. Rather, the long-term priming effect of the source words retrieved in an identification and production task was considered to be an experimental variable (see details of the procedure in Section 2.4).

The structural types of stimuli that are used for this research are also different from the ones used by Lehrer and Veres. The present study aims to demonstrate the influence of the type of shortening (clipping or blending) on processing. Therefore, the experimental stimuli include clipping compounds, or formations containing two initial sprinters. The structural types of the stimuli are coded here using the widely cited formula in Plag (2003: 123):

$$AB + CD = AD,$$

where AB is the first source word and CD is the second one. Thus, blends are labelled as AD, and clipping compounds as AC forms. Full preservation of any of the source words in the blend is marked as W, so that blends with complete overlap such as *palimony* in Lerher and Veres' experiment are labelled as WW (i.e. word + word). In addition to comparing blends and clipping compounds, one of the aims of the present experiment is to study the differences between processing fully overlapping WW blends and non-overlapping AD and AC types.

Unlike in previous studies of blends and clipping compounds, the stimuli include only relatively new formations dated no earlier than January 1, 2000 (a date conventionally chosen to set the criteria for data selection). The stimuli for the present experiment were sampled from the corpus of contemporary English blends which, in its turn, was collected from various media such as online dictionaries and databases of neologisms (Wordspy, Urban Dictionary, The Rice University Neologisms Database), newspapers, magazines and radio broadcasts. The data set included those neologisms which were not dated earlier than January 1, 2000 in the Corpus of Contemporary American English (Davies 2008), and were not found in Google with occurrences before that date[2].

Choosing the stimuli for the experiment, I avoided including blends whose splinters showed signs of productivity, such as the initial splinter *edu-* which is a part of *edutainment, edupunk,* etc., or the final splinter *–noia* (present in *juvenoia, parentnoia,* etc.). Such restrictions on data sampling were introduced to separate the effects of recognisability of source words from those of lexicalisation (the case of older blends) and of analogy (the case of productive splinters).

The experiment was designed to verify two hypotheses. The first of them concerns the actual recognition of the source words of blends and clipping compounds:

1) The source words of blends with a higher degree of formal transparency (WW, e.g. *predictionary*) will be more easily identified than those of blends with a lower degree of formal transparency (AD, e.g. *blizzaster*), and of clipping compounds (AC, e.g.

---

[2] See more on collecting data in Beliaeva (2014).

finlit). It is also hypothesised that because AC forms are less transparent than any blends (including AD), according to the criteria discussed in the Introduction, their source words will be less easily identified than the source words of AD blends.

The second hypothesis concerns the effect of blends or clipping compounds on the processing of their source words.

2) Prior exposure to blends will facilitate recognition of their source words in a lexical decision task. This effect will be greater for blends with a higher degree of formal transparency (WW) than for blends with a lower degree of formal transparency (AD). For clipping compounds (AC) no priming effect is expected. This is because the source words of higher transparency blends are more likely to be recognised in the identification / production task which will mediate recognition in the subsequent task.

2.2. Participants

Native speakers of English were offered gift vouchers for their voluntary participation in this experiment. Overall, there were 107 participants: 37 male and 70 female, aged between 18 and 45.

2.3. Stimuli

The experimental stimuli included three groups of complex formations with different degrees of formal transparency: AC forms or clipping compounds (low formal transparency), AD blends (moderate transparency), and WW blends (high transparency). All the words that were used as stimuli for the identification and production task (10 of each structural type) are given in the first column of Table 1. These words will henceforward be referred to as primes. The source words of primes were then presented as targets in a lexical decision task, 60 target words in total. The lexical decision task stimuli also included 60 pseudowords created specifically for this experiment and matched with the target words in length and in the degree of orthographic similarity to primes.

Table 1: Experimental stimuli arranged by structural types

Prime	**Structural type**	**Source word 1**	**Source word 2**	**Pseudoword 1**	**Pseudoword 2**
acatramp	AC	academic	trampoline	acalucher	trampenoit
adorapresh	AC	adorable	precious	adorauze	precsoud
finlit	AC	financial	literacy	finerniel	litruvey
foco	AC	food	court	fonk	coalx
globfrag	AC	globalisation	fragmentation	globertoteing	fraglienses
hydfrac	AC	hydraulic	fracturing	hydresol	fracsedding
hydrail[3]	AC	hydrogen	railway	hydresol	raildaws
rumint	AC	rumour	intelligence	rumacks	intreniewing
scigov	AC	science	government	scineill	govimptern
spagbol	AC	spaghetti	bolognese	spaglingo	bolerlead

[3] The clipping compounds *hydfrac* and *hydrail* have identical initial splinters *–hyd*, shortened from *hydraulic* and *hydrogen* respectively. These two primes were shown to different groups of participants to avoid confusion.

Prime	Structural type	Source word 1	Source word 2	Pseudoword 1	Pseudoword 2
blizzaster	AD	blizzard	disaster	blizant	colaster
briet	AD	bride	diet	brilk	giet
chugger	AD	charity	mugger	chafelet	stugger
collabulary	AD	collaborative	vocabulary	collabication	scaurublary
femcho	AD	female	macho	femurce	ancho
negatude	AD	negative	attitude	negacede	gartitude
pickade	AD	picket	blockade	picknell	rackade
renoviction	AD	renovation	eviction	renluirtion	civiction
scoratorium	AD	score	moratorium	scort	droatorium
virtopsy	AD	virtual	autopsy	virtockan	reitopsy
baggravation	WW	bag	aggravation	chag	garravation
clapathy	WW	clap	apathy	calp	apalty
dotcomrade	WW	dotcom	comrade	doctom	comhaed
flabdomen	WW	flab	abdomen	falb	adoumen
flotsametrics	WW	flotsam	metrics	flotasm	mertics
guitarthritis	WW	guitar	arthritis	giurtar	rahritis
predictionary	WW	prediction	dictionary	repdiction	doctoilary
slacktivism	WW	slack	activism	slark	arcovism
stoption	WW	stop	option	tosp	olpion
textrovert	WW	text	extrovert	twext	xerovert

2.4. Procedure

The experiment consisted of an identification and production task and a lexical decision task, completed one after the other. Both tasks were created and run in the E-Prime 2.0 software package (Schneider et al. 2002). A response box with "No", "Ok", and "Yes" buttons was used to input answers for the two tasks, and the participants were instructed to use the "Ok" button for Task 1 and the "Yes" and "No" buttons for Task 2. The buttons on the response box were placed so that the "Yes" button was pressed with the dominant hand, i.e. the response box had the "Yes" button on the right for right-handed participants, and on the left for left-handed participants.

In the first task, the participants were shown a set of blends such as *negatude,* and clipping compounds such as *finlit,* presented one at a time on a computer screen. Each word appeared on the screen for a maximum of 15000 ms and the participants were asked to press the "Ok" button as soon as they guessed which two words made up the word on the screen. When the participants pressed the "Ok" button, they were prompted to say the two words into the microphone; if the "Ok" button was not pressed within 15000ms, the next stimulus was shown. The participants were randomly assigned to two groups, so that each participant was shown one of two lists of 15 stimuli words (5 AD, 5 WW, and 5 AC stimuli per list). All the words were lower case, in light silver colour on black background, as shown in Fig 1. A training session with 2 AD blends, 2 WW blends and 2 AC forms preceded the actual task so that the participants could get accustomed to the task. The stimuli were presented in a pseudo-randomised order, so that no more than two words of the same structural type followed one another.

