PERCEPTUAL SKILL LEARNING AND REPETITION PRIMING FOR NOVEL MATERIALS IN AMNESIC PATIENTS, NORMAL SUBJECTS, AND NEURON-LIKE NETWORK MODELS. N.J. Cohen*, I. Abrams*, W.S. Harley*, L. Tabor*, B. Gordon*, & T.J. Sejnowski. Departments of Psychology, Biophysics, & Neurology, The Johns Hopkins University and School of Medicine, Baltimore, MD, 21218.

Recent memory research has distinguished between the incorporation of experience into skilled performance and explicitly stored memory for particular processing episodes. Investigations of skilled performance have indicated both the generalizability of skill to new materials within the trained domain and the further superiority of performance for repeating materials (repetition priming effects). This is particularly clear in amnesic patients who, despite profound disorders in recall and recognition, nonetheless demonstrate both intact skill learning and repetition priming. The same dissociation between classes of memory can also be observed in normal subjects with the appropriate tests. Such findings have important implications for understanding the organization of normal memory systems, and have played a prominent role in several different theoretical accounts of memory.

Some accounts, most particularly those invoking a distinction between episodic and semantic memory, have predicted that the memory system preserved in amnesia could support a facilitation of performance based on experience only for familiar materials, i.e., materials for which there are already-established representations. The present studies investigated the acquisition of skills and repetition priming effects for novel or unfamiliar materials in amnesic patients, normal subjects, and neuron-like network models. In a series of studies involving detection of the axis of symmetry in mirror symmetric checkerboard-based visual patterns, each of three amnesic patients showed acquisition and retention of perceptual skill within and across daily testing sessions; and, extended testing with two of these patients also showed repetition priming effects that were at least as large as those shown by normal subjects. Parallel studies with quasi-neural, massively-parallel network models, in which no prior knowledge was built in about symmetry detection, topography, or checkerboard-based patterns, thus requiring completely de novo learning, showed both skill learning and repetition priming. Indeed, repetition priming could be demonstrated with as few as 6 presentations of the primed stimuli spread out among 20,000 visual patterns.

These findings suggest that skill learning and repetition priming are aspects of the basic, procedural learning mechanisms that serve to configure and reorganize processing modules as a consequence of experience.