Tonal density
Functional load of tone

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Tonal density

- First suggested by Gussenhoven (2004), supported by Hyman (2009, 2011).
- We suggest a simple mechanism of calculation of the tonal density by the means of the Tonal Density Index: the number of tonemes per 100 syllables (or 100 morae).
- The main difficulty: to define what is a toneme in each language.
- A unified set of notions and terminology is necessary for a uniform analysis and interpretation of different tonal systems, so that the quantification of the tonal density might be doable.

The rationale of the tonal density

- If a toneme = a tone (or tonal contour) which has a distinctive function, then the number of tonemes per fixed segment is meaningful.
- The tonal density directly reflects the functional load of tone in a language.

Other methods for calculation of the functional load of tone:

- Calculation of minimal pairs in a dictionary.
- Experiments with native speakers to evaluate the tonal notation in writing system (Roberts et al. 2020).
- Change of enthropy and minimal pair count (Hall et al., 2016).

Minimal pairs in a dictionary

- Shortcomings:

- number of minimal pairs depends on the completeness of a dictionary;
- tonal inflection is normally not represented in the dictionary.

To my mind, these shortcomings (especially the second one) invalidate this method.

Experimental studies on reading errors (Roberts et al. 2020).

- Results are interesting, and often with good prospects.

Some shortcomings, difficult to circumvent:

- Such experiment is costly, time-consuming and logistically complicated.
- It is impossible for non-written languages.
- Results of such an experiment are seriously influenced by side factors: reading skills of the participants; adequacy of the orthography; choice of a text...

Change of enthropy and minimal pair count (Hall et al., 2016)

- Applied in the Phonological Corpus Tools
- http://corpustools.readthedocs.io/en/latest/index.html
- The most promising method up to date.

Difficulties of this method:

- Rather voluminous text corpus (10 000 words) phonetically annotated, difficult to compile for understudied languages.
- Evaluation of the functional load of tone may proceed well for the languages with « simple » tonemic structure, but it encounters serious difficulties with respect to the languages with more intricate tonal systems.

Compatibility with the „Tonal Density method”

- The “tonal density method” seems to be compatible with the “Change enthropy & minimal pairs” method.
- An analysis of a individual tonal system (especially, identification of toneme in a language) can be viewed as a preliminary (and lest costly) stage before its analysis according to the “Change enthropy & minimal pairs” method.

Strong sides of each method

- “Change enthropy & minimal pairs”:

- possibility of a fine-grained analysis of each tone (toneme); a comparision of functional loads of tones and other phonological units (consonants, vowels…).

- “Tonal density”:

- based on a tonemic analysis, necessary as a preliminary stage;
- a relatively simple and low-cost procedure,
- as a result, it can be easily applied to a large number of languages,
- allows an easy quantitative comparison of the functional load of tone in different languages.