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Syllable Breaks in Swiss German: Implications for Hyphenation

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Abstract

Intuitions about syllable structure have direct implications for the practical problem of hyphenation. Bruce Derwing's work on the syllable, spelling rules, and the influence of orthography in English phonological judgments is extended here to an unwritten language without accepted conventions of hyphenation. Predictions based on different principles of syllable division and standard German hyphenation rules vary for words with certain syllable forms. The judgments of syllable breaks in bisyllabic Swiss German words made by both naïve Swiss children and Swiss translation college students are well predicted by the obligatory onset principle described in the new German rules. These rules, with a minor adjustment for intervocalic stop-liquid clusters allowed word-initially, are recommended for Swiss German hyphenation.

Syllable Breaks in Swiss German: Implications for Hyphenation

Few dispute the psychological reality of the syllable, or its usefulness as a linguistic construct to describe phonological processes (see Kahn, 1976, for a good review), but many have discussed the difficulty in determining its boundaries in multisyllabic words. Bruce Derwing and his lab associates started empirically investigating this area of phonological knowledge almost two decades ago (e.g. Derwing, 1987; Derwing, Dow, & Nearey, 1987; Dow, 1987; Derwing, 1992a; Wiebe & Derwing, 1992). Using innovative techniques with a variety of languages (including Swiss German), Derwing (1992a; 1997) assessed two principles of syllable structure. The first of these is the so-called OOP or obligatory onset principle (as suggested by Pulgram, 1970, and espoused by Hooper, 1972, as universal), whereby the consonant immediately preceding a vowel is the onset for that vowel's syllable, as long as it is phonotactically allowed. The second principle, the MOP or maximal onset principle, is an extension of the first (see Kahn, 1976, and Selkirk, 1982) and allows as many consonants as possible to precede the vowel, subject to phonotactic constraints for word-initial onsets. Another possibility is that syllables are open, with all intervocalic consonants linked to the following vowel.

It might be claimed that indeterminacy of formal syllable boundaries is never a serious problem for native users of a particular language until they are confronted with the decision of where to divide a word at the end of a line of text. For the notoriously complicated case of the English language (see Derwing, Priestly, & Rochet, 1987, or Hofrichter, 1989), entries in dictionaries and/or text editing programs prove helpful for hyphenation, if not always consistent. Gallmann and Sitta (1996) list hyphenation as the second most frequent problem in German spelling and punctuation. As part of a general orthographic reform, new German hyphenation rules were revised in 1996 to be more consistent with spoken syllables (see Duden, 1967, for the old rules; Duden, 1996 or

Hellman, 1998, for the new rules). This, of course, assumes that native speakers of standard German are actually in agreement as to what constitutes the boundary of a particular spoken syllable. Native speakers of non-standard German may have different intuitions. In any case, all writers have recourse to the formal hyphenation rules to resolve differences in standard written German.

For linguists, however, a potential problem in investigating syllable structure and boundaries is the influence of exactly those hyphenation rules on speakers' syllabification judgments. Educated adults are normally aware of the 'correct' syllabification and may provide little more than a measure of their mastery of hyphenation conventions when performing syllable divisions. The influence of orthography on linguistic intuitions has been of concern for many years (see Derwing, 1992b, for an excellent review) and cannot be excluded in the case of syllable boundaries. Some studies have examined children's responses in an effort to avoid the orthography/phonology confound (for example, Read, 1971; Dow, 1987), although then the issue of phonological development arises. An unwritten language, the so-called German dialect¹ of *Schwyzertütsch* or Swiss German offers the chance to turn the problem around and to access native speaker intuitions about syllable breaks using a hyphenation-type task.

The Special Case of Swiss German

German is one of the four official languages² in Switzerland. However, the situation is further complicated by what Kolde referred to as *mediale Diglossie* (1981; also discussed by Haas, 1992), because Swiss German is spoken and German is written. Although Swiss German is sometimes written (largely but not exclusively using German phoneme-grapheme correspondences; see Weber & Bächtold, 1983, for the Zurich dialect), its use is restricted to local advertising, electronic text messages (especially among younger people), and a small albeit persistent group of authors and supporters. Not only does this result in a literate population of speakers with no preconceptions of orthographic standards for their native language, it raises the interesting question of whether intuitions about syllabification help or hinder Swiss German speakers in hyphenating standard German words. Hyphenation is introduced to Swiss students in the second or third year of primary school and rules are reviewed up to the end of secondary school. In a very practical sense, information about syllable breaks has implications both for the education of Swiss students in standard German and in the writing of hyphenation rules for Swiss German.