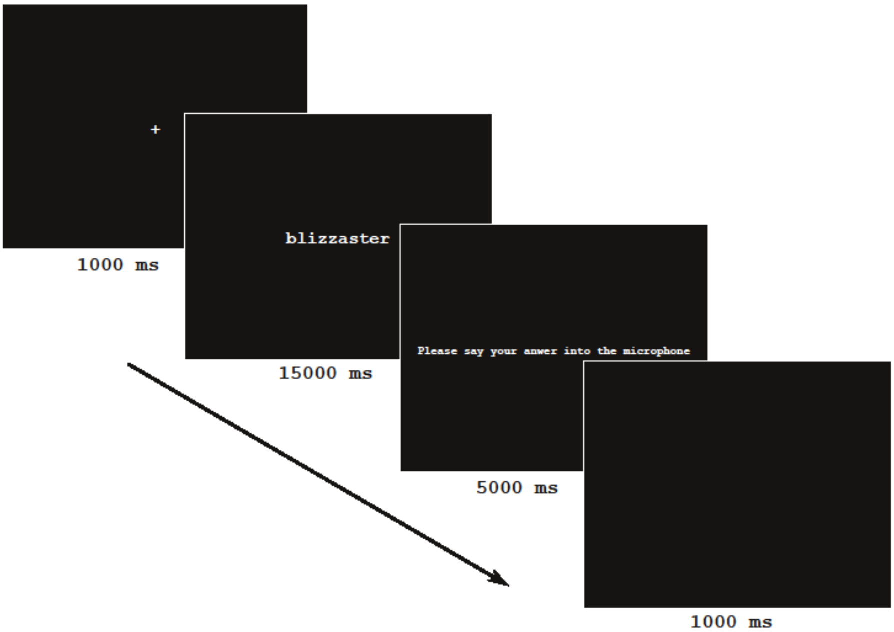

Figure 1: The experimental procedure, Task 1

In the second task, participants saw a series of real words and pseudowords and were instructed that for each stimulus they should press the “Yes” button if they thought that what they saw was an existing English word, or the “No” button if they thought that it was not an existing English word. The stimuli appeared on the screen in upper case, preceded by a fixation cross and followed by a blank screen (see Figure 2). Each stimulus disappeared as soon as either the “Yes” or the “No” button was pressed, or after 3000 ms if no answer was given. The participants were instructed to give their answer as quickly as possible. A training session with three word and three pseudoword stimuli preceded the actual task, and in the actual task two fillers (one word, one pseudoword) served as warm-up items before the main list of targets.

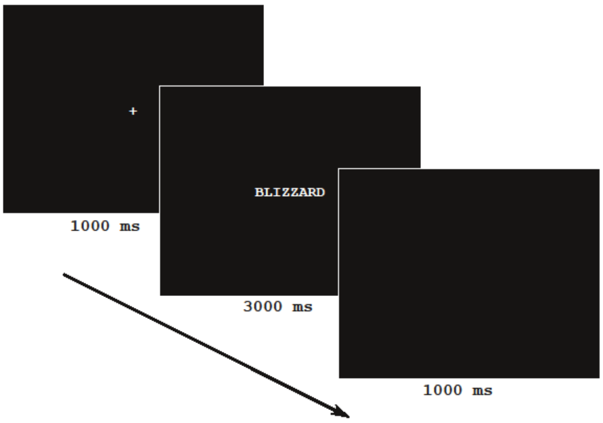

Figure 2: The experimental procedure, Task 2

The procedure of the second task was arranged in such a way that half of the targets could potentially have been reconstructed from the stimuli in the first task. For this, the original two groups of participants were further subdivided into two groups each, as shown in Table 2. As a result, 1) each participant was shown only half of the total number of blends and clipping compounds in Task 1; 2) each participant was shown only one of the two source words of each blend in Task 2 (i.e. either NEGATIVE or ATTITUDE for *negatude*). Thus, the targets such as ATTITUDE might have been recognised from the prime *negatude*. The other half of the word stimuli in Task 2 had no relation to the words shown in Task 1 and served as fillers.

Table 2: Arrangement of word stimuli into groups according to priming conditions. Group 1 (first two columns) and Group 2 (second two columns) were shown different sets of primes but the same targets; Group A (grey background) and Group B (white background) were shown the same set of primes but different targets

Group 1 Task 1		**Group 2 Task 1**	
Group A Task 2	**Group B Task 2**	**Group A Task 2**	**Group B Task 2**
prime *scoratorium* – target MORATORIUM (pseudoword SCORT)	prime *scoratorium* – target SCORE (pseudoword DROATORIUM)	No prime – target MORATORIUM (pseudoword SCORT)	No prime – target SCORE (pseudoword DROATORIUM)
No prime – target NEGATIVE (pseudoword GARTITUDE)	No prime – target ATTITUDE (pseudoword NEGACEDE)	prime *negatude* – target NEGATIVE (pseudoword GARTITUDE)	prime *negatude* – target ATTITUDE (pseudoword NEGACEDE)

2.5. Methods of analysis

In accordance with the hypotheses in Section 2.1, the dependent variables to be analysed were the response choice and the percentage of correct responses in Task 1, and the response time in Task 2. The percentage of correct answers in naming the first and second source words of all targets in Task 1 was analysed in mixed effects logistic regression models. As it was hypothesised that the formal transparency of primes would influence the percentage of correct answers in this task, the structural type of the prime was used as predictor in the regression models. For Task 2, it was hypothesised that response times to word stimuli would be shorter if the relevant primes had previously been shown in Task 1, and that the priming effect would be stronger for source words of higher transparency blends. Therefore, the structural type of primes, henceforth referred to as *prime type*, was used as the main experimental variable in the data analysis. A mixed effects regression analysis of reaction times (RT) was performed, with both prime type (i.e. AC, AD or WW) and the priming condition (i.e. whether or not the target had a potential prime in the Task 1 stimuli seen by the participant group, and whether or not the prime was correctly identified by participants in Task 1) included in the models as independent variables.

To interpret the observed values of the dependent variables (that is, response choice and RT), a number of factors had to be accounted for, in addition to experimental conditions. These factors are, on the one hand, participant characteristics, i.e. sex, age and handedness, and, on the other hand, various characteristics of primes and targets. The choice of item variables to be used in the analysis was motivated by the properties of blends, and also by theoretical assumptions from studies on word recognition. Previous studies on visual word recognition reveal the effects of word length (Weekes 1997), frequency (Grainger 1990), and, in case of morphologically complex words, family size, or cumulative frequency of all tokens having a particular morpheme (Chialant & Caramazza 1995). Thus, the set of item variables included the frequency of the source words (COCA was used as the source of frequencies in all analyses in this study), the length of the splinter, whether the splinter is initial (as is the case for both splinters in AC forms) or final, how similar the blend or clipping compound is to its source words, and how frequently these words co-occur. The regression models also included random intercepts for prime and participant, and a nested random effect for Group (to account for the fact that participants of different groups saw different sets of primes). Some models also included random slopes, which will be specified where relevant.

