Theoretical and empirical approaches to phonotactics and morphonotactics

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A R T I C L E   I N F O

A B S T R A C T

Phonotactics deals with constraints shaping the form of speech. Constraints may either be universal or language-specific; they may be grounded on properties of the articulatory content or on auditory salience. By organizing the form of speech and enhancing perception, phonotactic constraints simplify language acquisition and storage. Therefore they play a fundamental role in cognition, both in children's acquisition and adult processing. This volume brings together some of the most relevant European projects currently dealing with phonotactics from an empirical perspective. Some of the papers deal in particular with morphonotactics, i.e. the area of intersection between phonotactics and morphotactics. In those contributions, evidence is provided supporting the hypothesis that a given sound sequence is processed differently when it occurs across a morpheme boundary, compared with the morpheme internal position. This volume is of particular importance for functionalist and naturalist approaches to phonological complexity. Universal preferences of sound organization and language-specific constraints on phoneme and morpheme concatenation are investigated in English, German, Dutch, Italian and Polish.

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1. The form of speech and its cognitive value

If it is true, as declared by Saussure (1916: 157), that "la langue est une forme, non une substance", some of the consequences of this fundamental statement still need to be explored. With the notable exception of Glossematics (Hjelmslev, 1939) and *Gestalt* (Bühler, 1934)[1], no further attempts have been made in that direction. Saying that speech is a *form* is tantamount to saying that speech is not a form whatsoever, but on the contrary, different constraints at different analytic levels contribute to its precise shape. From a general point of view, phonotactic approaches deal specifically with these constraints shaping the form of speech. Constraints may either be universal, such as the existence of a rising vs. falling syllabic contour, or language-specific, such as the maximal weight of consonant clusters in various languages, or even both at the

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[1] Albano Leoni (2012: 117) interprets Bühler's contribution in the following terms: "Bühler, while appreciating the idea of phoneme as proposed by the Prague school and Trubeckoj as an example of the general principle of *abstraktive Relevanz*, integrates the idea with a representation model of the signifier based on the gestalt principle of the *Klanggesicht*. Therefore, the semiotic and linguistic principle of pertinence and of distinctive capability does not display itself always and only in the traditional phonologic oppositions (typically represented by minimal pairs), but can also be distributed along the entire string".

same time, such as stress not regressing further than the antepenultimate position but still varying in location among languages. Additionally, they may either be founded on properties of the articulatory content such as the need for articulatory contrast between two successive elements, or on properties of the auditory form such as perceptual salience. These constraints, as far as they organize the form of speech and enhance perception, simplify language acquisition and language storage. Therefore they play a fundamental role in cognition, both in children's acquisition and adult processing.

The analysis of form constraints operating at the phonotactic level is far from new. Harris (1951) already established a link between phonotactic dependencies and the notion of "long component". During the 1970s, Natural Phonology and Natural Generative Phonology ascertained that the abstract representations and architectures as postulated in *The Sound Patterns of English* (Chomsky and Halle, 1968) are incompatible with the requirements of those constraints that organize the surface of speech chains (i.e. the Surface Phonetic Constraints, SPC) as well as with the possibility of modeling the degree of naturalness of phonological processes in segmental sequences (e.g. the Obligatory Contour Principle, OCP) (Laks, 2006). The well-known debate on the Morphemic Structure Constraints (MSC) was the equivalent at the morphemic level. All these postulated constraints, or their equivalent still play a role in contemporary phonology and morphology within the optimality-theoretic accounts (Booij, 2011).

If language is a form, this form – continues Saussure – is organized along one single dimension, i.e. the temporal dimension. The linguistic sign develops according to a linear order, but its internal organization is not constituted by a simple succession of concatenated elements. According to Pike and Pike (1947: 78, 91), "[i]t is well known that sentences have an internal structure which can be analyzed in terms of successive layers of immediate constituents. Thus, the sentence *Poor John ran away* divides first into *Poor John* and *ran away*, then *Poor John* divides into *Poor* and *John*, while *ran away* divides into *ran* and *away* and so on. It is convenient to describe syllables […] in a similar fashion. The structure of these syllables does not consist of a series of sounds equally related, like beads on a string, but rather like an overlapping series of layers of bricks. The different layers in the syllable tend to have different phonetic and grammatical categories."

Phonotactic constraints could therefore be viewed as restrictions which carry weight onto the consecutive organization of elements and their concatenation. These constraints on the internal organization of the speech chain allow the emergence of *strong language-specific statistic and probabilistic relations*. Such probabilistic dependencies, sometimes active at quite long distances, are not only selective constraints, insofar as the presence of a particular unit strongly influences the presence or absence of another particular unit within the proximal or distal context. On the contrary, they function at the global level as form constraints on the shape of the speech chain. Within each different language, they define a set of principles of perceptual salience, articulatory plausibility and morpho-syntactic co-occurrence of segmental sequences. In short, they contribute to the definition of language-specific phonotactic profiles. Their cognitive value must therefore be precisely investigated, as much research in the field is attempting.

As is well-known, Saussure also affirmed that language is not a nomenclature (Saussure, 2001: 230). And if language is not a simple list of objects, i.e. a dictionary containing autonomous elements arranged in a given order and supplied end-to-end for sentence formation, the consequences for the form and the internal organization of the mental lexicon should be seriously taken into account. As a matter of fact, any linguistic theory is guaranteed by a certain conception, often only implicitly present, of the mental lexicon, of the type and relations of its units and its internal overall organization. Several contemporary approaches (construction grammars, Goldberg, 2006, as well as exemplarist and probabilistic grammars, e.g. Bybee, 2006, Bybee and McClelland, 2007) deny that the mental lexicon is a simple list of lexical entries. On the contrary, all these approaches defend that the mental lexicon incorporates construction schemes (chunks) and probabilistic information on possible sequences and clusters. Language acquisition, storage, and use would thus be *extremely sensitive to phonotactic constraints and regularities*. Such constraints and regularities would definitely represent what we might call the linguistic and grammatical knowledge as experienced and reinforced daily by the speakers.

In conclusion, the experimental research on phonotactics is fertile investigatory ground in contemporary linguistics, as it concerns speech and language as cognitive and formal objects, as well as the everyday uses and practical understanding of such uses. This is the core subject of the present collection of papers.

2. Overview of the special issue

This volume brings together some of the most relevant European projects currently dealing with phonotactics and morphonotactics from an empirical perspective. The papers combine theoretical considerations and experimental studies based on large corpora of written or spoken texts or on the analysis of the speakers' behavior in producing phonotactically marked structures such as consonant clusters. Psychological and computational models of phonotactic learning and sublexical processing are presented; their inductive generalizations are discussed from a theoretical and methodological point of view. Some of the papers deal in particular with morphonotactics, i.e. the influence of morphology on the shape of a language's phonotactics. In those contributions, morphonotactics is shown to help in explaining those aspects of cluster occurrence which phonotactics itself cannot.

The content of this volume is based on two recent international workshops that had theoretical and empirical models of phonotactics as their central topic. These are the thematic session of the 43th Poznań Linguistic Meeting "Theory and evidence in the study of phonotactics" (Poznań, September 8th–10th, 2012), organized by the Adam Mickiewicz University of Poznań, and the international workshop "Phonotactic grammar: theories and models" held in Cortona, Italy, September 28th–29th, 2012 and co-organized by the Scuola Normale Superiore of Pisa and the Université de Paris Ouest. The papers collected