

# Does Native Language Affect Second Language Storage? A Research Proposal Regarding the Storage of Morphologically Complex Words

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## Abstract

The nature of the storage of morphologically complex lexical items, specifically words consisting of a base and an affix, is part of an ongoing debate in the linguistic community. While some research points to the storage of complex items as distinct units, other research seems to favor the decompositional model of storage, which holds that complex words are stored in separate units that are combined later on. Recent research has shown that both models could prove to be valid in some way, with differences possibly existing for storage of the same language by native (L1) and non-native (L2) speakers. However, this type of research has thus far suffered from narrow samples and poor generalizability. We propose a study consisting of a primed lexical decision task that encompasses a much wider (and inter-familial) sample of languages. This type of research will significantly increase the linguistic insight into the differences in storage between L1 and L2 speakers.

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**Keywords:** lexical storage, morphological complexity, decompositional model, connectionist model

## 1. Introduction

Linguistics, as a science, is concerned with many and highly differing aspects of human language use. A notable aspect thereof is the nature of lexical storage, or, in layman's terms, how words are stored in the brain. One component of this line of inquiry is concerned specifically with the storage of morphologically complex lexical

items. The existing literature can generally be divided into two major camps: the connectionist camp and the decompositionist camp.

The connectionist camp holds that morphologically complex lexical items are stored in a unitary fashion, separately from their components. In other words, inflected forms are stored as separate units that are distinct from their uninflected forms. This is commonly referred to as *individual storage*. Sereno and Jongman (1997) reports that surface frequency (i.e, the frequency of specifically the inflected lexical item) significantly affects word response latencies, while total frequency (i.e., the frequency of the inflected and uninflected forms combined) does not. The reported primacy of surface frequency in word response latencies leads them to support the connectionist model.

However, other research seems to lend support to the decompositionist camp. Decompositionist theory asserts that morphologically complex forms are not stored at all. Instead, only the base form and the rules that allow for the modification of this base form are stored. Notably, Stockall and Marantz (2006) examine the priming abilities of morphologically related words. Priming refers to the act of briefly exposing a participant to a stimulus to see how this affects the participant in a following task. In research regarding the storage of morphologically complex words, priming refers to the act of showing a word or non-word for several milliseconds to see if this affects reaction times to questions regarding the validity of a second word or non-word. The second word can either be identical, morphologically related, orthographically related, or unrelated. Stockall and Marantz (2006) report that participants' response times improve when participants are primed with morphologically related words, as opposed to morphologically unrelated words, which do not achieve a significant priming effect. Furthermore, they also identify a negative effect of orthographic overlap between words on reaction time. This indicates that the discovered priming effects are morphological in nature and refutes the presumption that these effects result from orthographic overlap.

Sereno and Jongman (1997) and Stockall and Marantz (2006), however, both base their findings on native (L1) speakers of English. This constitutes an extremely limited dataset, especially when the studies are considered in light of the massive degree of variation between the world's languages. They analyze one language in complete isolation from other languages, which leads any generalization made from their data to be based solely on the inner workings of a very select subset of Indo-European languages.

Notably, this is not the case for all studies. Some studies delve into the possible differences between L1 and L2 speakers when it comes to the storage of

morphologically complex lexical items. Clahsen and Neubauer (2010) investigate whether findings regarding storage mechanisms are universal for all (adult) speakers of German. They report that native speakers of German were susceptible to priming but L2 German speakers from Poland were not. From this, they conclude that L2 speakers exclusively use individual storage whereas they argue that L1 speakers use a combination of individual storage and decomposition. Heyer and Clahsen (2015) report that “highly proficient” Russian L2 speakers of German were susceptible to priming, but that this priming could be achieved both morphologically and orthographically. Their findings support the notion that storage differs for L1 and L2 speakers, but they dispute that priming itself does not affect L2 speakers. Notably, Jacob et al. (2017) claim to have found no differences in priming effects for L1 English speakers, Dutch L2 English speakers, and Spanish L2 English speakers.

These later studies call into question why Clahsen and Neubauer’s (2010) experiments did produce priming effects for their L2 speakers. This must stem from either a difference between the L2 groups, a difference in methodology, or a difference in proficiency in Clahsen and Neubauer’s (2010) L2 group. Clahsen and Neubauer’s (2010) explanation for the differences in priming effects is therefore precarious, as they exclusively analyze Polish speakers of German and use these narrow findings to make generalizations regarding L2 storage—they hold that all L2 speakers exclusively rely on individual storage, and L2 speakers of similar levels of proficiency should therefore yield similar results, regardless of their L1. Any differences in results for various groups another study might find should therefore indicate that Clahsen and Neubauer’s (2010) conclusion is unfounded and that any number of uninvestigated factors could be affecting the results. Their claims should be cross-referenced with other groups of L2 speakers.