It is essential to check whether the priming effect in Task 2 is due to the recognition of the source words of primes, or simply due to orthographic similarity between primes and targets. One way of looking at this would be to control for orthographic similarity by having a group of control primes with the same degree of orthographic relatedness to targets as the experimental primes. However, such an approach is problematic for the present study for two reasons. Firstly, it would be very difficult (and in some cases not possible at all) to find control words which are as orthographically similar to targets as primes are, and at the same time not morphologically related to targets. Secondly, the identification task which was used to introduce primes could not be used with morphologically simple words. Therefore, in order to look at possible effects of the orthographic similarity between primes and targets, the responses to pseudoword targets were analysed. The regression analysis of pseudoword data was performed in a similar way to the analysis of responses to word targets. The models for pseudoword data also included random effects for item and participant, and a random slope for participants over the orthographic similarity between prime and target. All the statistical analyses presented in this paper were performed using the statistical computing environment R (R Core Team 2014).

3. Results

One participant did not give answers to any questions in Task 1, and the same participant and three further participants gave incorrect answers to more than 20% of the stimuli presented in Task 2. Responses from this total of four participants were excluded from the analysis. The analysis below is therefore based on the responses received from 103 of the original 107 participants: 26 in group 1A, 26 in group 1B, 25 in group 2A and 26 in group 2B.

3.1. Identification and production task

Correct answers in Task 1 include all cases when the source words were named in exactly the same form as found in the sources, e.g. *text* and *extrovert* for *textrovert, globalisation* and *fragmentation* for *globfrag*, and also cases when the same lemma was named, e.g. *texting* instead of *text.* Morphologically related, but different lemmas, as *globular* instead of *globalisation* were marked as incorrect. The criterion that was used to determine whether the responses were correct or incorrect, was the formal and semantic equivalence between the words named by participants and the actual source words of primes which were subsequently used as targets in the lexical decision task. Despite the fact that *globular* is both morphologically and semantically related to the target *globalisation,* it is not possible to conclude they are equivalent. Correct answers for the first and second source words were coded as two separate variables.

As predicted, the source words of WW blends turned out to be the easiest to identify. The participants correctly identified the source words of overlapping blends such as *predictionary* more often than the source words of non-overlapping blends such as *negatude*, and the source words of clipping compounds such as *finlit*.

The influence of the structural type of primes on the recognition of their source words was analysed in two series of logistic regression models: the first predicting the identification of the first source word of the primes in Task 1, and the second predicting the identification of the second source word. The participant factors that were taken into consideration were age, sex and handedness. For both SW1 and SW2 naming it was found that older participants gave more correct answers, which may be because older adults tend to have larger vocabulary and therefore are likely to successfully recognise more words. This effect is significant at the 5% level only for SW1 naming (the regression coefficient for Age is 0.024, p=0.028, cf. the regression coefficient 0.024, p=0.066 for the model predicting SW2 naming; see model summaries in Tables A1 and A2 in the Appendix). No other participant factors were shown to have significant influence on the responses.

It can be expected that successful naming of one of the source words triggers naming of the other, therefore a variable indicating correct or incorrect naming of SW2 was included as one of the predictors in models for SW1, and vice versa. The regression analysis showed that SW1 is more likely to be named correctly if SW2 is correctly identified (the regression coefficient for PrimeSW2Correct is 1.717, p<0.0001, Table A1), and the same is true for SW2 (the regression coefficient for PrimeSW1Correct is 1.705, p<0.0001, Table A2).

The same models confirmed that the influence of prime type on the correct naming of SW1 and SW2 is statistically significant. In particular, the difference between AC prime type (used as the reference intercept level for all models discussed here) and WW prime type is significant at the 5% level (p=0.01 for SW1 naming, p=0.016 for SW2 naming). However, no significant differences between AD and AC prime types were found at this stage. The regression coefficients for the variable PrimeTypeWW (2.841 for SW1 and 2.216 for SW2) indicate that both source words of a prime are more often named correctly if the prime is a WW blend.

It may be the case that the observed result is wholly or partly due to the influence of other properties of primes (apart from prime type), or an interaction of those. For example, the recognition of the source words can be related to the amount of their material retained in primes, i.e. the splinter length, and the similarity between the prime and its source words. The possible effect of various features of primes can be already accounted for by prime type (for example, the similarity between WW blends and their source words can be high because the source words are fully retained in blends of this type). Nevertheless, it is essential to include additional characteristics of primes into the analysis to increase the predictive power of the model. The item variables that were included in more complex regression models were: length of blends, lengths of their source words, similarity between primes and their source words, frequency of the source words, and the relative splinter frequency, calculated as the cumulative frequency of words beginning or ending with the splinter divided by the frequency of the source word, as suggested in Cook and Stevenson (2007).

A cohort of regression models was built for SW1 and for SW2 naming, using all the item variables mentioned above. Afterwards, the number of variables included in the model was reduced by excluding the insignificant predictors if this simplification did not significantly reduce the performance of the model. In addition, the predictors which highly correlated with each other were residualised against one another or entirely excluded. The models with different sets of predictors were compared using likelihood ratio tests, and the models which outperformed others will be discussed here.

The regression model predicting the identification of SW1 (see Table A3 in the Appendix) confirms the effects of participants' age, and of correct identification of SW2, discussed above. The simple effect of prime type on SW1 identification does not reach significance at the 5% level, but prime type has a significant effect on the response type if considered in interaction with relative splinter frequency: adding this interaction significantly improved the model fit, as shown by a likelihood ratio test (Chi-square=11.635, df=6, p=0.0406). The regression analysis shows a significant effect of the relative splinter frequency of SW1 (the regression coefficient for RelFreq1 in Table A3 is 6.308, p=0.0012). The higher the frequency of SW1 and the fewer orthographically similar neighbours it has (hence the higher the relative frequency), the higher the probability of correct naming of SW1. However, this effect works in an opposite direction for WW blends, as shown by the significant interaction between SW1 relative splinter frequency and prime type, which is visualised in Figure 3.

