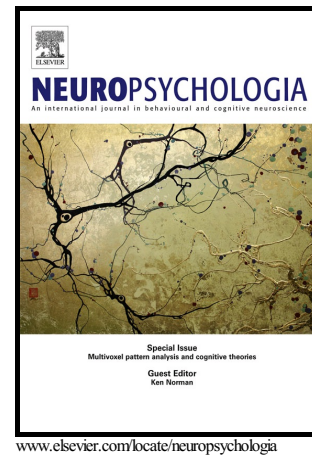


# Author's Accepted Manuscript

The neuro-cognitive representations of symbols: the case of concrete words

Valentina Borghesani, Manuela Piazza



PII: S0028-3932(17)30239-7  
DOI: <http://dx.doi.org/10.1016/j.neuropsychologia.2017.06.026>  
Reference: NSY6407

To appear in: *Neuropsychologia*

Received date: 25 October 2016  
Revised date: 18 June 2017  
Accepted date: 21 June 2017

Cite this article as: Valentina Borghesani and Manuela Piazza, The neuro-cognitive representations of symbols: the case of concrete words *Neuropsychologia*, <http://dx.doi.org/10.1016/j.neuropsychologia.2017.06.026>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

**The neuro-cognitive representations of symbols: the case of concrete words.****Valentina Borghesani<sup>1,2,31\*</sup>, Manuela Piazza<sup>3</sup>**

1. École Doctorale Cerveau-Cognition-Comportement, Université Pierre et Marie Curie - Paris 6, 75005, Paris, France;
2. Cognitive Neuroimaging Unit, Institut National de la Santé et de la Recherche Médicale, U992, F-91191 Gif/Yvette, France;
3. Center for Mind/Brain Sciences, University of Trento, 38068, Rovereto, Italy;

**\*Corresponding author:** UCSF Department of Neurology, 675 Nelson Rising Lane, San Francisco, CA, 94158. V.B. (valentinaborghesani@gmail.com)

**Abstract**

We live our lives surrounded by symbols (e.g., road signs, logos, but especially words and numbers), and throughout our life we use them to evoke, communicate and reflect upon ideas and things that are not currently present to our senses. Symbols are represented in our brains at different levels of complexity: at the first and most simple level, as physical entities, in the corresponding primary and secondary sensory cortices. The crucial property of symbols, however, is that, despite the simplicity of their surface forms, they have the power of evoking higher order multifaceted representations that are implemented in distributed neural networks spanning a large portion of the cortex. The rich internal states that reflect our knowledge of the meaning of symbols are what we call *semantic representations*.

In this review paper, we summarize our current knowledge of both the cognitive and neural substrates of semantic representations, focusing on concrete words (i.e., nouns or verbs referring to concrete objects and actions), which, together with numbers, are the most-studied and well defined classes of symbols. Following a systematic descriptive approach, we will organize this literature review around two key questions: what is the content of semantic representations? And, how are semantic representations implemented in the brain, in terms of localization and dynamics? While highlighting the main current opposing perspectives on these topics, we propose that a fruitful way to make substantial progress in this domain would be to adopt a geometrical view of semantic representations as points in high dimensional space, and to operationally partition the space of concrete word meaning into motor-perceptual and conceptual dimensions. By giving concrete examples of the kinds of research that can be done within this perspective, we illustrate how we believe this framework will foster theoretical speculations as well as empirical research.

---

<sup>1</sup> § Author now at: Department of Neurology, Memory and Aging Center, University of California San Francisco, 94158, CA, USA;

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات