SKILL LEARNING AND REPETITION PRIMING IN SYMMETRY DETECTION: PARALLEL STUDIES OF HUMAN SUBJECTS AND CONNECTIONIST MODELS[1]

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ABSTRACT

The present paper is a preliminary report of our work exploring skill learning and repetition priming in parallel studies of mirror symmetry detection in humans and network models. The memory mechanisms supporting the acquisition of skill and repetition priming in humans have been the subject of much speculation. On one account, drawing on the distinction between procedural and declarative learning, these learning phenomena grow out of experience-based tuning and reorganization of processing modules engaged by performance in a given domain, in a manner that is intimately tied to the operation of those modules. Such learning appears similar to that suggested by the incremental learning algorithms currently being explored in massively-parallel connectionist models (e.g., the Boltzmann machine). In the present work, both learning phenomena were observed in the behavioral data from human subjects and the simulation data from the network models. The network models showed priming effects from the start of de novo learning despite being designed to handle generalization to new materials - the essence of skill learning - and without additional mechanisms designed to provide a temporary advantage for recently presented material. Priming occurred for the human subjects despite the use of novel materials for which pre-existing representations cannot already be present in memory. These findings support the notion that skill learning and repetition priming are linked to basic incremental learning mechanisms that serve to configure and reorganize processing modules engaged by experience.