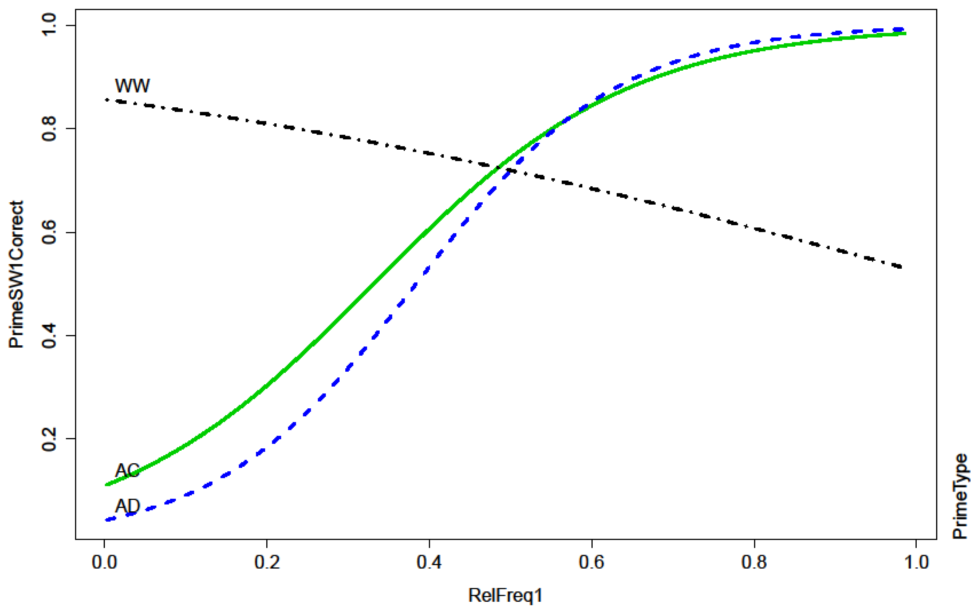

Figure 3: The interaction of prime type and the relative frequency of SW1 splinter in the model predicting SW1 naming in Task 1. The vertical axis shows the proportion of correct namings of SW1, the horizontal axis shows the relative splinter frequency of SW1

Higher relative frequency of SW1 of WW blends, unlike AC or AD forms, results in lower proportion of SW1 named correctly. Such effect can be explained if we consider the way relative frequency is calculated. For AC and AD blends high relative frequency of SW1 means that the cumulative frequency of all words attested in COCA that start with the particular splinter is not much higher than the frequency of SW1. This, in turn, implies that SW1 with fewer orthographically similar competitors would be easier to identify by its splinter (e.g. guess that *blizza-* in *blizzaster* stands for *blizzard*). On the other hand, for WW blends the relative splinter frequency is the ratio of the frequency of a source word (since splinter equals the full source word in WW blends) and the cumulative frequency of words beginning or ending with this same word. Therefore, high relative frequency of SW1 of WW blends indicates that there are relatively few compounds or derivatives containing SW1 as their part, but it does not rule out cases when there are some high frequency words with similar beginnings, which can inhibit SW1 identification. Therefore, some of the participants named other words beginning with the same letter string as SW1 (e.g. unpacked the WW blend *baggravation* as *bad* + *aggravation* instead of *bag* + *aggravation*).

Slightly different results from those described above were observed in the logistic regression analysis of SW2 identification, which followed the same steps as for SW1. Firstly, SW2 was named correctly less often than SW1, for all stimuli except AC primes. The participants of Group 2 correctly identified SW2 of AC primes more often than SW1 of those primes (though still not as often as any of the source words of WW primes and, at least in Group 1, AD primes). These results are consistent with earlier findings of the studies of word recognition which show that word beginnings are more important for recognition than word endings (see, for example, Whitney (2001) and White et al. (2008) for experimental findings). Therefore, if the ending of SW2 is preserved in a prime, as is the case for AD blends, SW2 is less easily recognised than SW1. It should be noted that, despite the fact that WW blends fully preserve both SW1 and SW2, SW1 of WW primes was more often named correctly than SW2. This can be explained by the fact that in WW primes the beginning of SW2 does not coincide with the beginning of the whole blend, and therefore may not be recognised as a word beginning at all. In fact, some of the incorrect responses to WW primes (such as *stop* + *motion,* or *stop* + *action* for the WW blend *stoption* ← *stop* + *option*) suggest that some of the participants misinterpreted the overlap in WW primes and assumed that only the end of SW2 was preserved in them.

As is the case with SW1 identification, SW2 is more likely to be identified correctly if SW1 is also correctly identified (the regression estimate for PrimeSW1Correct is 1.753, $p<0.0001$, see model summary in Table A4 in the Appendix). Both SW1 frequency and SW2 frequency have a significant effect on SW2 identification ($p<0.001$ for both fixed effects), but they work differently, as shown by the opposite signs of the regression coefficients for the two effects (-0.00056 for Freq1 and 0.00043 for Freq2). More frequent SW2 are more likely to be identified correctly. On the contrary, higher frequency of SW1 appears to inhibit the identification of SW2. A possible explanation is that on recognising higher frequency SW1 the participants might think of relatively frequent collocations of this word with words other than SW2 (such as, for example, *stop motion*). A detailed study of this aspect of the processing of blends is, however, outside the scope of the present paper.

The regression analysis also shows a significant positive effect of WW prime type on SW2 identification (the regression coefficient is 2.854, $p=0.0003$). This means that SW2 of WW primes are more likely to be identified correctly than SW2 of AC primes (as noted above, AC prime type is used as the reference intercept level in all the models). The effect of AD prime type goes in the same direction as the effect of WW prime type (both regression coefficients are positive) but does not reach significance at the 5% level ($p=0.1733$).

Even though the effect of prime type is not consistent across all the models predicting the response value in Task 1, it is robust enough to conclude that the type of prime affects the recognition of its source words in this experimental task. As was found in a similar task in Lehrer (2003), the source words are more likely to be identified correctly if they are fully preserved in the blends (the case of WW forms) than otherwise. Both kinds of formations containing splinters that were tested in the present study (i.e. AD and AC forms) differ significantly from WW blends in this respect.

3.2. Lexical decision task

The analysis of the RT in the lexical decision task is based on the responses of 103 participants whose overall error rate in Task 2 is smaller than 20%. Incorrect answers (i.e. pressing the "No" button for word stimuli or "Yes" answers to pseudoword stimuli, making up 4.5% of all responses to word stimuli and 8.7% of responses to pseudoword stimuli) were excluded from the analysis. A lower RT threshold of 200 ms was set, but no responses were faster than this. On the other hand, about 3% of responses were more than 2.5 *SD* above the overall mean RT. These responses, however, cannot be simply discarded as outliers because the overall distribution of the response data is positively skewed. Therefore, in regression analysis, the data was inverse-transformed in order to normalise the distribution of the dependent variable, following the method suggested in Weisberg (2005). After transformation, the number of outliers did not exceed 1% of the data. Excluding the slowest 0.96% of the responses did not significantly change the output of the regression models, so these responses were kept in the data set for the analysis presented here. The RTs to word targets and to pseudowords were analysed separately.

Even a casual glance at the descriptive statistics of the RTs makes it evident that the reaction time to word targets is different across priming conditions (Table 3). In particular, the source words of AD or WW primes were recognised faster in Task 2, if they were shown in Task 1. This is not true, however, of targets which are the source words of AC primes. On the contrary, the mean reaction to such targets is slower, if prime was shown (744 ms if target was named correctly, and 749 if target was not named), than if no prime was shown (726 ms).

Table 3. Mean reaction time to target words in Task 2 for different priming conditions, millisecs (SD)

Priming condition	**Prime shown in Task 1, and target named correctly**	**Prime shown in Task 1, and target not named correctly**	**No prime**
AC prime	744 (292)	749 (275)	726 (260)
AD prime	682 (244)	703 (271)	705 (278)
WW prime	683 (235)	703 (237)	726 (267)
All words	704 (260)	718 (262)	719 (269)

The effect of both prime type and priming condition (i.e. whether the prime was shown in Task 1 or not) on the response latency in the lexical decision task was explored in a multiple regression analysis. It is essential to note that the priming condition was expressed as a binomial variable PrimeShown, which has the values True and False. Whether or not the targets were named correctly (in the PrimeShown=True condition) turned out not to have a significant effect on the reaction time. Adding the relevant variables did not significantly improve the model fit (Chi square=2.1946, df=4, p=0.7), nor did it reveal any significant effect of the correct naming of the source words. Therefore, only the effect of the exposure to primes was explored in the final analysis.