Preliminary work on Swiss German syllable structure, using the oral 'pause-break' technique in Derwing (1992a), demonstrated a clear tendency for single intervocalic consonants and the final consonant of intervocalic clusters to be treated as syllable onsets (including affricates) independent of the length of the first vowel. The obligatory onset principle was supported, but because of the particular items used it was not possible to adequately assess the maximal onset principle. A subsequent examination of the data showed that the MOP did not hold for the /t/ clusters (instead, 96% of the preferences were for the V]tV break) or for /gl/ clusters (only 33% preferred V-glV), yet /dl/ clusters seemed possible (58% V-dlV), despite not being allowed in word-initial position. The superiority of the OOP remained to be clarified.

The Present Study

The recent orthographic reform of written German, despite its avowed goal of being simpler for users, has not been without its opponents. For more than a year before the new German orthographic rules took effect (officially on August 1, 1998), the media in Germany, Switzerland, and Austria were abuzz with ridicule and denunciations. The so-

called simplifications did not offer enough to counterbalance the effort of (adults) learning new rules, claimed some authors and publishers. Even the judicial system became involved in the debate: in the German Bundesland of Hesse, for example, a court decided that the proposed reform would be stopped in the local school system (NZZ, 1997), although the next year the federal court rejected a complaint that the cultural ministers' imposition of the orthographic reform was unconstitutional (BVerfG, 1998). In Switzerland, the cantonal departments of education accepted the reform and introduced it in the 1998/99 academic year (EDK, 1996; Gallmann & Sitta, 1996). Claims and counterclaims have been made, reminiscent of the controversy surrounding the last orthographic reform in 1901 (see Hofrichter, 1989, or Gallman & Sitta for a review). By the year 2000, the reform seemed to have been accepted, however grudgingly, by most newspapers, publishing houses and text editing systems if not all users (Johnson, 2005, presents a sociolinguistic analysis of the reform program). With the exception of Lindauer's (2002) examination of the relationship between Swiss German syllabification and the spelling of fricative geminates, the questions of whether the reform's simplifications reflect speaker knowledge or are simply artificial exercises in rule elegance remain to be addressed empirically.

Although only one aspect of the orthographic reform, the new hyphenation rules are truly simple (the OOP for bisyllabic words with intervocalic clusters) and eminently testable. The old rules are based roughly on the OOP, with some deviations related to earlier printing technology. Of special interest for the Swiss German velar affricate /kχ/, which occurs word-initially, medially, and finally, is the old rule concerning the digraph ck: it was realized as k-k (e.g. *Zucker* became *Zuk-ker* at line breaks). The letter c does not occur in native German words without a following k or h (e.g. *sicher*), so was not on a separate printing block. The st cluster (the closest equivalent to Swiss German /ʃt/ in all positions) was never separated (e.g. *dur-stig* and *last-bar*), again because it occurred on a single block. A final inconsistency in the old rules with respect to the OOP was that the morphological structure of loan words with certain clusters (e.g. gn, bl) was retained in the hyphenation (e.g. *Magnet* as *Ma-gnet*, *Publikum* as *Pu-bli-kum*).

Motivated in part by the controversy surrounding the new rules, and a more general interest in the phonology and syllable structure of Swiss German, a simple experiment with bisyllabic Swiss German words was designed and carried out in 1997 to assess the psychological reality of the models of syllable structure and hyphenation rules discussed above. The predictions of OOP and new hyphenation rules (OOP/New model) are identical for native words, with a single consonant preceding the second vowel (i.e. *Sib-ner* and *Chisch-te*). The MOP model predicts a larger syllable onset where phonotactically permissible (i.e. *Sib-ner* but *Chi-schte*). The Open syllable model predicts that all intersyllabic consonants are associated with the second vowel (i.e. *Si-bner* and *Chi-schte*) and the Old hyphenation rules treat ck and st clusters as exceptions. Swiss adults conversant with German rules might generalize these to Swiss German words, but children who have had no training in hyphenation should have only native speaker intuitions about syllable structure to guide them in dividing words.