It should be noted that this is not the only complication that arises from their study. Clahsen and Neubauer (2010) compare Polish L2 speakers of German to L1 speakers of German. This is problematic because it does not account for the possibility of elements in the L1 of the Polish participants affecting their storage of the L2. This factor is especially germane considering German neighbors Polish geographically and results found through the examination of Polish L2 speakers of German could therefore be possibly skewed. Even if the Polish participants believe they have learned German around a certain age, it is impossible to determine how much they have already encountered German and how much it has already taken root in their passive knowledge. Although it is impossible to fully control for such an interference (should it exist), disqualifying any language that neighbors German would have certainly minimized any possible interference.

Considering the uncertainties that arise when studying a small set of sometimes related or neighboring languages, it should therefore prove fruitful to further analyze the storage mechanisms of languages with varying degrees of morphological complexity. This level of analysis alone would be somewhat limited, however. Although repeating the study by Clahsen and Neubauer (2010) on a greater scale and reducing possible interference could yield more conclusive results, only controlling for interference would be wasteful of the available resources.

### *1.1 Present Study*

To reduce the risk of linguistic familial interference in our findings, in this study, we intend to analyze multiple, distinct languages. We base our selection of these languages on a number of relevant factors. Firstly, by selecting languages that vary in terms of morphological complexity and that are not normally spoken in close proximity to the German language area, we can hopefully reach generalizable claims concerning the degree to which certain languages are stored differently as L2s and whether the complexity of the speaker's L1 affects L2 decomposition. Cross-case investigations into the storage of L2 languages, like the one we propose here, can also provide insight into the universality of different models of lexical storage.

This proposal was constructed to clarify these matters and is intended to answer the question: to what degree does a speaker's L1 (and the morphological complexity of that L1) influence how they store their L2? We predict that L1s with a larger degree of morphological complexity also lead to a higher likelihood of instances of decompositional storage in their speakers' L2s. To test the validity of this hypothesis, we intend to partly replicate Clahsen and Neubauer's (2010) original study (see also Sereno & Jongman, 1997; Stockall & Marantz, 2006), while selecting participants based on the complexity of their L1. We will also test whether identical, morphologically related, orthographically related, or unrelated primes affect participants reaction times. Crucially, our participants will not be categorized solely as L1 or L2 speakers, but they will also be categorized by their specific native language. These languages are German, Uralic, or Afroasiatic, with Uralic being subcategorized into Finnish, Estonian, and Hungarian, and Afroasiatic into Arabic, Shilha, and Hausa. Should we discover differences in reaction times between any combination of L1s, this indicates a potential effect of L1s on the storage of L2s.

Clahsen and Neubauer's (2010) findings provide insight into the morphological storage of Polish second-language speakers of German, which in turn could be used to contemplate greater linguistic cognitive mechanisms. Since our participants will be

classified by L1, and their L1s can generally be classified for their morphological complexity, we can incorporate characteristics of the various L1s that might alter the storages of the L2s. For this reason, our findings should provide generalizable insight into the storage of L2s. The results of the study we propose could provide the lexical storage debate with new perspectives. Moreover, should we discover differences in the storage of L2s based on the complexity of speakers' L1s, this can be used to argue the necessity for different forms of second-language education based on the complexity of the students' L1.

## 2. Method

### 2.1 Participants

Participants for the proposed study will fall into one of three categories: control, Uralic, or Afroasiatic. The control group consists of native speakers of German. This is done to allow for the closest possible comparison to Clahsen and Neubauer (2010). The Uralic group is further subdivided into three different groups: Finnish, Estonian, and Hungarian. The Afroasiatic native speakers are also subdivided into three groups: Arabic, Shilha, and Hausa. This means there are a total of seven groups. The reason for selecting Uralic and Afroasiatic native speakers is that studying two distinct linguistic families increases the generalizability of the results and minimizes possible covert inter-familial interference. Each group should consist of roughly thirty university students with advanced, but not near-native proficiency in German (approximately B2 to C1 level on the Goethe-Institute Placement Test; Clahsen & Neubauer, 2010) to ensure their proficiency is not too great to measure any influence of their L1 on their processing of German. The Uralic and Afroasiatic participants will be selected on having learned German in a classroom setting from age 6 to 8 onward to minimize the influence of the learning environment on the results (immersion vs. classroom-based learning). We have chosen classroom-based learning since it allows us to measure based on established metrics, and its systemized nature increases the likelihood of accurate measurement of participants' proficiency.