In accordance with Hypothesis 2 (Section 2.1) it was predicted that there is an interaction between the effect of priming condition and prime type. Therefore, such interaction was included as a variable in the regression modelling. Indeed, an ANOVA comparison confirmed that the model including this interaction outperforms the model with simple effects only (Chi-square=184.34, df=4, p<0.0001). In addition to that, various random slopes for item and participant variables were added to the model. The random slopes for target frequency across participants and for the age of participants across the different items significantly improved the model fit. The final model is summarised in Table A5 of the Appendix.

The regression analysis has shown that male participants responded more slowly than females. A possible explanation of such a result is that women tend to better perform in tasks based on written expression such as naming words beginning with a particular letter (Kimura, 1999). It was also found that the response latency increases for longer targets, and decreases with the increase of target frequency, which is a common finding in lexical decision experiments, discussed, for example, in Weekes (1997) and Grainger (1990).

The regression analysis confirmed the priming effect of prior exposure to blends on the recognition of their source words. Importantly, the priming effect is different for different types of prime, as illustrated in Figure 4 (left panel). The partial effects of prime type and priming condition plotted in Figure 4 suggest that the exposure to AD and WW Primes in Task 1 results in faster recognition of Targets in Task 2 (all the random item and participant effects being accounted for). For AC primes, on the contrary the RT is larger if the prime was shown in Task 1, in comparison with the PrimeShown=False condition. Moreover, the model in Table A5 confirms that both AD primes and WW primes are significantly different from AC in this respect ($p<0.0001$ both for PrimeShownTRUE:AD and PrimeShownTRUE:WW).

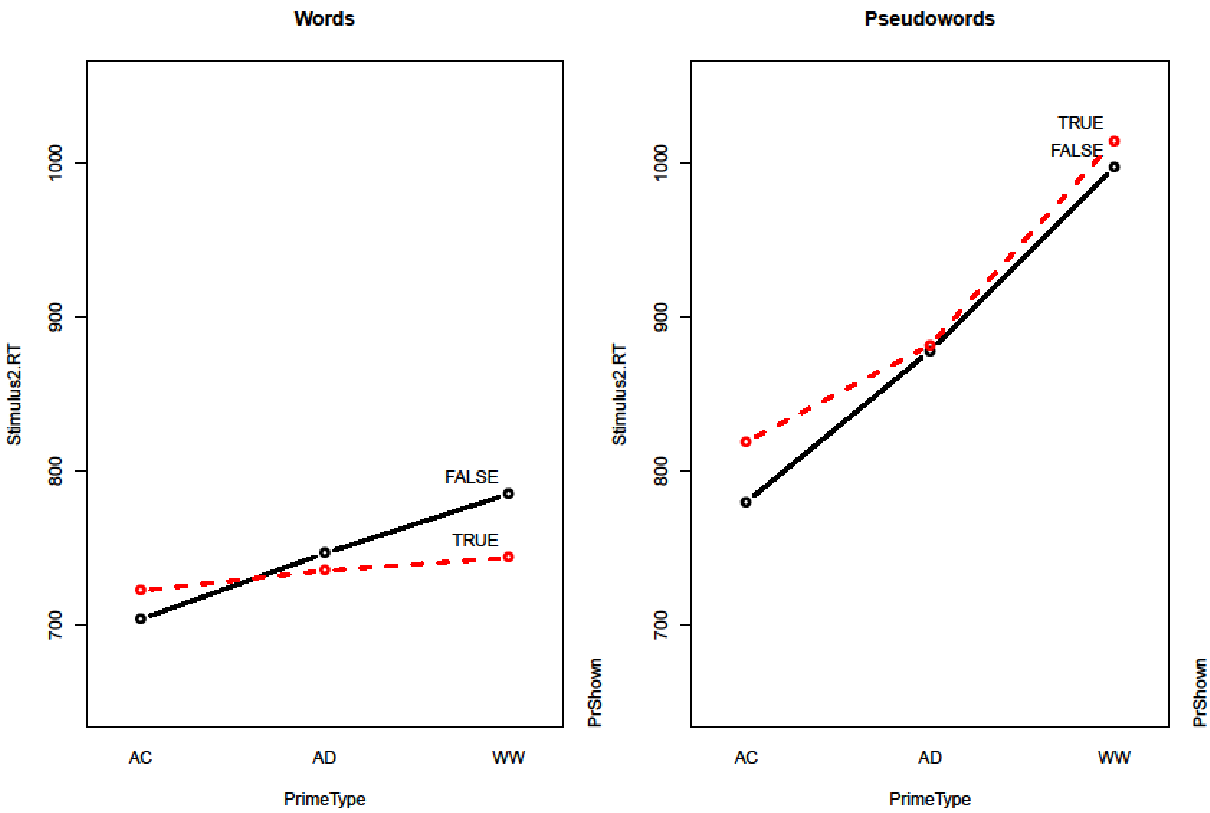

Figure 4: The interaction of prime type and priming condition in the model predicting RT to word targets (left panel) and pseudoword targets (right panel) in Task 2. The graph in a solid line shows the mean reaction times for different prime types if no prime was shown (PrimeShown=False priming condition); the graph in a dashed line shows the mean reaction time for different prime types if primes were shown in Task 1 (PrimeShown=True priming condition)

The facilitating effect of exposure to AD and WW primes on the recognition of targets is in agreement with Hypothesis 2 in Section 2.1. As for AC primes, not only does prior exposure to them not facilitate the recognition of their source words, but it also appears to inhibit their recognition. The nature of this effect may become more evident if we look at the recognition of pseudoword targets in the same task.

Pseudoword targets created for Task 2 were matched with the word targets for syllabic length and orthographic similarity to primes, as stated in Section 2.3. The mean reaction time to pseudoword targets in the lexical decision task (987 ms) is higher than to word targets (714 ms). This is consistent with earlier findings of many lexical decision experiments, e.g. Forster & Davis (1984), which show that pseudowords are generally responded to more slowly than words. Partially, this is because the "No" button in this experiment was pressed with the non-dominant hand, but also because 'non-acceptance' judgements are generally slower than 'acceptance' judgements, if the task is to determine if a given letter string is a word (not to judge if it is a pseudoword). What is interesting about the reaction to pseudowords in this study is that the mean reaction time is lengthier for pseudowords orthographically similar to AC and WW primes, if the participants had seen the primes in Task 1. For pseudowords similar to AD primes there is almost no difference in response latency across all priming conditions, as shown in Table 4.