Method

Participants. Twenty-two grade two children, all native speakers of the Zurich dialect who had had approximately six months of instruction in standard German³ but no introduction to hyphenation, and 22 final-year adult students of the Zurich translation college (5th and 6th semester), all native speakers of northern Swiss German dialects, took part.

Materials. A list of 28 native Swiss German bisyllabic words was designed in

conjunction with a Swiss primary schoolteacher to be appropriate for the children (see Table 1). Seven different types of intervocalic consonants and consonant clusters were of interest for various reasons. All four models made the same predictions for words with single intervocalic consonants (VCV), included here as a control. Words with intervocalic /χ/ (VchV) were a separate category, to assess any potential orthographic interference of digraph consonants, as were words with intervocalic /kχ/ to assess the ck prediction of the old hyphenation rules (Old Vk-kV vs. New V-ckV). The OOP/New model differs from the MOP and Open models in its predictions for VschCV clusters (Vsch-CV vs. V-schCV), as do the old and new hyphenation rules for st. The exception of the old hyphenation rules concerning loan words was extended here to investigate phonotactically permissible consonant clusters which also differ for MOP and OOP/New. Consonant-liquid clusters permitted word-initially (VCLV) were compared to consonant-liquid and consonant-nasal clusters which are not allowed word-initially (VCNC). Finally, phonotactically disallowed consonant clusters without liquids (VCCV) were included for the purpose of comparison. For each word type there were four words with each of /i, o, u, æ/ in the first syllable and /i/, /ʌ/, or /ɛ/ in the second syllable.

Task. Because of the concern that the children would have difficulty with the short-term memory demands of the Derwing (1992a) pause-break task (pilot attempts with 8-year-olds were unsuccessful) and the primary interest in syllable breaks in written words, the present study employed the slash-insertion technique used by Treiman and Danis (1988) in investigating English syllabification. The words (with spellings from Weber & Bächtold, 1983) were presented in a single random order. The classroom teacher explained that after she said each word, the students should draw a line through the word on their sheets to indicate where the best place was to divide it. She demonstrated this procedure on the board by asking where the compound Swiss German word *Schuelhuus* (schoolhouse) would best be divided and, when prompted by the students, drew a line between the *l* and the *h*. She then said each word in the list aloud, waiting for the students to draw a line before saying the next word. The students kept pace with the teacher.

Analyses and Results

The responses were scored as matching the predictions of a model (correct) or not (incorrect).⁴ Although no model makes the same predictions for all the word types, there is considerable overlap. For ease of representation, the preferred break for the different words types is shown with the percentage preference for the children and adults and whether each model agrees or disagrees (Table 2). The scores for the adults and children were significantly different for two types of words (V-chV and Vsch-CV; *t*-tests for independent samples, $p < .05$).

Comparisons of models and groups. Both the OOP/New and MOP models correctly predict the preferred break for six of the seven word types. In fact, the OOP/New scores are significantly higher than any of the other models for the adults, and significantly higher than Open or Old scores for the children (see Table 3; all comparisons are paired sample *t*-tests, $p < .01$). There is no significant difference between the OOP/New and MOP scores for the children. The MOP scores are significantly higher than the Open and Old scores for the children and higher than the Open scores but not the Old scores for the adults.

Comparisons of word types with each model. To investigate differences between groups and types of word, the correct scores for each type of word for each group of speakers were analyzed using a separate partially repeated measures ANOVA for each model. With the most successful model (OOP/New), the group factor was significant, because the adults had significantly higher OOP/New scores than the children ($F(1,42) = 9.2, p < .001$). There

were significantly different scores for the various types of words ($F(6,252) = 32.2, p < .001$), and the intervocalic consonants and clusters were treated differently by the two groups (interaction $F(6,252) = 3.4, p < .001$; see Figure 1). The children were less consistent with V-chV and Vsch-CV words than the adults were (children 78% and 67%; adults 91% and 85%, respectively), and the most dramatic difference was with the VC-LV words (children 17%; adults 47%). There were no differences among the single intervocalic consonants for the children, but the adults' score for the V-ckV words (69%) was significantly lower than those of the other single intervocalic consonants (V-CV 93%; V-chV 91%). The Vsch-CV scores were lower than the VC-CV scores for the children (67% vs. 83%) but not for the adults (85% vs. 93%). The VC-LV scores (children 17%, adults 47%) were significantly lower than any of the other clusters for both groups. The VC-NV scores were lower than those of the VC-CV words for both groups (all significant comparisons were paired t-tests with $p < .05$).

