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Speech Rhythm and Speech Rate in Crosslinguistic Comparison

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The methodological problem

It is widely accepted that languages can be classified into (two or) three rhythm classes: Stress-timed (e.g. Dutch, English), syllable-timed (e.g. Italian, Spanish), or mora-timed (Japanese). But it is difficult to set out clear rules for assigning a language to such categories. After the rejection of the isochrony hypothesis, recent work (e.g. Ramus 2002) mainly focuses on durational patterns of vocalic and intervocalic intervals and their variability. In this paper Ramus suspects that differences in rhythm might be closely related to differences in speech rate but that it is "almost illusory" to find a valid measure of speech rate across languages. Roach (1998) argues that the n of syllables is a much more reliable measure than the number of words, but that one "should bear in mind that different languages have very different syllable structures". Is it useful to include the problematic variable "speech rate"?

The more syllables, the simpler the syllables

Our studies (cf Fenk-Oczlon & Fenk, 1999; Fenk & Fenk-Oczlon, 2006) suggest viewing speech rhythm as something coming about by a faster or slower succession of syllables of higher or lower (variability of) complexity. Native speakers of 34 (18 Indo-European, 16 non-Indo-European) languages were asked to give written translations of 22 simple sentences (one proposition per intonation unit) into their mother tongues and to determine the number of syllables in careful speech. The number of phonemes was determined with the help of grammars. Statistical evaluations revealed a significant negative crosslinguistic correlation ($r = -.75$) between n of syllables per clause and n of phonemes per syllable. In Table 1 the endpoints of these variables are marked by Dutch (lowest n of syllables per clause, highest n of phonemes per syllable) and by Japanese (the inverse relations). These results point to a restricted size of the superordinate rhythmical unit, the clause.

Differences in tempo

Below the clause level the syllable is the relevant unit as to rhythmic patterns. In our controlled set of sentences the n of syllables could be related to their complexity (see Roach's above arguments) without the problematic (cf Roach, 1998) measurements of duration. Since the nucleus of syllables is most commonly a vowel, the n of syllables corresponds with vocalic and intervocalic intervals as measured by the Ramus group. Results in Table 1 exhibit speech rhythm as a continuum starting with languages showing a low tempo, i.e. a low number of syllables or pulses per clause. This "low frequency band" is characterized by a high mean complexity of syllables allowing a high variability of syllable size, from simple CV syllables to syllables with large consonant clusters (CCCCVCCCC). These languages may be associated with stress-timed rhythm. They are followed by those languages with the higher tempo of the syllable-timed rhythm, with Japanese occupying an extreme position: It has almost exclusively CV- and V-syllables, the highest n of syllables (twice as many as Dutch) and the highest n of phonemes. All that might explain its staccato-like sound in the ears of speakers of stress-timed languages.

Table 1: Characteristic values from 12 out of 34 languages

	syll/clause	phon/syll	phon/clause
Dutch	5.045	2.9732	15.000
German	5.500	2.8429	15.636
Slovenian	5.500	2.2645	12.455
Russian	5.682	2.3838	13.545
English	5.772	2.6854	15.500
Turkish	6.455	2.2674	14.636
Yoruba	6.591	1.9586	12.909
Greek	7.545	2.0122	15.182
Spanish	7.955	2.0913	16.636
Annang	8.227	1.9227	15.818
Chiquitano	9.136	2.0199	18.455
Japanese	10.227	1.8756	19.182

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