Table 4: Mean reaction time to pseudowords in Task 2, millisecs (SD)

Priming condition	**Prime shown in Task 1, and target word named correctly**	**Prime shown in Task 1, and target word not named correctly**	**No prime**
AC prime	1014 (475)	1022 (463)	973 (430)
AD prime	1016 (415)	1010 (415)	1012 (436)
WW prime	934 (402)	977 (435)	911 (391)
All pseudowords	987 (433)	1003 (439)	964 (421)

A multiple regression analysis of factors which influence the reaction to pseudoword targets included the same participant and item variables as were included for word targets, except target frequency (given that all pseudowords have zero frequency, there was no point in including it as a variable in the regression models). The regression analysis shows that responses to all pseudowords were slower if orthographically similar primes were shown in the task preceding the lexical decision (the summary of the regression model is provided in Table A6 in the Appendix). The analysis also demonstrates that prior exposure to primes slows down the reaction to targets, and this is true for all three prime types, although the inhibitory effect of AD primes is smaller than that of AC and WW primes, as illustrated in Figure 4 (right panel).

If we consider the effects of prime type and priming condition on the recognition of word and pseudoword targets in Task 2 (Figure 4), it appears that the presence of AC primes has a similar effect on response times to both the source words and to matched pseudoword targets in this lexical decision task. In both cases, prior exposure to AC primes results in slower responses to the related targets in Task 2. The analysis of RT to pseudowords has also shown similar effect of exposure to AD and WW primes. If a prime was shown in Task 1, it took the participants longer to recognise an orthographically related pseudoword. Judging by this result, the priming effect of AD and WW blends is different for word and pseudoword targets.

4. General discussion

The results of the identification and production task reveal a statistically significant effect of the structural type of blends on the recognition of their source words, which was not found in earlier experiments, e.g. in Lehrer (2003) and Lehrer and Veres (2010). Easier recognition of the source words of WW blends, in comparison with the source words of AD blends or clipping compounds, can be explained by the fact that the source words are fully preserved in WW blends and are not fully preserved in other formations used as stimuli in this experiment. The observed differences in recognition of the source words of AD blends and clipping compounds should be explained by other factors, as both AD and AC formations contain only parts of their source words, i.e. splinters. First of all, SW2 of AD blends have to be recognised not by their beginning, but by their final letters, unlike SW2 of clipping compounds, and word onsets are generally recognised more easily (Jarema 2006: 54). However, the absence of SW2 onset in AD blends is compensated by having more of SW2 present in the blend, and also by the overall prosodic shape, which AD blends tend to retain from SW2, as suggested by findings, e.g. in Piñeros (2004) and Gries (2006, 2012). Indeed, all the AD blends which were selected as stimuli for this experiment, have the same number of syllables and the same main stress position as their SW2, except *renoviction* ← *renovation* + *eviction,* which retains the prosodic contour of SW1. The degree of preservation of SW2 in AD blends may not be enough to ensure the same degree of recognisability as in WW blends, but appears to be higher than in AC formations. Moreover, the results of Task 1 show that SW1 of AD blends is correctly identified more often than SW1 of clipping compounds.

The results of the lexical decision task showed the priming effect of WW and AD blends on the recognition of their source words. It was also confirmed that the priming effect was stronger for WW blends than for AD, as had been predicted. As for clipping compounds, no priming effect on the recognition of their source words was predicted. The experiment results showed that, in accordance with hypothesis 2, AC formations did not prime their source words. On the contrary, the observed reaction times suggested an inhibitory effect of exposure to AC formations. This result is in line with the finding that the source words of AC formations were most difficult to identify in Task 1. As shown in Gries (2006), on the basis of corpus data, the source words of AC are difficult to recognise because the splinters in AC formations are cut off too early to reach the recognition point. The results of the present study show that the source words of at least some novel clipping compounds can be correctly identified (in Group 2, more than in half cases). This may be due to the fact that AC primes contain splinters which appear also in other blends or clippings. Nevertheless, it appears that the source words of AC primes are less easily identified than those of AD blends. It is possible that several words were considered as candidates to be named in Task 1, and therefore, more than one word was activated, in accordance with the cohort model of word recognition (Marslen-Wilson & Welsh 1978; Marslen-Wilson 1987). Competition between those words could be a reason why the source words of AC primes were recognised more slowly.

It is important to note that in the regression analysis of reaction times in Task 2, the priming condition (i.e. whether a prime was shown in Task 1 or not) turned out to be a significant predictor of the response latency, but no significant effect of the actual response in Task 1 was found. It appears that the exposure to primes in Task 1 may result in facilitating the response to the corresponding source words in Task 2 even if these source words were not named correctly. It is possible, therefore, that the source words of higher transparency blends for which the priming effect was observed (i.e. WW and AD) were activated in Task 1, even if the participants did not actually name them.

It may be argued that the priming effect observed in the experiment was due to orthographic similarity between blends and their source words. The analysis of the responses to pseudoword targets demonstrates the difference between pseudowords and words in this respect. Exposure to AD and WW primes in the identification and production task was found to facilitate the recognition of word targets, but was shown to inhibit the recognition of pseudowords orthographically similar to primes. This may be the consequence of the high resemblance of WW-like pseudoword targets to real words. As discussed earlier, word and pseudoword targets were matched in orthographic similarity to primes. For example, both the word target *rumour* (SW1 of an AC prime *rumint*) and the corresponding pseudoword **rumacks* begin with the same letter string (*rum-*) as the prime. Likewise, the pseudowords **picknell* and **rackade* contain the same amount of orthographic material of the AD prime *pickade*, as its source words *picket* and *blockade*. The pseudowords matched with the source words of WW targets, therefore, look very similar to words (compare *aggravation* and **garravation*, *text* and **twext*), and for this reason it may take more time to distinguish them from real words. The inhibitory effect of AC primes on pseudoword targets may be due to the fact that they share the initial letter string with the corresponding source words, which means that activating one or more real words from the initial cohort could cause a delay in recognition. The inhibitory effect of AD primes was smaller than that of WW and AC primes, which may be due to the fact that only half of AD primes share initial letter strings with pseudowords. The other half of AD primes which share the final letter strings with pseudoword targets do not affect the recognition of their source words in the same way as AC primes. This is, however, an assumption only, because the difference between targets similar to SW1 and SW2 of primes did not appear significant in any of the analyses, perhaps due to the limited number of primes.

5. Conclusions

The results of the identification and production task show that the degree of formal transparency of different types of primes determines whether or not their source words can be easily identified. The results of the lexical decision task demonstrate that the type of prime influences the effect the primes have on the speed of the recognition of the targets. These results imply that the priming effect of blends on the recognition of their source words is related to the activation of the source words during the processing of blends, rather than simply to orthographic similarity between the primes and the targets.

This experiment presents evidence that clipping compounds (AC formations) are different from blends not only in terms of their form, but also in terms of the way they are processed. This distinction is of a different nature to that made, for example, in Gries (2006: 536) wherein blends, clipping compounds and acronyms are classified as ‘other’ types of word formation, different both from derivation and compounding. What is important about the present findings is that, in addition to the distinction between blends and clipping compounds, significant differences were revealed between blends containing full source words (WW) and blends containing only shortened versions of the source words (AD).