The ANOVA on MOP scores showed no difference between the groups, but a significant effect of word type ($F(6,252) = 42.7, p < .001$) and interaction of group with word type ($F(6,252) = 3.9, p < .001$). The pattern for the MOP scores with single intervocalic consonants was the same as discussed above for OOP/New, with a difference between children and adults for V-chV words. There were no significant differences between the two groups for words with intervocalic consonant clusters. The differences between the OOP and MOP models lay in the predictions for VschCV words (OOP Vsch-CV; MOP V-schCV), where OOP was more successful, and for VCLV words (OOP VC-LV; MOP V-CLV), where MOP was more successful (see Figure 1). The V-schCV MOP scores were lower than those of any of the other clusters for both the children and adults (31% and 14%, respectively). The V-CLV scores (children 68%, adults 52%) and VC-NV scores (children 60%, adults 73%) were not significantly different from each other for either group, but were both significantly lower than the VC-CV scores for both children (83%) and adults (93%).

With the Old rule analysis, the adults' performance was better than the children's ($F(1,42) = 21.2, p < .001$), and there was a significant difference in the word types ($F(6,252) = 95.8, p < .001$) but no interaction. The Old rules predicted results for the VckV words very poorly: only 2% of the children's and 22% of adults' responses were the predicted Vc-kV pattern, significantly different from each other and the lowest of the single intervocalic consonants for both groups. There was also little to support special treatment of st (32% correct overall for both groups with VschCV words). The Open analysis made poor predictions for all of the consonant clusters except for V-CLV words, as discussed in the MOP analysis above: these scores were significantly higher than the others for both the children and adults.

Discussion

There is unequivocal support in this study for the superiority of the new German hyphenation rules over the old rules for Swiss German: the new rules were better than the old at predicting the treatment of intervocalic ck and /ʃt/.⁵ However, both the old and new German hyphenation rules failed to predict the adults' lack of preference with phonotactically permissible stop-liquid clusters (47% VC-LV and 53% V-CLV) and the children's apparent preference for retention of the cluster (only 17% VC-LV but 68% V-CLV). All of the words used in the present study were native, so the old hyphenation rule exception for loan words with these clusters does not apply.⁶ In light of these results, it must be recommended that Swiss educators focus on stop-liquid clusters in order to avoid transfer of native Swiss German intuitions which could result in erroneous hyphenations in

standard German. A Swiss German dictionary would be well advised to incorporate a special clause for stop-liquid clusters into its hyphenation rules in order to minimize artificiality.

Among the syllable models, it is more difficult to claim a clear winner. There is little in the present results to support an open syllable analysis of Swiss German: open syllables were preferred with single intervocalic consonants, as predicted by the other models, but not with intervocalic clusters other than the stop-liquid blends. The OOP/New and MOP models predicted the syllable break judgments of native speakers well, but both had shortcomings. The OOP/New model fell short on the words with stop-liquid blends allowed word-initially. Whereas the MOP model correctly predicted that these stop-liquid clusters would remain together, it did not predict that sibilant-stop clusters would be split, consistent with the results found in Derwing's (1992a) oral pause-break study.

The adults had higher scores than the children for the VchV and VschCV words. Other studies (e.g. Read, 1971; Dow, 1987; Ho & Bryant, 1997) have found that phonological judgments become more consistent with age, education, and/or orthographic knowledge. Adults may well be more convinced than children that the digraph ch represents a single phoneme. The higher scores for the adults with sch-clusters is suggestive of a developmental change as to what constitutes a 'single' consonant. Children may not be consistent until they are literate (or 'discover' the system in German orthography, see Eisenberg & Feilke, 2001): clusters like /ʃt/ might be perceived as single units similar to the affricates /tʃ/ and /ts/ (German tsh and z). A hint of orthographic influence in the present results was the slight tendency of adults to split ck clusters according to the old hyphenation rule (22%); two or three even changed the ck to k-k.

