

Language and Human Complexity: A Neurobiological Perspective

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Abstract

To understand human behaviors, philosophers for thousands of years have made serious attempts to describe behavioral phenomena from above by deriving laws that explain objective phenomena in general (the nomothetic approach) and/or specific subjective phenomena which is meaning contingent and often unique (the idiographic approach). Scientists, on the other hand, prefer to examine behavioral phenomena on the ground by advancing precise measurements upon which to describe the functional relationship between stimulus input and response output in terms of a hypothetic-deductive research framework. This approach was successful at the proximal level but failed at the distal level description of the causal relationship between stimulus environments and their impact on the responses which are vicarious in nature. A single lens model was constructed to put the simple S-R associative account back to the evolutionary perspective. The model, based upon a lens metaphor, reminded researchers that a clear distinction of proximal versus distal stimulus in terms of the variant and invariant nature of the perceptive field must be recognized and taken into account in any theoretical development. A second lens was also added to describe the vicarious nature of the response hierarchy. Finally, in-between the double lenses, a dynamic and computational interface platform must be implemented to interpret the stimulus environment from the first lens with both the proximal and distal considerations; at the same time, the platform computes necessary response alternatives, based on its various executive functions (e.g., attention, retention, working memory, comprehension, resource allocation, decision making, etc.), and make appropriate choices of feasible reactions. The platform is dynamic in the sense of changing organizations through continuous neuronal network learning as a result of constant interaction with both lenses. The platform is the brain and the aim of cognitive neuroscience as a discipline is to understand the nature and the evolutionary (both phylogenetically as well as ontogenetically) developments of various brain functions.

The significance and prospect of neuroscience research have been a consensus in the international scientific community. Technical advancements in both the neuro-imaging and the functional genomics disciplines have a profound impact on the approaches upon which cognitive neuroscientists may now choose to answer the questions on how brain enables the mind and how mind changes the brain developments. The obvious capability for our youngsters to learn and acquire motor skills to walk, use language to express their thought and to discern right from wrong, as well as failure to do so, becomes essential questions for cognitive neuroscientists in their pursuit for understanding human nature. The formidable task of trying to understand the process of cognition becomes so challenging when the application of neuro-imaging techniques (fMRI, MEG, TMS, tDCS) and their advanced analyses are rapidly in progress. The visualization of human brain in action at the Macro level intrigues its revelation at the Micro level, especially, for the scientists who currently work on the epi-genomic research problems, which go much beyond the Human Genome Project.

The purpose of this presentation is to introduce the joint research center for Language and Human Complexity which will examine human language and human complexity from such a perspective, emphasizing the multi-methods and multi-tools approaches of investigation into the human mind.
