Chapter 1
Social Learning from the Inside Out:
The Creation and Sharing of Knowledge from the Mind/Brain Perspective

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ABSTRACT

This chapter explores from the viewpoint of the mind/brain the factors and conditions which influence the social creation and sharing of knowledge. A foundation is developed by providing clear definitions of information, knowledge and learning, including levels of knowledge and the process through which the mind/brain creates new knowledge. Then neuroscience findings are used to discuss social interaction, including environmental impacts on the creation and sharing of knowledge. Factors such as arousal and stress level, social attunement, holding environment, intersubjective space, level of trust, social bonding, and an enriched external environment are posited to enhance the creation and sharing of knowledge. Finally, the individual learning and knowledge activity is extrapolated to the societal level through a short introduction to collaborative entanglement (learning to create and apply knowledge as communities), and the use of metaphor and story. Summary highlights of neuroscience findings are also provided.

INTRODUCTION

We are social creatures. While this concept has been around for centuries, Cozolino believes that we are just waking up to this fact from a biological perspective. As he describes,

> *As a species, we are just waking up to the complexity of our own brains, to say nothing of how brains are linked together. We are just beginning to understand that we have evolved as social creatures and that all of our biologies are interwoven. (Cozolino, 2006, p. 3)*

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While humans have studied the brain since ancient Greece and perhaps before that, neuroscience is a very young field. Although an association of professional scientists known as The Society for Neuroscience was formed in 1970 (Bear, Connors, & Paradiso, 2001), it wasn't until the development of measurement and excitation technology (George, 2007; Ward, 2006) in the early 1990s that the field began to flourish. Examples of these technologies include functional magnetic resonance imaging (fMRI), the electroencephalograph (EEG), and transcranial magnetic stimulation (TMS); (George, 2007; Kurzweil, 2005; Ward, 2006). fMRI is used for neuroimaging to produce precise measurements of brain structure activity (Hyman, 2007). EEG is another noninvasive technique that measures the average electrical activity of large populations of neurons (Nicolelis and Chapin, 2007). TMS uses head-mounted wire coils that send very short but strong magnetic pulses directly into specific brain regions that induce low-level electric currents into the brain's neural circuits, and appears to be able to "turn on and off particular parts of the human brain" (George, 2007, p. 21).

Simultaneously, because of increasing computational power, the field of neuroanatomy has become a central aspect of neuroscience. Neuroanatomy is the branch of anatomy that deals with the nervous system. The first comprehensive volume in this field, edited by Giorgio Ascoli, head of the Krasnow Institute for Advanced Study at George Mason University and published in 2002, defines this field as, "… the use of computer models, simulations, and visualizations to gain a deeper understanding of the complexity of nervous system structures" (p. v).

Collectively, these advancements are steadily providing new information on how the mind/brain works. The term "mind/brain" connotes the combination of the physiological brain and the mind, that is, the patterns of neuron connections, the strengths of those connections, and the signals they send to other neurons that exist in the brain. The neuroscience findings that have emerged since the 1990's form the foundation of this paper. With learning and knowledge at the core of our exploration, we will (1) develop a common understanding of baseline definitions; (2) discuss the creation and sharing of knowledge from the viewpoint of the mind/brain; (3) discuss social interaction and the mind/brain, including environmental impacts on the creation and sharing of knowledge; and (4) extrapolate the individual learning and knowledge activity to the societal level through a short introduction to collaborative entanglement (learning to create knowledge as communities), and then the use of metaphor and story.

DEVELOPING A COMMON UNDERSTANDING

Embracing Stonier's description of information as a basic property of the Universe—as fundamental as matter and energy (Stonier, 1990; Stonier, 1997)—we take the amount of information to be a measure of the degree of organization expressed by any non-random pattern or set of patterns. The order of a system is a reflection of the information content of the system. Data (a form of information) would then be simple patterns, and while data and information would both be patterns, they would have no meaning until some organism recognized and interpreted the patterns (Bennet and Bennet, 2006a, 2008c). Thus knowledge exists in the human brain in the form of stored or expressed neuronal patterns that may be activated and reflected upon through conscious or unconscious thought. This is a high-level description of the creation of knowledge that is consistent with the neuronal operation of the brain and is applicable in varying degrees to all living organisms. From this process neuronal patterns are created that may represent understanding, meaning and the capacity to anticipate (to various degrees) the results of potential actions. Thus it is not just information