The role of metrical stress differences in learner word recognition

Isabella Fritz[1], Aditi Lahiri[1], Sandra Kotzor[1,2]
[1]Language and Brain Laboratory, University of Oxford, UK
[2]School of Education, Oxford Brookes University, UK
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Abstract

This paper shows that native metrical phonology drives second-language processing of similar Romance loans in three related West Germanic languages: Dutch, English and German. All three have borrowed large numbers of Romance loans which do not necessarily share the same stress pattern: *ko'lonie* (D), *'colony* (E), *Kolo'nie* (G). First, a visual task conducted with highly proficient German and Dutch learners of English revealed that loans differing in the number of syllables (e.g. E *ba.llad vs.* G *Ba.lla.de*) are more difficult to process. Second, corresponding auditory lexical decision tasks elicited slower and less accurate responses to words with a reduced final syllable in English (e.g. *moral*) when the other two languages have a full vowel.

Keywords: stress processing, second-language processing, loanwords, word recognition

Introduction

Romance loanwords (largely from Latin and Old French) such as *moral* or *panic* have become an integral part of the vocabulary of West Germanic languages. However, during the course of loanword adaptation, the very same loan often displays phonological differences across present-day Dutch, English, and German. For inherited Germanic monomorphemic words, which are often disyllabic, stress invariably falls on the same syllable in all three (e.g. D *'weduwe, 'open;* E *'widow*, *'open;* G *'Witwe, 'offen*), usually the first syllable (Lahiri et al. 1999), and the final unstressed syllable is often reduced to a schwa. However, in loans, main stress can fall on different positions in multisyllabic words. For instance, the Latin *mō'rālis* was borrowed into both Dutch and German with a final long vowel which then bore stress [mo'raːl] while the main stress in English is on the first syllable and the second is reduced to a schwa: *moral* ['mɔrəl].

Generally speaking, the modern metrical structure of the three languages is trochaic (i.e. stress falls on the left). If a word has two light syllables, then stress is primarily trochaic for all three languages. If a word has two heavy syllables (i.e. syllables with long vowels or are closed by a coda consonant), then Dutch and German prefer stress on the second syllable, while English prefers the leftmost syllable, although there can be variation. If the first syllable is light and the second clearly heavy, which is rare for English, stress falls on the final syllable. Some later loans do have a final heavy syllable in English which can

bear stress. There is a strong tendency for English to have main stress on the first syllable e.g. *costume* ['kɒstjuːm] while the German word is stressed finally, *Kostüm* [kɔs'tyːm]. Finally, the same loanwords can also differ in their number of syllables across the three languages (e.g. English *me.lon* and German *Me.lo.ne*; Lahiri 2015).

In this study, we exploited these cross-linguistic differences in loanword phonology in two visual and auditory lexical decision tasks (LDT) to investigate the role of metrical stress differences in the recognition of such loanwords in English by language learners with native Dutch or German. Although previous studies on the processing of words with shared origins have investigated the influence of phonological overlap on word recognition (e.g. Dijkstra et al. 2010, Frances et al. 2021), little attention has been paid to metrical stress differences. From a general word processing perspective, stress can be used as a cue in spoken word recognition (e.g. Friedrich et al. 2004) but it has not yet been established whether native language stress patterns play a role in second-language processing. It would not be surprising if lexical decision times were slower when the stress patterns differ, but to what extent does the native system impose its dominance?

Methods and design

The stimulus set consisted of 284 items: 142 disyllabic English monomorphemic Romance loanwords and 142 pseudowords. Two conditions included loanwords where the English stress pattern differed from the corresponding loanwords in German and Dutch, with either a reduced or a non-reduced vowel in the final syllable in English. The experiment further included two conditions where the number of syllables was also manipulated. One of those conditions contained items where the German loanword has three syllables whilst their English and Dutch counterparts have only two syllables. In the second condition, both Dutch and German loanwords were trisyllabic. A final condition consists of loanwords which do not exist in either German or Dutch (see Table 1).

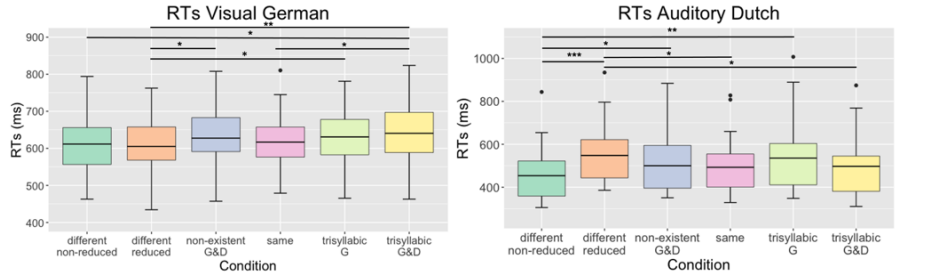
Table 1 Example stimuli.