### 2.2 Materials

Emulating Clahsen and Neubauer (2010), the task will be a so-called primed lexical decision task. During this task, participants will be quickly shown an initial lexical item known as a *prime*. They are then asked to classify a presented lexical item as either

a word or non-word. This process is then repeated. The task will be presented on a computer monitor. Also present will be two buttons, one labeled *yes* and one labeled *no*. Each lexical item will fall under one of three conditions: *identical*, *related*, and *unrelated*. Under the *identical* condition, the prime is completely identical to the target word. Under the *related* condition, the prime is an *-ung*-nominalized form of the target word. Lastly, under the *unrelated* condition, the prime and target are not related semantically or morphologically, but the prime is still an *-ung* form. For every participant, each condition will be included approximately 30 times. The participants will also be presented with filler combinations to ensure the exact purpose of the study remains unclear. These filler combinations can be word/word, word/non-word, non-word/word, or non-word/non-word. The non-words will be created by changing one or two letters of an existing German word (based on the items employed by Clahsen and Neubauer (2010)) to create a new phonotactically valid form. All conditions will be comparable in average word length and syllable number.

### 2.3 Procedure

The participants will be shown a fixation cross on the screen for 500 ms, a prime will then be shown for 60 ms (short enough so as to not be consciously perceivable as per Clahsen and Neubauer (2010)) according to the condition, then the target will be presented for 500 ms for each item in the lexical decision task. The participants' reaction time will be measured by the time it takes them to press a response button. To reduce the effects of visual priming, the primes and targets will be presented in different fonts. The items will be presented in random order. After completion of the lexical decision task, the participants will be asked to complete a vocabulary test to confirm that they were familiar with the words shown in the three measured conditions. Participants will also be asked to describe the experiment to ensure the priming has been successfully masked. If no participants are able to describe any of the priming items, then the masking will have succeeded.

### 2.4 Design and Analysis

This study is intended to measure the effect of a speaker's L1 on the decomposition of morphologically complex lexical items in the L2 with reaction time as the dependent variable. Decomposition is measured by the *related* condition—if the reaction time for the *related* condition approximates the *identical* condition, this indicates that decomposition has taken place. If the reaction time under the *related* condition

approximates the *unrelated* condition, this would point to no decomposition having taken place. All wrong answers on the lexical decision task will be discarded. Two analyses will be conducted: one intra-familial analysis and one comprehensive analysis. The intra-familial analysis will compare the results based on the morphological complexity of the languages within a family. The comprehensive analysis will compare the families to confirm that the intra-familial results of the two families are similar and to attempt to discover possible additional influences.

### **3. Expected Findings**

If results turn out to vary exclusively based on the morphological complexity of the speakers' L1, and we do not find other significant differences between the L1s, both intra-familially and inter-familially, this would point to the morphological complexity of the L1 being a major factor affecting storage of the L2. However, if the study finds similar results intra-familially, but vast differences between the families themselves, this would indicate that one or more confounding elements may be present in one or both families that affect the way they store and retrieve languages. This could provide an explanation for why research following Clahsen and Neubauer (2010) failed to replicate their results. Further research would then be needed to ascertain the nature of these confounding elements. The results of previous linguistic studies that only compare closely related languages would then therefore likely be influenced by some covert L1 interference. Further research in this field would then have to consider the potential effects of linguistic familiarity between the L1 and the L2. In other words, in this scenario, comprehensive conclusions cannot be drawn regarding language storage solely based on research that focuses on languages that are part of the same family.

It would also be possible for none of the L2 participants to respond to priming, as was the case for Clahsen and Neubauer (2010). If this were to be the case, it would likely be due to proficiency effects. The criteria for proficiency would have to be adjusted and the experiment would have to be repeated to determine whether varying degrees of proficiency produce significantly different results. If participants were to consistently fail to respond to priming across different proficiency levels, that then would indicate that L2 speakers store a language differently than L1 speakers on a fundamental level.

#### 4. Conclusion

Clahsen and Neubauer (2010) argue that second-language speakers do not decompose complex words, whereas native speakers do. Their research lacks generalizability, however, since other experiments have found different results. They compare German and Polish speakers of German. Studying only two L1s cannot provide generalizable results, especially considering the extensive border contact between Germans and Poles that may influence Polish speakers' understanding and acquisition of German. This research proposal has outlined a study designed to increase the possible generalizability of experiments like Clahsen and Neubauer's (2010) based on a primed lexical decision task. We plan to realize this increase in generalizability by analyzing several languages simultaneously and attempting to reduce any possible influence of language contact by using two families of geographically distant and genealogically unrelated languages, thereby attaining a higher degree of validity than previous studies in the field.

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