

Alexeeva, S., Frolova, A., & Slioussar, N. (2017). Data from Russian Help to Determine in Which Languages the Possible Word Constraint Applies. *Journal of Psycholinguistic Research*, 46(3), 629–640.

Segmenting continuous speech signal into words is one of the central problems in the domain of language comprehension. Several probabilistic acoustic cues to word boundaries have been identified so far, including certain phonological characteristics, metrical and phonotactic information (e.g. Cutler and Norris 1988; Gow and Gordon 1995; Mattys and Melhorn 2007; McQueen and Cutler 2001; McQueen 1998, 2007). All these cues rely on language-specific properties, which provokes the question whether any segmentation principles are universal. One principle that was suggested to be universal is the Possible Word Constraint, or PWC (Norris et al. 1997, 2001).

The PWC was initially formulated for English where all words contain a vowel. It says that word boundaries should not be postulated if a remaining segment contains only consonants since this segment is not a possible word. Most studies testing the PWC use the word-spotting task (Cutler and Norris 1988). In this task, participants are asked to listen to nonsense strings and to respond whether a real word is embedded in them. Reaction times (RTs) and accuracy rates are measured. In the study in which the PWC was first suggested, Norris et al. (1997) demonstrated that it was harder for English speakers to recognize the word *apple* in a string like *fapple* than in a string like *vuffapple*. In both cases, the implied residue (we will further call it *context*) does not correspond to an existing English word. However, it could be a word in the latter case, but not in the former: a syllable is a possible word, while a single consonant is not. The PWC capitalizes on this to explain different performance in the two conditions.

Subsequent experiments on different languages confirmed the validity of the Possible Word Constraint. However, several findings pose a challenge to it, namely studies on Slovak and Tarifiyt Berber. In these languages there are words that contain only consonants. The results of these studies did not converge: the authors of the former concluded that the PWC operates in Slovak, but one-consonant words are an exception, while the latter indicated that the PWC does not apply in Tarifiyt Berber.

This could be due to the differences between the two languages: among other things, Slovak has several single-consonant words, while in Tarifiyt Berber, words without vowels or sonorant consonants are more diverse and widespread. El Aissati et al. (2012) arrive at this conclusion trying to reconcile the findings from Tarifiyt Berber and Slovak. “The PWC holds even when a language allows a small set of vowelless words, as in Slovak; it is suspended for the consonants that are these words, but it applies for other consonants” (p. 82). However, it does not hold in a language like Tarifiyt Berber where complete multiword sentences without vowels are possible.

In the present study, we claim that another factor could also play a role. Slovak has fixed word stress on the first syllable. In the first experiment reported by Hanulíková et al. (2010), target words did not keep their stress in the syllabic context, and this context was the most difficult for the participants, which contradicts the PWC. In the second experiment, cross-splicing was used so that target words could preserve their normal stress across all experimental conditions. As a result, one-consonant word contexts were the easiest for the participants, but other one-consonant contexts were harder than syllabic contexts.

As it seems to us, both designs are potentially problematic because syllabic contexts contain a strong cue against positing a word boundary in the former case and calling for a boundary in the latter. This is an independent factor that cannot be controlled for. Therefore, we decided to conduct an analogous word-spotting experiment on Russian, a language that also has one-consonant words, but flexible stress. We selected two-syllable target words with the stress on the second syllable, so they could keep their stress in all experimental conditions without any further manipulations.

The results of this experiment indicate that the PWC does not operate in Russian: participants responded significantly faster in all single-consonant contexts (containing one-consonant words and non-words) than in syllabic contexts. In the second follow-up experiment,

we aimed to find out whether there would be any differences between single-consonant word contexts. However, their properties (being proclitic or enclitic, phonotactically legal or illegal before words beginning with sonorants and v) did not significantly affect the word-spotting performance.

We do not think that based on our results, the PWC should be abandoned altogether. As we demonstrated in the previous studies, the principle is supported by experimental results from many languages including those that have more specific constraints on possible words. For example, Sesotho has no one-syllable words, but in word-spotting experiments (Cutler et al. 2002), only the difference between single consonant contexts and one or two syllable contexts was detected, as the PWC suggests, but no difference between one syllable and two syllable contexts.

Therefore, we conclude that the PWC is operant in the majority of languages and does not apply only in a small set of exceptions. The crucial question is how this set is defined. Based on their own study and the data from Slovak, El Aissati et al. (2012) argued that the PWC does not hold altogether in the very few languages like Tarifit Berber where a wide variety of vowelless words are possible. In languages like Slovak, the PWC holds, only an exception for the relevant vowelless words is made.

The present study suggests that the PWC does not operate in any languages where words without vowels are possible. A different pattern observed in the Slovak study might be explained by the prosodic properties of this language. In our view, this is consistent with the nature of the PWC, which is a very general, very basic principle applying on the prelexical level—most probably, this is what makes it effective for segmentation. Previous studies show that the PWC is not modified in the languages where more specific constraints on possible words can be formulated, such as the ban on one-syllable words in Sesotho or on open syllables with a lax vowel in English. Our findings suggest that it is also not modified to take some possible vowelless words into account—if a language has such words, the PWC does not apply in it.

