

## **Visual recognition of morphologically complex words by second language learners: A masked priming study**

Mariia Baltais (Ghent University), Anna Jessen (University of Potsdam)

Many recent studies examined early visual recognition of morphologically complex words in native (L1) speakers by conducting masked priming experiments, in which prime words are presented so briefly that they are typically not consciously visible to the readers. Lexical decisions to the target words preceded by morphologically related primes (e.g., *walked* – *walk*) tend to be significantly shorter than those obtained in the unrelated condition (e.g., *brush* – *walk*). This facilitation is attributed to automatic decomposition of the primes into their constituent morphemes (*walk* + *-ed*). However, it is not clear whether this mechanism applies to irregular inflections (e.g., *taught*), or they are stored and processed as indecomposable whole forms. Research on non-native (L2) visual recognition of regular and irregular inflections also provides controversial results (Neubauer & Clahsen, 2009; Clahsen & Jessen, 2020). According to the Shallow Structure Hypothesis, L2 processing tends to rely on “shallow” parsing strategies, which make use of surface information (Clahsen & Felser, 2006). Some masked priming studies found that in contrast to native speakers, L2 speakers can show effects of purely orthographic relatedness (Feldman et al., 2010).

To examine early visual processing of inflected words in L2 speakers, we tested 63 highly proficient Russian learners of German (mean age of acquisition: 13 years, SD: 5.93, range: 5-30 years) and compared their results to a control group of 32 German native speakers. Experimental materials come from the study by Clahsen and Jessen (2020). In the morphological item set, three types of German past participles were used as related primes: regular, irregular without stem allomorphy, and irregular with stem allomorphy (see Table 1). The corresponding verbs in the first person singular of the present tense acted as targets. Purely orthographically and purely semantically related primes and targets formed two control item sets. All related and unrelated prime-target pairs were distributed over two counter-balanced lists, so that each participant would see each target only once. Each list consisted of 150 experimental and 210 filler pairs; in half of the trials, targets were non-words. Prime words were preceded by a hash mask and appeared on the screen for 50 ms (see Figure 1).

Lexical decision times were analyzed by fitting mixed-effect linear regression models. The L1 group showed genuine morphological priming for all types of inflections, indicative of their morphological decomposition. Similar priming effects, including numerical patterns, were observed for the Russian L2 group (see Figure 2). However, statistical models could not reliably distinguish these latter effects from facilitation caused by purely orthographic overlap between control primes and targets: there were no significant interactions of prime type (related, unrelated) and relatedness type (morphological, orthographic). It suggests that orthographic relatedness could have played a role in the L2 speakers’ early recognition process of inflected words.

Our results can be directly compared to those obtained by Clahsen and Jessen (2020) for Turkish-German bilinguals, who demonstrated genuine morphological priming for regular inflections and no purely orthographic facilitation. One of the possible explanations for greater importance of orthographic relatedness for the Russian speakers might be the difference in L1 and L2 scripts: Russian uses a Cyrillic-script alphabet while both Turkish and German use Latin-script alphabets. Feldman et al. (2010) also tested a group of L2 speakers whose L1 had a Cyrillic-script alphabet (Serbian learners of English): orthographic and irregular primes produced statistically undistinguishable patterns, although regular primes yielded genuine morphological facilitation in more proficient L2 speakers. However, the present study demonstrates that even highly proficient L2 speakers can rely on orthographic information during the processing of regular inflections, which goes in line with the Shallow Structure Hypothesis.

Condition	Target	Related prime	Unrelated prime	No of targets
Regular (-t)	lande 'I land'	gelandet 'landed'	furchtbar 'awful'	30 items
Irregular (-n, no stem change)	falle 'I fall'	gefallen 'fallen'	klüger 'smarter'	30 items
(-n, stem change)	finde 'I find'	gefunden 'found'	herrlich 'splendid'	30 items
Orthographic	Lasche 'strap'	Flasche 'bottle'	Herbst 'autumn'	30 items
Semantic	Arzt 'physician'	Doktor 'doctor'	Presse 'press'	30 items

Table 1. Stimulus examples (based on Clahsen & Jessen, 2020).

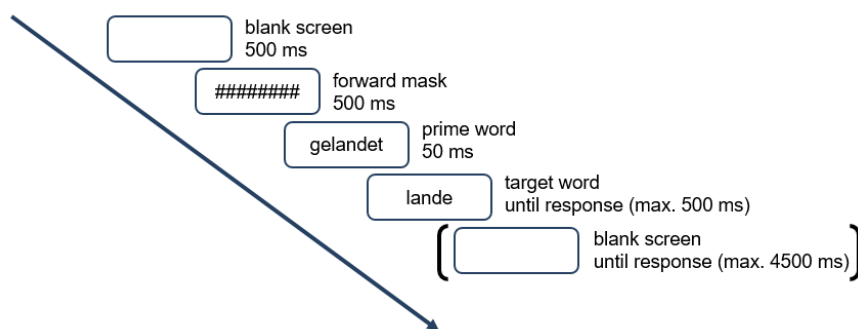


Figure 1. Structure of a trial (based on Clahsen & Jessen, 2020). The number of hashes in the forward mask was equal to the number of letters of the prime word.

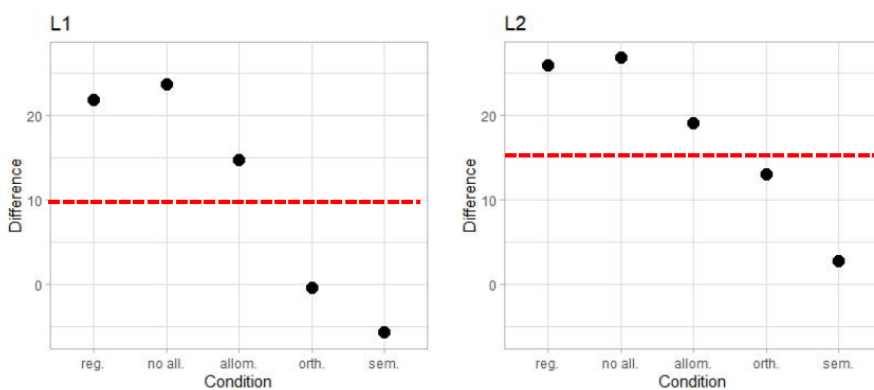


Figure 2. Priming effects (in milliseconds) obtained for each group (L1, L2) and condition (regular participles, irregular participles without allomorphy, irregular participles with allomorphy, orthographic, semantic). The dashed line represents the significance level ( $p < .05$ ).

## References

- Clahsen, H., & Felser, C. (2006). Grammatical processing in language learners. *Applied Psycholinguistics*, 27(1), 3–42. <https://doi.org/10.1017/S0142716406060024>
- Clahsen, H., & Jessen, A. (2020). Variability and its limits in bilingual word recognition: A morphological-priming study. *The Mental Lexicon*, 15, 292–326. <https://doi.org/10.1075/ml.20013.cla>
- Feldman, L. B., Kostić, A., Basnight-Brown, D. M., Đurđević, D. F., & Pastizzo, M. J. (2010). Morphological facilitation for regular and irregular verb formations in native and non-native speakers: Little evidence for two distinct mechanisms. *Bilingualism: Language and Cognition*, 13(2), 119–135. <https://doi.org/10.1017/S1366728909990459>
- Neubauer, K., & Clahsen, H. (2009). Decomposition of Inflected Words in a Second Language: An Experimental Study of German Participles. *Studies in Second Language Acquisition*, 31(3), 403–435. <https://doi.org/10.1017/S0272263109090354>