

Breaking well – Syllabification strategies in German speakers

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We were interested in the role of two principles of syllabification in synchronic grammar of German speakers. The first principle under investigation that is known to drive syllabification in the world's languages is the Maximal Onset Principle (MO). It refers to the tendency that onsets are preferred over codas and, as a consequence, that consonants are preferably syllabified in onsets rather than in codas (Selkirk, 1982). The second principle playing a role in syllabification is the Syllable Contact Law (SCL, Vennemann, 1988). It covers the cross-linguistic preference for falling sonority across a syllable boundary compared to rising sonority. The phonotactics of German allows both structures that are in agreement with these principles as well as structures that are in disagreement; there are forms like *ko[n.tr]a* “contra” and *A[nt.l]itz* “face”, where the first form is conform to MO and the latter is not and there are forms like *A[t.l]as* “atlas” and *A[l.t]ar* “altar”, where the first form is conform to the SCL and the latter is not. German allows simplex and complex onsets and codas as well as falling and rising sonority across the syllable boundary (Wiese, 1996). This raises the question as to the strength with which both principles apply. In a first experiment we compared the relative strength of the two principles of syllabification in German speakers. In a second experiment we investigated the SCL's role in their learning behavior.

In the first experiment 50 subjects were exposed to artificial language items with two syllables containing medial consonant sequences, e.g. VC.CV. The experiment was designed as a word game (Treiman, 1983) in which subjects were asked to insert a vowel between the two syllables of a given nonce. Crucially, the 50 target items contained a sequence of three consonants word-medially and the possible output forms VC_əCCV and VCC_əCV were interpreted to be indicative of the syllabification of the participants: VC.CCV or VCC.CV. The first half of the target items contained clusters consisting of a sonority fall followed by a rise (i.e. alto). For these types of clusters (condition 1) both principles predict a preference for an answer like VC_əCCV. The other half of the target items contained clusters consisting of a sonority rise followed by a fall (i.e. akʃpo). For these types of clusters (condition 2), MO predicts a preference for an answer like VC_əCCV, while the SCL predicts a preference for the other possible answer VCC_əCV, see table 1. Results indicate that in condition 1 sequences there is a clear preference (84%) for the output form which is preferred by both MO as well as the SCL. In condition 2 sequences the majority of answers (73%) indicates a preference for syllabifying clusters on the basis of MO and the minority on the basis of the SCL (see table 1). The overall preference for a syllabification preferred by MO persists even if only clusters are taken into account which are extremely rare or even non-existent in German according to a corpus (Shaoul & Tomaschek, 2013). All results have been confirmed by means of logistic regression. The results imply a strong role of the Maximal Onset Principle for German speakers. Even though their language allows for relatively complex syllable structures, the preference for maximized onsets is active in synchronic grammar. This is in line with a study by Berg & Niemi (2000) who found in a cross-linguistic comparison between Finnish and German that Germans use a strong onset maximization strategy in syllabification in items with simpler clusters. Furthermore, a recent study by Finley (2017) argues that English speakers learn an artificial language better if the output improves the MO configuration compared to a language which does not.

To put the influence of the SCL to the test we conducted an online study on the SCL's influence on learning. While two control groups did not receive any training we tested the learning performance of two learning groups that were trained with two artificial patterns. The learners in group 1 received input about a metathesis that improved the SCL

configuration. They were trained with pairs like $fe[p_1.l_2]i \sim fe[l_2.p_1]ini$. The learners in group 2 received input about a metathesis that worsened the SCL configuration. They were trained with pairs like $do[l_1.p_2]u \sim do[p_2.l_1]unu$. Items were designed in a way that an additional vowel harmony pattern distracted from the metathesis pattern. All learners and the control group were tested by means of a forced choice test with a choice between a form with a good SCL configuration $pu[l.t]onu$ vs. a form with a bad configuration $pu[t.l]onu$ (plus the corresponding non-harmonic forms) after being provided with the first member of the pair ($pu[t.l]o$ or $pu[l.t]o$). While the control groups clearly preferred forms with no metathesis and reached only chance level regarding the vowel harmony pattern as expected, the learning groups do not show a difference in their learning behavior (mean accuracy of 76% vs. 77%). They chose the expected answer to the same extent (see table 2).

Both experiments show that in syllabification German speakers rely more on MO than on the SCL.

	possible syllabification pattern	predicted by SCL	predicted by MO	answers in %
Condition 1 altro (fall-rise)	al.tro	+	+	83.8%
	alt.ro	-	-	16.2%
Condition 2 akfpo (rise-fall)	ak.fpo	-	+	73.2%
	akf.po	+	-	26.8%

Table 1: Examples of target items of the two conditions in exp. 1 and their possible syllabification patterns, both predicted by the two theories as well as the observed frequencies.

	Number of subjects	Learning material	Test result: mean accuracy
Learner group 1	31	$fep.li \sim fel.pini$	76%
		$tuk.mo \sim tum.konu$	
Learner group 2	37	$fel.pi \sim fep.lini$	77%
		$tum.ko \sim tuk.monu$	
Control groups	13	-	52% forms according to VH, 10% with metathesis

Table 2: Examples of training material as well as the results of the test phase in exp. 2.

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