

The influence of syntactic, word-bigram, and word frequency measures of language redundancy on prosodic phrasing in English

Alice Turk¹ and Tina Bögel²

University of Edinburgh¹, University of Konstanz²

a.turk@ed.ac.uk, Tina.Boegel@uni-konstanz.de

Turk (2010) hypothesized that prosodic boundary structure is planned in order to achieve smooth signal redundancy (Aylett 2000, Aylett & Turk 2004). On this view, speakers manipulate the acoustic salience of boundaries between words in order to make the recognition of each word in an utterance equally likely. Planned boundary strength is hypothesized to relate inversely to language redundancy, i.e. the likelihood of recognition based on non-acoustic information, including the likelihood of a particular syntactic structure, likelihood based on semantic and pragmatic context, patterns of word usage, and length. In this paper, we test the influence of syntactic, word-bigram, and word frequency measures of language redundancy (assessed via CELEX, Baayen et al. (2001); Google; and the ICE-GB corpus, ICE-GB (1998)) on the placement of intonational phrase boundaries in English. Materials consisted of 16 sets including 2 to 4 sentence pairs combining frequent and infrequent verbs and nouns.

All utterances were ambiguous in syntactic structure, allowing for the adjective to

Freq.V - freq N	When the water turned smooth balls were bobbing on it
Freq.V - infreq N	When the water turned smooth baulks were bobbing on it
Infreq.V - freq N	When the butter was churned smooth balls were bobbing on it
Infreq.V - infreq N	When the butter was churned smooth baulks were bobbing on it

either combine with the preceding verb (infrequent structure) or the following noun (frequent structure). 23 speakers read each sentence, and an expert judged the location of the intonational phrase boundary produced within the Verb-Adj-Noun sequence. A second listener judged a subset (40%) of the data, and 100% agreement was obtained.

Results support the Smooth Signal Redundancy view that prosodic boundary location is influenced by language redundancy. Prosodic boundaries were more likely to occur before the adjective when a particular A-N sequence (e.g. *smooth balls*) was more frequent than the V-A sequence (e.g. *churned smooth*). Results also showed that the influence of syntactic frequency (V-A infrequent vs. A-N frequent) depended on the relative frequency of the verb, but not of the noun: With an infrequent verb, prosodic phrasing was more likely to follow the frequent (A-N) syntactic pattern. And, with a frequent verb, the parsing was more likely to follow the adjective.

References

- Aylett, M.P. 2000. *Stochastic suprasegmentals: Relationships between redundancy, prosodic structure and care of articulation in spontaneous speech*. Ph.D. dissertation, University of Edinburgh.
- Aylett, M. and A. Turk. 2004. 'The smooth signal redundancy hypothesis: A functional explanation for relationships between redundancy, prosodic prominence, and duration in spontaneous speech'. *Language and Speech* 47 (1): 31-56.
- Baayen, R. H., Piepenbrock, R. and L. Gulikers. 2001. *WebCelex*. Online resource: <http://celex.mpi.nl/>.
- *ICE-GB corpus*. 1998. Online resource: <http://ice-corpora.net/ice/icegb.htm>.
- Turk, A. 2010. 'Does prosodic constituency signal relative predictability? a smooth signal redundancy hypothesis'. *Laboratory Phonology*: 227-262.