Therefore, different types of blends can be pictured as points in a continuum space of formations governed by two processes: compounding and clipping. In this light, one of the key implications of this study is in revealing psycholinguistically relevant differences between items with different degrees of shortening of the original constituents: from no shortening at all in compounds, to a substantial shortening in clipping compounds (an extreme degree of shortening would in this case be represented by acronyms). This conceptualisation of the word formation categories is similar to what is postulated in López Rúa (2004), and in Bauer (1998), and the results of the present research comprise empirical evidence supporting the claims therein. The present findings can be used for the development of models of word processing, in particular in the framework of a usage-based approach to morphological processes, discussed, for example, in Hay and Baayen (2005), Bybee (2006). Therefore, the findings of the present research have implications for both descriptive and taxonomic studies in morphology, as well as for cognitive studies.

Appendix: Regression model summaries

Table A1: Logistic regression model predicting SW1 identification

Model formula:
PrimeSW1Correct ~ Age + Sex + Handedness + PrimeSW2Correct + PrimeType + (1|Prime) + (1|Group:uID)

	Estimate	**Std. Error**	**z value**	**p value**
Intercept	-2.179383	0.865655	-2.518	0.0118
Age	0.023592	0.010707	2.203	0.0276
Sexmale	0.056345	0.178936	0.315	0.7528
Handednessright	-0.004971	0.275423	-0.018	0.9856
PrimeSW2Correct	1.716712	0.209339	8.201	0.0000
PrimeTypeAD	1.323845	1.098240	1.205	0.2280
PrimeTypeWW	2.841471	1.109863	2.560	0.0105

Intercept levels: Sexfemale, Handednessleft, PrimeSW2:incorrect, PrimeTypeAC

Table A2: Logistic regression model predicting SW2 identification

Model formula:
PrimeSW2Correct ~ Age + Sex + Handedness + PrimeSW1Correct + PrimeType + (1|Prime) + (1|Group:uID)

	Estimate	**Std. Error**	**z value**	**p value**
Intercept	-2.99261	0.80181	-3.732	0.00019
Age	0.02335	0.01270	1.839	0.06597
Sexmale	-0.19466	0.22005	-0.885	0.37637
Handednessright	0.50931	0.34154	1.491	0.13590
PrimeSW1Correct	1.70486	0.21752	7.838	0.00000
PrimeTypeAD	0.72455	0.92138	0.786	0.43165
PrimeTypeWW	2.21640	0.92228	2.403	0.01625

Intercept levels: Sexfemale, Handednessleft, PrimeSW1:incorrect, PrimeTypeAC

Table A3: Logistic regression model predicting SW1 identification, including interaction between variables

Model formula:
PrimeSW1Correct ~ Age + PrimeSW2Correct + RelFreq1 * PrimeType + RelFreq2 * PrimeType + spd1 + spd2 + (1|Prime) + (1|Group:uID)

	Estimate	**Std. Error**	**z value**	**p value**
Intercept	-5.02073	0.87539	-5.735	0.00000
Age	0.02369	0.01078	2.197	0.02801
PrimeSW2Correct	1.66035	0.20674	8.031	0.00000
RelFreq1	6.30828	1.95329	3.230	0.00124
PrimeTypeAD	0.02347	1.41927	0.017	0.98681
PrimeTypeWW	5.89311	4.46913	1.319	0.18729
RelFreq2	5.44590	2.78963	1.952	0.05092
spd1	-0.84839	0.40729	-2.083	0.03725
spd2	-0.10521	0.28724	-0.366	0.71414
RelFreq1:PrimeTypeAD	1.77346	2.58348	0.686	0.49242
RelFreq1:PrimeTypeWW	-7.99432	3.24132	-2.466	0.01365

PrimeTypeAD:RelFreq2	-2.24680	3.09976	-0.725	0.46856
PrimeTypeWW:RelFreq2	-4.38688	4.64540	-0.944	0.34499
Intercept levels: PrimeSW2:incorrect, PrimeTypeAC, RelFreq1:PrimeTypeAC, PrimeTypeAC:RelFreq2				

Table A4: Logistic regression model predicting SW2 identification, including interaction between variables

Model formula:
PrimeSW2Correct ~ Age + PrimeSW1Correct + Freq1 + Freq2 + PrimeType + (1|Prime) + (1|Group:uID)

	Estimate	Std. Error	z value	p value
Intercept	-0.28920	0.7698	-3.757	0.000172
Age	0.02349	0.01274	1.845	0.065108
PrimeSW1Correct	1.753	0.2171	8.075	0.000000
Freq1	-0.00056	0.00001	-3.849	0.000119
Freq2	0.00043	0.00001	3.367	0.000761
PrimeTypeAD	1.058	0.7771	1.362	0.173322
PrimeTypeWW	2.854	0.7932	3.598	0.000321
Intercept level: PrimeTypeAC				

Table 35: Linear regression model predicting RT to words in Task 2

Model formula:
bcPower(exp.words.noerr$Stimulus2.RT, pt$roundlam) ~ PrimeType * PrShown + Sex + LogTfreq + Tlength + (1+LogTfreq|uID) + (1+Age|Target)

	Estimate	Std. Error	t value	p value
Intercept	8.881e-01	5.318e-05	16700.262	0.00000
PrimeTypeAD	-7.910e-06	1.724e-05	-0.459	0.64812
PrimeTypeWW	1.049e-05	1.886e-05	0.556	0.58031
PrimeShownTRUE	6.369e-06	1.975e-06	3.225	0.00126
Sexmale	1.118e-04	2.043e-05	5.473	0.00000
LogTfreq	-2.376e-05	4.019e-06	-5.912	0.00000
Tlength	1.664e-05	3.199e-06	5.202	0.00000
PrimeTypeAD:PrimeShownTRUE	-1.726e-05	2.804e-06	-6.156	0.00000
PrimeTypeWW:PrimeShownTRUE	-3.762e-05	2.823e-06	-13.325	0.00000
Intercept levels: PrimeTypeAC, PrimeShownFALSE, Sexfemale, PrimeTypeAC:PrimeShownFALSE				

Table A6: Linear regression model predicting RT to pseudowords in Task 2

Model formula:
bcPower(exp.pseudowords.noerr$Stimulus2.RT, ptnw$roundlam) ~ Sex + PrShown * PrimeType + tlength + spd.nw + (1 + SimToSW|uID) + (1|Target)

	Estimate	Std. Error	t value	p value
Intercept	1.262	1.706e-04	7397.691	0.00000
Sexmale	9.596e-04	2.245e-04	4.275	0.00004
PrimeShownTRUE	1.785e-04	1.843e-05	9.689	0.00000
PrimeTypeAD	2.153e-04	1.502e-04	1.433	0.15808
PrimeTypeWW	2.668e-04	1.567e-04	-1.702	0.09471
Tlength	2.485e-04	3.022e-05	8.223	0.00000

spd.nw	-9.084e-05	4.676e-05	-1.943	0.03790
PrimeTypeAD:PrimeShownTRUE	1.169e-05	2.605e-05	-4.489	0.00000
PrimeTypeWW:PrimeShownTRUE	9.573e-05	2.615e-05	-3.660	0.00025
Intercept levels: Sexfemale, PrimeShownFALSE, PrimeTypeAC, PrimeTypeAC:PrimeShownFALSE				

References

Adams, Valerie. 1973. *An introduction to modern English word formation*. London: Longman.