Obviously an adequate model of syllable structure for Swiss German must take special account of intervocalic stop-liquid clusters. It is clear that more research needs to be done with intervocalic liquids, nasals, and more complex clusters in order to adequately describe syllable boundaries. Although the OOP and MOP models examined in the present study were found wanting, the so-called sonority hierarchy (e.g. Selkirk, 1984, or Derwing & Nearey, 1991, on 'vowel-stickiness'), syllable laws (e.g. Vennemann, 1988), or descriptions of German syllable structure within the framework of lexical phonology (e.g. Hall, 1992) may be useful in constructing testable models of Swiss German syllable structure.

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Footnotes

¹Really a number of different local dialects, all commonly referred to as 'Swiss German'.

²The others are French, Italian, and Rhaeto-Romantsch.

³The language of instruction in kindergarten and the first grade was the Zurich dialect of Swiss German.

⁴A small number of items were not marked with a line (6 out a possible 610 responses) by the adults.

⁵The Swiss German /ʃt/ might not be directly comparable to the German st (which is realized as /ʃt/ in morpheme-initial position, but as /st/ in medial and final position), since it is spelled scht.

⁶The argument that knowledge of this rule might have confused the adults cannot explain the children's results.

Table 1

Intervocalic Consonants, Codes, and Model Predictions for Sample Words

Intervocalic consonant	Code	Model predictions			
		Open	MOP	OOP/New	Old
$C_{1/2/3}$	VCV	<i>Ri-gel</i>	<i>Ri-gel</i>	<i>Ri-gel</i>	<i>Ri-gel</i>
χ	VchV	<i>si-cher</i>	<i>si-cher</i>	<i>si-cher</i>	<i>si-cher</i>
$k\chi$	VckV	<i>spi-cke</i>	<i>spi-cke</i>	<i>spi-cke</i>	<i>spic-ke</i>
$C_2C_{1/3}$	VCCV	<i>li-sme</i>	<i>lis-me</i>	<i>lis-me</i>	<i>lis-me</i>
$C_1C_{3/4}^a$	VCNV	<i>Si-bner</i>	<i>Sib-ner</i>	<i>Sib-ner</i>	<i>Sib-ner</i>
$C_1C_4^b$	VCLV	<i>Bi-ble</i>	<i>Bi-ble</i>	<i>Bib-le</i>	<i>Bib-le</i>
$[\text{C}_1]$	VschCV	<i>Chi-schte</i> <i>Wä-schpi</i>	<i>Chi-schte</i> <i>Wä-schpi</i>	<i>Chisch-te</i> <i>Wäsch-pi</i>	<i>Chi-schte</i> <i>Wäsch-pi</i>

Note. Differences in model predictions are indicated in bold. C_1 : stop. C_2 : fricative, excluding / χ / for VCV and / ʃ / for VCCV. C_3 : nasal. C_4 : liquid.

^a including alveolar stop-/l/ clusters. ^b excluding alveolar stop-/l/ clusters.

Table 2

Preference for Children and Adults for each Word Type and Agreement (✓) or Disagreement (X) with Model Predictions

Preference	Agreement with model predictions					
	Children	Adults	Open	MOP	OOP/New	Old
V-CV	88	93	✓	✓	✓	✓
V-chV	78	* 91	✓	✓	✓	✓
V-ckV	85	69	✓	✓	✓	X
VC-CV	83	93	X	✓	✓	✓
VC-NV	60	73	X	✓	✓	✓
V-CLV	68	52	✓	✓	X	X
Vsch-CV	67	* 85	X	X	✓	X

Note. Values represent mean percentages of preferred break.

* significant difference between children and adults ($p < .05$)

Table 3

Syllable Models Scores for Children and Adults

Model	Children	Adults	Overall
OOP/New	68	79	74
MOP	71	69	70
Old	52	64	58
Open	57	50	54

Note. Values represent mean percentages of successful predictions.

Figure Caption

Figure 1. OOP/New and MOP percent correct for each syllable type by group.

Figure 1.

