Grammatical Approaches to Written and Graphical Communication

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Introduction

The notion of mental grammar has been at the heart of linguistic theorizing for much of the past century. The arguments for the existence of grammar, a set of mental rules/constraints governing the well-formedness of linguistic structures, are vast and varied, however the central argument that has been made in its favor is that speakers are capable of producing (and understanding) an infinite set of systematically structured words (phonology, morphology) and utterances (syntax).

Within the cognitive sciences, the notion of mental grammar has been reserved to describe competence in spoken language, signed language, and on occasion, narrative structure. This symposium explores the possibility that the notion of grammar should be extended to other cognitive domains, specifically the domain of written and graphical communication. Four different domains representing a broad swath of written communication are considered: letter combinations in spelling (orthotactics), sequential images in comics, the internal structure of individual Chinese characters, and the formal structure of calligraphic scripts. Although these domains all integrate elements of spoken language (e.g., phoneme-grapheme mappings, thought bubbles in comics, etc.), this symposium focuses exclusively on those aspects that are distinct from spoken language: abstract orthography-specific spelling knowledge, the system by which narratives are constructed with sequential graphical panels, the internal formal structure of Chinese characters, and the constraints governing the articulation of brushstrokes in a calligraphic manuscript.

The papers presented here provide theoretical and experimental evidence that the move to extend the notion of grammar to these domains is substantive and is not simply a metaphor or an analogical borrowing of terminology. These domains are shown to have complex internal structure that is subject to specific constraints on well-formedness. In some cases acceptability judgments and electrophysiological data indicate that speakers have online, synchronic knowledge of these structural constraints. The similarities and differences between the grammars of natural languages and the written/graphical domains presented here will be discussed. Regardless of whether term 'grammar' is ultimately applied in these cases, the complexity and systematicity of the cognitive processes underlying these domains must be recognized.

Modeling the statistical structure of orthographic representations

The study of positional and sequential restrictions on speech sounds (phonotactics) is a traditional subfield of linguistics that has been the subject of much recent experimental and computational research (e.g., Vitevitch et al., 2004; Hayes & Wilson 2008). The possibility that there are analogous, independent restrictions on graphemic representations -- orthotactic constraints on letter or grapheme sequences that are formally similar to those found in spoken language but not reducible to phonotactics or other phonological regularities -- has not been extensively investigated (but see Jespersen 1909-1949; Venezky 1970). In this talk, Wilson evaluates the evidence for an independent orthotactic component by combining a number of methodologies: computational modeling of the mapping from phonology to orthography in spelling, which is plausibly constrained to construct letter strings that are orthotactically acceptable; experimentally elicited judgments of stimuli that differ in spelling but not pronunciation; and prediction of spelling errors made by normal and impaired individuals, which may

similarly respect orthotactic restrictions despite deviating from the intended outputs. The talk also discusses the reciprocal issue, namely how grammatical knowledge of phonotactics can constrain and simplify the mapping from orthography to phonology in reading aloud. The resulting model is one in which individual grammars of sound, spelling, and the mapping between them combine to explain the joint statistical structure of the spoken and written forms of words. (This talk is based on joint work with Mike McCloskey, Simon Fischer-Baum, and Don Mathis).

The grammar of visual narratives: Structure and processing of sequential images in comics

Comics are a ubiquitous form of visual narrative in contemporary society, and nowhere is this more prevalent than Japan, where comics occupy over one-third of all printed material (Gravett, 2004). In this talk, Cohn argues that, just as syntax allows us to differentiate coherent sentences from scrambled strings of words, the comprehension of sequential images in comics also uses a grammatical system to distinguish coherent narrative sequences from random strings of images. First, Cohn will present a theoretical model of the narrative grammar underlying comics—a hierarchic system of constituency structure that constrains the sequences of images. He then will provide an overview of recent research that supports the psychological validity of this grammar, using methods from psycholinguistics and cognitive neuroscience. In particular, Cohn will emphasize that the same neurophysiological responses that appear to violations of syntax and semantics in sentences appear to violations of narrative and semantics in the sequential images of comics. Finally, Cohn considers what ramifications a narrative grammar of sequential images has on theories of verbal narrative and language in general.

Levels of analysis in the generalization of Chinese character regularities

Regardless of calligraphic style, Chinese characters obey strict shape regularities, including restrictions on reduplicated elements and on the location and shape of semantic radicals. In this talk, Myers argues that these regularities should be ascribed to a true grammar. Experimentally collected well-formedness judgments of nonce characters show that the regularities are psychologically active and readily generalize to non-radicals and lexically non-reduplicating character elements (Myers, 2011). New reanalyses show just how far beyond lexical analogy these generalizations can go. Intriguingly, the superficially distinct regularities are derivable from a single abstract structural template that, like metrical feet, shows asymmetric binary branching (Myers, 1996). New cross-regularity priming experiments test whether this template is itself active in character judgments. Together the findings suggest that high-level character grammar is not only real, but akin to prosody in spoken and signed languages.

Constraint interaction in the analysis of Chinese calligraphic scripts

The field of Art History has traditionally treated its object of study—art, in its various physical manifestations—as a phenomenon "out in the world". Yet, art, like language, is fundamentally a product of the human mind. Goldberg and Cohen-Goldberg argue that the field of Art History can benefit from a mentalist perspective where art is considered the product of artistic/esthetic cognition. Goldberg and Cohen-Goldberg provide a theoretical account of Chinese calligraphy that views calligraphic scripts (seal, clerical, and standard scripts) as the product of a grammar that must simultaneously balance the needs of scriptual well-formedness and legibility (Goldberg, 2004). Borrowing notions from work in theoretical phonology, they argue that calligraphic grammars consist of "markedness" constraints that assure that the calligraphic inscription possess script-typical qualities while "faithfulness" constraints ensure the recoverability of the underlying character. Utilizing this framework, they report novel results concerning 1) the various types of scope that are active within a calligraphic script and 2) the formal relationships that exist between scripts.

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