

INTERNATIONAL CONFERENCE
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EXTENDED ABSTRACT SUBMISSION FORM

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2. The title of the report in English is:

Mind: meet network. Emergence of features in conceptual metaphor.

The title should not exceed 14 words.

3. Author details:

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4. Keywords:

connectionism, objectification, conceptual metaphor, feature emergence, embodiment

Please, list less than 7 keywords, separated with comas (in English).

5. Contribution addresses the following two topics:

First Topic	Second Topic
Cognitive Models of Language Phenomena	Metaphor Theory

Please, indicate two topics from the topics given bellow:

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Mental Lexicon and Lexicon Ontology

Naive World Image and Verbal Form

Knowledge Conceptualisation and Verbalisation

Cognitive Mechanisms for Text Processing

Cognitive Models in Language Learning

Species-Specificity of Human Language

Thinking through Language Processing

Cognitive Slavistics

The extended abstract starts on the second page:

Mind: meet Network

Anna Jelec, Dorota Jaworska

As a human product, language reflects the psychological experience of man (Radden and Dirven, 2007). One model of language and human cognition in general is connectionism, by many linguists is regarded as mathematical and, therefore, too reductive. This opinion trend seems to be reversing, however, due to the fact that many cognitive researchers begin to appreciate one attribute of network models: feature emergence. In the course of a network simulation properties emerge that were neither inbuilt nor intended by its creators (Elman, 1998), in other words, the whole becomes more than just the sum of its parts. Insight is not only drawn from the network's output, but also the means that the network utilizes to arrive at the output.

It may seem obvious that the events of life should be meaningful for human beings, yet there is no widely accepted theory as to how do we derive that meaning. The most promising hypothesis regarding the question how the world is meaningful to us is that of embodied cognition (cf. Turner 2009), which postulates that the functions of the brain evolved so as to 'understand' the body, thus grounding the mind in an experiential foundation. Yet, the relationship between the body and the mind is far from perspicuous, as research insight is still intertwined with metaphors specific for the researcher's methodology (Eliasmith 2003). It is the aim of this paper to investigate the conceptual metaphor in a manner that will provide some insight with regard to the role that objectification, as defined by Szwedek (2002), plays in human cognition and identify one possible consequence of embodied cognition.

If the mechanism for concept formation, or categorization of the world, resembles a network, it is reasonable to assume that evidence for this is to be sought in language. Let us then postulate the existence of a network mechanism for categorization and concept formation present in the human mind and initially developed to cope with the world directly accessible to the early human (i.e. tangible). Such a network would convert external inputs to form an internal, multi modal representation of a perceived object in the brain. The sheer amount of available information and the computational restrictions of the brain would force some sort of data compression, or a computational funnel. It has been shown that a visual perception network of this kind can learn to accurately label patterns (Elman, 1998). What is more, the compression of data facilitated the recognition of prototypes of a given pattern category rather than its peripheral representations, an emergent property that supports the prototype theory of the mental lexicon (cf. Radden and Dirven, 2007).

The present project proposes that, in the domain of cognition, the process of objectification, as defined by Szwedek (2002), would be an emergent property of such a system, or that if an abstract notion is computed by a neural network designed to cope with tangible concepts the data compression mechanism would require the notion to be conceptualized as an object to permit further processing. The notion of emergence of meaning from the operation of complex systems is recognised as an important process in a number of studies on metaphor comprehension. Feature emergence is said to occur when a non-salient feature of the target and the vehicle becomes highly salient in the metaphor (Utsumi 2005). Therefore, for example, should objectification emerge as a feature in the metaphor KNOWLEDGE IS A TREASURE, the metaphor would be characterised as having more features of an object than either the target or vehicle alone. This paper focuses on providing a theoretical connectionist network based on the Elman-type network (Elman, 1998) as a model of concept formation where objectification would be an emergent feature. This is followed by a psychological experiment whereby the validity of

this assumption is tested through a questionnaire where two groups of participants are asked to evaluate either metaphors or their components. The model proposes an underlying relation between the mechanism for concept formation and the omnipresence of conceptual metaphors, which are interpreted as resulting from the properties of the proposed network system.

Thus, an evolutionary neural mechanism is proposed for categorization of the world, that is able to cope with both concrete and abstract notions and the by-product of which are the abstract language-related phenomena, i.e. metaphors. The model presented in this paper aims at providing a unified account of how the various types of phenomena, objects, feelings etc. are categorized in the human mind, drawing on evidence from language.

KEYWORDS

connectionism, objectification, conceptual metaphor, feature emergence, embodiment

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