

## Linguistic Cognition in an Integrated Connectionist/Symbolic Architecture

Paul Smolensky  
Department of Cognitive Science  
Johns Hopkins University

Within cognitive science, the formal study of abstract, high-level mental functions has enjoyed great progress made possible by the symbolic hypothesis: the mind is a symbol-manipulating computer. This progress has been particularly evident in the study of language, which has developed rich theories of grammar - the knowledge governing the modes of combination of linguistic elements such as sounds, gestures and words. On the other hand cognitive science has in recent years witnessed major advances made possible by the connectionist hypothesis: the brain is a massively parallel numerical computer, and the mind inherits important computational properties from the neural architecture in which it is realized. The Integrated Connectionist/Symbolic Cognitive Architecture aims to unify these hypotheses into a theory of the mind/brain: described at a macro-level, the mind/brain is a novel kind of symbolic computer; described at a micro-level, it is a novel kind of connectionist computer. This talk will present results that flow in two directions. Top-down research shows how the need to support basic symbolic computation leads to powerful new design principles for neural networks. Bottom-up research shows how such a neural substrate gives rise to new kinds of symbolic theories of grammar with enhanced explanatory power.