Bauer, Laurie. 1998. Is there a class of neoclassical compounds, and if so is it productive? *Linguistics* 36(3). 403–422.

Bauer, Laurie. 2006. Compounds and minor word-formation types. In Aarts, B. & McMahon, A. (eds.), *The handbook of English linguistics*, 483–506. Oxford: Blackwell.

Bauer, Laurie. 2012. Blends: Core and periphery. In Renner, V, Maniez, F., Arnaud, P. J. L. (eds.), *Cross-disciplinary perspectives on lexical blending,* 11–22. Berlin: De Gruyter Mouton.

Beliaeva, Natalia. 2014. A study of English blends: From structure to meaning and back again. *Word Structure* 7(1). 29–54.

Berg, Thomas. 1998. *Linguistic structure and change: An explanation from language processing*. Oxford: Oxford University Press.

Bertinetto, Pier Marco. 2001. Blends and syllabic structure: A four-fold comparison. In Lorente, M., Alturo, N., Boix, E., Lloret, M. R., Payrató, Ll. (eds.), *La gramàtica i la semàntica per a l'estudi de la variació*, 59–112. Barcelona: Promociones y Publicaciones Universitarias.

Bybee, Joan L. 2006. From usage to grammar: The mind's response to repetition. *Language* 82(4). 711–733.

Cannon, Garland. 1986. Blends in English word formation. *Linguistics* 24(4). 725–753.

Chialant, Doriana & Caramazza, Alfonso. 1995. Where is morphology and how it is processed? The case of written word recognition. In Feldman, L. B. (ed.), *Morphological aspects of language processing*, 55–76. Hillsdale, NJ & Hove, UK: Laurence Erlbaum Associates.

Cook, Paul & Stevenson, Suzanne. 2007. Automagically inferring the source words of lexical blends. In *Proceedings of the 10th Conference of the Pacific Association for Computational Linguistics (PACLING 2007)*, 289–297. Melbourne, Australia.

Forster, Kenneth I. & Davis, Chris. 1984. Repetition priming and frequency attenuation in lexical access. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 10(4). 680–698.

Grainger, Jonathan. 1990. Word frequency and neighborhood frequency effects in lexical decision and naming. *Journal of Memory and Language* 29. 228–244.

Gries, Stefan Th. 2006. Cognitive determinants of subtractive word-formation processes: A corpus-based perspective. *Linguistics* 17(4). 535–558.

Gries, Stefan Th. 2012. Quantitative corpus data on blend formation: Psycho- and cognitive-linguistic perspectives. In Renner, V., Maniez, V., Arnaud, P. J. L. (eds.), *Cross-disciplinary perspectives on lexical blending*, 145–167. Berlin: De Gruyter Mouton.

Hay, Jennifer B. & Baayen, Harald R. 2005. Shifting paradigms: Gradient structure in morphology. *Trends in Cognitive Sciences* 9(7). 342–348.

Jarema, Gonia. 2006. Compound representation and processing: A cross-language perspective. In Libben, G., Jarema, G. (eds.), *The representation and processing of compound words*, 45–70. Oxford: Oxford University Press.

Kimura, Doreen. 1999. *Sex and cognition*. Cambridge, MA: MIT Press.

Kubozono, Haruo. 1990. Phonological constraints on blending in English as a case for phonology-morphology interface. *Yearbook of Morphology* 3. 1–20.

Lehrer, Adrienne. 1996. Identifying and interpreting blends: An experimental approach. *Cognitive Linguistics* 4(7). 359–390.

Lehrer, Adrienne. 2003. Understanding trendy neologisms. *Italian Journal of Linguistics. Rivista Di Linguistica* 15(2). 369–382.

Lehrer, Adrienne. 2007. Blendalicious. In Munat, J. (ed.), *Lexical creativity, texts and contexts: The morphology/stylistic interface*, 115–133. Amsterdam & Philadelphia, PI: Benjamins.

Lehrer, Adrienne & Veres, Csaba. 2010. Two experiments on processing lexical blends. Paper presented at the International Conference on Lexical Blending, Lyon, 10–11 June 2010.

López Rúa, Paula. 2004. The categorial continuum of English blends. *English Studies* 85(1). 63–76.

Marslen-Wilson, William D. 1987. Functional parallelism in spoken word-recognition. *Cognition* 25(1–2). 71–102.

Marslen-Wilson, William D. & Tyler, Lorraine Komisarjevsky & Waksler, Rachelle & Older, Lianne. 1994. Morphology and meaning in the English mental lexicon. *Psychological Review* 101. 3–33.

Marslen-Wilson, William D. & Welsh, Alan. 1978. Processing interactions and lexical access during word recognition in continuous speech. *Cognitive Psychology* 10(1). 29–63.

Neely, James H. 1991. Semantic priming in visual word recognition: A selective review of current theories and findings. In Besner, D., Humphries, G. W. (eds.), *Basic processes in reading: Visual word recognition*, 264–336. Hillsdale, NJ: Erlbaum.

Piñeros, Carlos-Eduardo. 2004. The creation of portmanteaus in the extragrammatical morphology of Spanish. *Probus* 16(2). 203–240.

Plag, Ingo. 2003. *Word-formation in English*. Cambridge: Cambridge University Press.

R Core Team. 2014. *R: A language and environment for statistical computing. R foundation for statistical computing*. Vienna. Retrieved from http://www.R-project.org/

Schneider, Walter, Eschman, Amy & Zuccolotto, Anthony. 2002. *E-Prime reference guide*. Pittsburgh: Psychology Software Tools, Inc.

Weekes, Brendan Stuart. 1997. Differential effects of number of letters on word and pseudoword naming latency. *Quarterly Journal of Experimental Psychology* 50(2). 439–456.

Weisberg, Sanford. 2005. *Applied linear regression*. Hoboken, NJ: Wiley.

White, Sarah J., Johnson, Rebecca L., Liversedge, Simon P. & Rayner, Keith. 2008. Eye movements when reading transposed text: The importance of word-beginning letters. *Journal of Experimental Psychology. Human Perception and Performance* 34(5). 1261–1276.

Whitney, Carol. 2001. How the brain encodes the order of letters in a printed word: The SERIOL model and selective literature review. *Psychonomic Bulletin and Review* 8(2). 221–243.

Electronic sources

Davies, Mark. 2008–. *The Corpus of Contemporary American English (COCA): 400+ million words, 1990-present.* (http://corpus.byu.edu/coca)

Kemmer, Suzanne, 2008. *The Rice University neologisms database*. (http://neologisms.rice.edu/index.php)

Urban Dictionary. (http://www.urbandictionary.com/)

Word Spy: The word lover's guide to new words. (http://wordspy.com/)

Dr. Natalia Beliaeva
School of Linguistics and Applied Language Studies
Victoria University of Wellington
PO Box 600
Wellington
New Zealand
belayanaveta@gmail.com

In SKASE Journal of Theoretical Linguistics [online]. 2016, vol. 13, no.2 [cit. 2016-09-11]. Available on web page http://www.skase.sk/Volumes/JTL32/pdf_doc/02.pdf. ISSN 1336- 782X.