Chapter 1
Representation of Meaning in Different Semiotic Systems

ABSTRACT

This chapter describe issues related to the ability to represent meaning in different semiotic systems that plays a major role in the development of infants and continues to influence humans throughout life. The semiosphere is the symbolic environment into which a child grows, that defines the types of representations encoded in the developing child's mind. It is dynamic and multifunctional, and includes a class of meaning-preserving transformations. These symbolic transformations generate multiple representations with equivalent meaning, and inevitably result in the over-determination of meaning within the semiosphere. Early meaning, derived from perceptual cues, evolve to mature meaning derived from combinations of perceptual cues and memories of their consequences. Adults generate intentional responses to meaning of combinations of perceptual and intellectual stimuli, and are aware of representation of meaning in different semiotic systems.

INTRODUCTION

The cognitive and neuroscience revolutions at the end of the 20th century have advanced the efforts of identifying and localizing cognitive processes. One of the enduring problems in cognitive psychology has been that of representation in its many forms, the activities of representing, the uses of

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representations in learning, memory, and thinking; and the mechanisms that control the formation of representations (Cocking, 2012).

A third revolution in technology is now expanding cognitive and neuroscience research in new directions and the databases are once again growing. Imaging technologies are enabling researchers to test theoretical conceptions of cognitive representation more precisely. At the same time, new learning technologies, especially computer and interactive technologies, are expanding the scope by adding new issues of representation, such as visual cognition.

'While current evidence suggests that incremental learning models show promise for addressing the acquisition of perceptual and conceptual knowledge structure in the brain, other possibilities remain that posit more dedicated functions to occipital and temporal cortex, with unsupervised learning applying throughout the visual system in a more feed-forward manner that relies on biases in low-level image statistics between stimulus categories to explain any category preferences in occipitotemporal cortex… On this view, most of the flexibility and adaptability of knowledge representation is handled by the prefrontal cortex… Indeed, it is interesting to note that conceptual "broadening" is observed when the task is categorization… as well as when the task requires individuation' (Gotts et al., 2014). This leads Gotts (2016) to suggest that it is 'raising the possibility that prefrontal cortex has a more general role in automatically extracting more abstract category-like structure from individual objects presented in the same context. At a minimum, the future experiments… will help to delineate the bounds on existing incremental learning proposals, allowing us to see how much of the adult knowledge organization is plausibly based in supervised versus unsupervised learning mechanisms, as well as to what extent innate anatomical constraints might contribute'.

Indeed, because of new evidence and new methodologies, the long-standing research topic of representational thinking has moved from speculation to science. In this evolution, the science of representation has played an important role as a unifying concept across many research disciplines.

During the last century increasing efforts were made to understand mental functioning, such as thought and language. The interest and proliferation of research in cognitive science lead to an exponential increase in approaches to the study of the development of representational thought and language. Cognitive science evolved into an interdisciplinary science. Central to this science was the development of the theory of representation (Sigel, 2012).