Modelling variability in intonation

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This study examines the phonetics of the three accents used in focal position in Greek declaratives, according to Arvaniti & Baltazani (2005): H*, used for discourse-new information, L+H*, used for contrastive focus, and H*+L, which indicates that the speaker believes the accented item should have been in the common ground.

Thirteen speakers of Greek (10F, 3 M) read four repetitions of eighteen dialogues designed to elicit the three accents on test words varying in stress placement (see (1)). The test words were always phrase-final; phrases were either one- or two-words long (in the latter the accent under investigation was preceded by a prenuclear accent). For each test word, the three-syllable interval ending at the offset of the stressed syllable was marked; the F0 of this interval (underlined in (1)) was extracted using Praat, and Principal Component Analysis (PCA) was conducted on the resulting curves (Gubian, Torreira, Boves, 2015).

(1)

Accent	**Sample dialogue**
H*	*What's this?*
	[laðoˈlemono] ***Lemon and oil sauce.***
H*+L	What should I do with all these lemons?
	[lemoˈnaða] ***Lemonade****. What else can you make with them?*
L+H*	*Did you say their son has brown eyes?*
	[yalaˈna] ***Blue!*** *Aren't you paying attention?*

PCA showed that 85.2% of the variability among accents can be captured by two PCs, with PC1 reflecting differences in peak height (62.1%), and PC2 reflecting peak alignment and shape (23.1%). Data-driven parameterization from PCA allowed us to observe co-varying dependencies between peak scaling and alignment, and both were needed to distinguish the three accents, as each of the dimensions showed overlap between categories. Further, the data showed extensive speaker-specific variation, as well as consistent differences that depended on distant context and led to non-localized effects on the F0 trajectory, such as differences in pitch height on the unaccented syllables in the analysis window.

These results have repercussions for theories that prioritize alignment over scaling and focus on localized F0 targets, as well as for theories that use phonetic invariance as a criterion for phonological status. As the present study shows, accents can be eminently variable across contexts and speakers, and may involve non-localized differences. Overall the results point towards a view of tonal phenomena as distributions of values rather than as invariable prototypes or sets of discrete "allotones". In short, they provide evidence that intonational categories behave phonetically in a way similar to segmental categories, and that the mapping between phonology and phonetics is no different for intonation than it is for segments.

References

Arvaniti, A., M. Baltazani. 2005. Intonational analysis and prosodic annotation of Greek spoken corpora. In Sun-Ah Jun (Ed), *Prosodic Typology: The Phonology of Intonation and Phrasing*, pp 84-117. Oxford University Press.

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