

A phonotactic grammar of Greek #Obstruent-Obstruent clusters

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In this paper, we investigate the role of phonotactic grammaticality and sublexical statistics in shaping Greek speakers' wellformedness intuitions of tautosyllabic word-initial consonant clusters. More specifically, we propose a phonotactic grammar of O(bstruent)-O(bstruent)_[-strident/-voiced] word initial clusters, i.e. /pt/, /fθ/, /ft/, /kt/, /xθ/, /xt/, that reflects gradient wellformedness resulting from markedness constraints and frequency effects present at the (sub)lexical level (Vitevitch & Luce 1999). Moreover, we assess experimentally the effectiveness of the phonotactic grammar and its ability to capture the distributional generalizations of the Greek language by testing it against the results of two perception experiments.

In order to analyze gradient wellformedness resulting from the occurrence of sound combinations, we used estimates of probabilistic phonotactic information in the Lexicon, as shaped by biphone frequency (on-line version of *The Triantafyllidis Dictionary of Modern Greek*). The frequency data point towards a wellformedness continuum with respect to both manner (MoA) (1a) and place (PoA) (1b) of articulation promoting labial-initial FS and SS combinations, but leave unresolved the relation between FS and SS clusters:

- (1) a. **MoA:** FS, SS \gg FF
- b. **PoA:** LAB(IAL)-CORONAL \gg DOR(SAL)-CORONAL

On the contrary, in terms of grammatical knowledge, cross-linguistic and language-specific observations favor a rather differentiated wellformedness continuum among #OO_[-strident/-voiced]. More specifically, SS and FF sequences are considered to be equally marked with respect to MoA (2a), whereas DOR-initial sequences are considered to be the most unmarked ones with respect to PoA (2b) (Greenberg 1978, Kiparsky 1994, Jun 1995, Morelli 1999, Tserdanelis, 2001, Wright 2004):

- (2) a. **MoA:** FS \gg SS, FF
- b. **PoA:** DORSAL-CORONAL \gg LABIAL-CORONAL

In order to explore in depth the precise nature of Greek speakers' gradient wellformedness intuitions, we conducted two perception experiments, a scalar rating task and a comparative wellformedness task. Forty native speakers of Greek were recruited from the undergraduate population of Aristotle University of Thessaloniki. Both experiments consisted of non-words (disyllabic masculine nouns stressed on the penultimate syllable) distributed across 2 experimental groups (i.e., legal and illegal #OO_[-strident/-voiced], e.g. *ptófas*, *pkófas*, respectively) and 2 filler groups (#CR clusters, e.g. *prófas*, and singleton obstruent consonants, e.g. *pófas*). The stimuli were controlled for lexical factors such as Neighborhood Density, Cohort, and Phonological Levenshtein Distance (controlled by the NumTool, Protopapas et al. 2010, IPLR, <http://speech.ilspp.gr/iplr/NumTool.aspx>). In the first experiment, the participants listened to nonce words and were instructed to rate their wellformedness on a 5-point Likert scale. In order to get more fine-grained results, we also conducted a comparative wellformedness judgment task. The same 40 subjects listened to pairs of nonce words (e.g., *ptexas-ftexas*) and were prompted to select the more well-

formed item of the two. Our basic hypothesis is that adults are sensitive to both grammatical/sequential constraints and sublexical/segmental co-occurrence relations word-initially (Frisch, Broe & Pierrehumbert 2004), pointing to a wellformedness continuum of #OO_[-strident/-voiced] based on both MoA and PoA; moreover, when subjects are forced to make specific distinctions, grammatical generalizations are expected to surface.

The results of the experimental component of our research reveal a close match between the experimental findings and the values predicted by the grammar. More specifically, with respect to PoA the preferred hierarchy was found to be DORSAL-CORONAL \gg LABIAL-CORONAL. Furthermore, the experimental outcomes demonstrate that information regarding the legality and probability of phonotactic patterns partially affects the representation and processing of spoken stimuli suggesting that phonotactic effects cannot be reduced to mere statistics because our speakers' grammar reflects both lexical (FS=SS for LAB-initial clusters) and grammatical (FS \gg SS for DOR-initial clusters) knowledge with respect to MoA. In conclusion, the experimental results support a multi-faceted account of the potential sources of phonological knowledge, that is, one in which probabilistic and phonological principles are both encoded in the speakers' grammar, with the latter playing a more pivotal role in the speakers' wellformedness judgements and the former confined to only marginal effects.

The present study provides a comprehensive account of categorical and gradient distinctions in Greek #CC phonotactics by testing the predictions of the theoretical investigation against lexicostatistic generalizations and the findings of experimental procedures. The main conclusion is that although lexical statistics were found to reflect specific wellformedness patterns in Greek #OO_[-strident/-voiced] clusters, subjects responded in ways opposite to what would have been expected based solely on lexical frequency effects, which clearly suggests that the speakers are not blind frequency matchers (Becker et al. 2011).

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