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The empirical investigation of semantics: Between abstract-symbolic and embodied-simulative models of meaning

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Introduction

Classical theories of meaning in the field of linguistics and psycholinguistics assume that meaning arises from the combination of symbols for which a substrings or other part-whole relation is defined. According to this perspective, symbols are abstract, amodal (i.e., neither perceptual, nor motoric) and only contingently related to entities in the external world.

For a long time, a convincing case for classical models has been the absence of alternatives. However, more recently, several theories subsumed under the notions of “embodied” or “grounded” theories have challenged the fundamental assumptions of classical models (e.g., Barsalou, 1999; Glenberg, 2010; Pecher & Zwaan, 2005). From the point of view of embodied theories, cognition is grounded in modal representations which simulate actual objects, properties and situations. Such a claim carries theoretical, empirical and methodological repercussions that also change the way linguistic processes are conceived of (Ferretti et al., 2013; Zwaan & Radvansky, 1998). The goal of the symposium is to explore which repercussions these issues have on the nature of linguistic meaning and its neural and cognitive realization or representation.

A main motivation for the symposium is that, in spite of the relevance of the issue, to this day the relationship between classical and embodied models of meaning is still not clear. More to the point, it is not clear whether classical and embodied models describe different aspects of meaning (and are then compatible) or whether they are mutually exclusive explanations of the same phenomena. As the nature and representation of meaning is a topic of increasing cross-disciplinary interest, the symposium aims to encourage an in-depth discussion among scholars interested in the problem, providing a cross-disciplinary forum of dialogue.

A further motivation for the symposium is that researchers in many specialized fields of cognitive sciences have been providing results which seem to support at least

some form of embodiment (Meteyard et al., 2012; Vigliocco et al., 2011). However, due to the specialization of competences, the circulation of these results among scholars in different arenas has not always been easy. This symposium will provide an opportunity to bring together philosophers, linguists, psychologists and neuroscientists joined by a common interest in the application of experimental methods to the analysis of the nature of meaning.

Given the interdisciplinary nature of the symposium, we would like to stress that the speakers are not only specialized in the field of semantics, but that they are also able to work at the crossroad between several disciplines. The symposium organizers share a background in philosophy with an active interest in neurolinguistics, at both a theoretical and an experimental level (Ferretti et al., 2013; Werning, 2012).

Speakers and abstracts

Erica Cosentino

Classical theories of meaning are two-step models, according to which contextual information is considered only after establishing phrase or sentence local meaning. In this perspective, local semantics cannot initially be overruled by the wider context. In this study we tested this prediction analyzing the effect of discourse context on affordances. Two-steps models predict that a verb-object violation, as in “She uses the funnel to hang her coat” will always be considered inappropriate, regardless of the wider discourse. In the current study we found that when this anomalous combination is embedded in a neutral context it elicits a typical N400, indicating that the subject is experiencing interpretative problems. However, when preceded by a supportive context, the very same sentence becomes perfectly acceptable, as reflected by the absence of an N400 effect. This finding challenges the classical approach to meaning suggesting that affordances are immediately integrated in the construction of meaning and that contextual information is immediately taken into account.

Lars Kuchinke

The embodied-simulative view proposes that linguistic meaning is grounded in memory traces in modality-specific brain regions as distributed neural representations of previously experienced internal and external states. This view also subsumes emotional information linked to words, and recent empirical evidence from emotional word recognition supports this assumption. Electrocortical findings point to a very early locus of these emotional effects preceding or at least altering the onset of lexical access. These effects are modulated by emotional valence, leading back to the ‘semantic cohesiveness’ hypothesis that proposes differences in the amount of semantic associations of valenced words. We recently proposed an associative read-out model based on co-occurrence statistics that

correctly predicts higher recognition rates for words with a greater amount of associations to other stimuli. Based on this model, we show that effects of positive words can be explained by their semantic cohesion, whereas negative words explain variance beyond their associations.

Gabriella Vigliocco

Theories of semantic representation ought to account for how we use this information, how we learn it and how it breaks down after brain damage. I will set the stage locating existing theories along a continuum from disembodied to fully embodied and presenting evidence from behavioural, imaging and patients' studies that limit the viable theories to those that incorporate some degree of embodiment but also include information from other sources such as language. I will then give a bird eyes overview of one such theories that we have developed in the past few years in which all concepts (concrete and abstract) are grounded in our sensory motor and affective experience but also statistical information from language contributes to the learning and representing meaning.

Markus Werning

In the first part of the talk, the central tenets of Emulative Semantics will be outlined. In the second part an EEG-based case study on the understanding of linguistic emotion contexts will be presented. (1) Emulative Semantics (Werning, 2012) is a naturalist theory of meaning. It claims that linguistic meaning consists in patterns of neuro-emulations. Unlike rival naturalist theories of meaning, Emulative Semantics is a non-symbolic, but still compositional theory of meaning. Neuro-emulations are abstractly described dynamical states of the brain's sensory-motor regions that are partially isomorphic to model-theoretical structures. Emulative Semantics thus inherits many formal features of model-theoretical semantics, which has been very successful as a formal account of meaning. (2) One prediction of Emulative Semantics is that the understanding of linguistic contexts about emotional scenarios should involve the emulation of emotions. Since the emulation of emotions is also thought to be a basis for the human capacity of empathy, Emulative Semantics predicts a correlation between empathy with emotions and the comprehension of linguistic emotion contexts. In a recent ERP study we could in fact show that, in linguistic emotion contexts, the N400 effect, which indicates violations of semantic expectations, depends on empathy as measured by the Multifaceted Empathy Test.

Rolf A. Zwaan

Language comprehension involves the construction of mental representations. This seems an uncontroversial statement in most of cognitive science. Much research has focused on the nature of these representations: are they text-based or situational (or both) are they abstract or grounded in perception and action? My goal here is to propose and

describe an integrative view. I will do this by discussing recent research from my lab.

Symposium program committee

Prof. Dr. Markus Werning
Dr. Erica Cosentino

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