Condition	English	German	Dutch
same stress	'temple (penult)	'Tempel	'tempel
different stress			
reduced	'moral (penult)	Mo'ral (final)	mo'raal (final)
non-reduced	'costume (penult)	Kos'tüm (final)	cos'tuum (final)
Different syllable number			
E + D: 2; G: 3	'melon (penult)	Me'lone (penult)	me'loen (final)
E: 2; G + D: 3	'ballad (penult)	Ba'llade (penult)	ba'llade (penult)
Non-existent G&D	'pigeon (penult)		

Three groups of participants took part in the study. Each participant only completed one version of the LDT. Our analyses included 29/31 British English native speakers, 41/29 L1 German speakers and 29/30 L1 Dutch speakers for the visual and auditory LDT respectively. Both second-language (L2) groups consisted of highly proficient learners of English. Participants had only limited or no knowledge of other Romance languages and either German or Dutch.

Data was collected online and participants were instructed to decide as quickly and accurately as possible whether the word presented (visually or auditorily) is a real word in English by pressing either 'F' or 'J' using their dominant hand for yes-responses. A 300ms fixation cross, followed by a 300ms blank screen, preceded the target, which was presented for 500ms. For the auditory version, items were recorded by a male native English speaker. Participants and items with accuracy below 75% and 60% respectively and outliers ± 2.5 SD from participant mean were excluded. RTs were time-locked to the stimulus onset in the visual LDT and to the offset in the auditory version. Response accuracy and RT data were analysed in RStudio using linear mixed effects models (lme4 package; Bates et al., 2015). Subject and Item were included as random effects as well as a random intercept and slope for Condition by Subject, with pair-wise comparisons run based on individual models.

Results



German Visual	RTs ms	SD ms	Accuracy %	SD %
Different stress non-reduced	611	73	95.9	4.0
Different stress reduced	605	78	95.7	5.0
Non-existent G&D	628	78	93.1	6.2
Same stress	617	70	95.3	6.3
Trisyllabic G	630	73	93.0	7.0
Trisyllabic G&D	640	78	94.2	5.6

German Auditory	RTs ms	SD ms	Accuracy %	SD %
Different stress non-reduced	421	149	95.5	4.7
Different stress reduced	480	143	91.1	9.0
Non-existent G&D	437	145	97.2	4.9
Same stress	441	153	95.9	5.2
Trisyllabic G	492	161	89.7	7.2
Trisyllabic G&D	444	143	94.4	6.1

Dutch Visual	RTs ms	SD ms	Accuracy %	SD %
Different stress non-reduced	628	126	96.3	5.4
Different stress reduced	634	133	95.5	4.8
Non-existent G&D	637	126	95.0	6.3
Same stress	624	128	94.2	5.8
Trisyllabic G	641	130	95.3	7.3
Trisyllabic G&D	652	130	93.8	6.1

Dutch Auditory	RTs ms	SD ms	Accuracy %	SD %
Different stress non-reduced	454	122	97.8	3.5
Different stress reduced	548	136	90.6	6.4
Non-existent G&D	500	127	94.3	5.3
Same stress	493	130	98.6	2.4
Trisyllabic G	535	161	94.2	6.8
Trisyllabic G&D	497	138	97.7	3.9

Figure 1. Top: Mean RTs plus indication of significant pair-wise comparisons; Bottom: Mean RTs and Accuracies for the L2 groups in both modalities.

Accuracy in the visual LDT was very high in all conditions (> 93%) with no significant effects in any of the three language groups. RTs in the L2 groups were slowest for conditions where syllable number differed across languages. The auditory data shows a different pattern, which suggests that a reduced vowel in the final syllable causes difficulties for L2 learners. For Dutch speakers, items in the condition with a reduced final syllable had the lowest accuracies and slowest RTs for Dutch L1 speakers. For German speakers, the reduced final syllable and the trisyllabic G condition, which mainly contains items with a reduced final syllable, had the lowest accuracies and slowest RTs (see Figure 1).

Discussion

These results indicate that the native language phonology on a metrical stress level plays a role in the L2 processing of shared loanwords. However, not all differences impact word recognition equally. Differences in stress placement only lead to slower and less accurate responses in combination with additional differences across the languages, i.e. either in the weight of the final syllable (in the auditory modality) or the number of syllables (in the visual modality). While both of these differences show clear processing consequences, the precise contribution of native phonological patterns to the processing of these loanwords, and the underlying causes, remain to be established.

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