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Introduction to Consciousness and EMDR

INTRODUCTION

Investigating the human mind as an abstract concept is very difficult. Exploring its biological foundations—especially consciousness—is an even more daunting task. If developing a map of the mind is the final frontier of the life sciences, the cartography of consciousness will be its last and most important accomplishment.

Antonio Damasio (1999) asks,

> What could be more difficult to know than to know how we know? What could be more dizzying than to realize that it is our having consciousness which makes possible and even inevitable our questions about consciousness? (p. 4)

We have trouble understanding our own understanding. At times, using consciousness to study consciousness is like trying to see one of your eyes with the other eye. Why is the working of our own mind so mysterious? Rodolfo Llinás (2001) speculates,

> The processes that generate such states as thinking, consciousness, and dreaming are foreign to us, I fancy, because they always seem to be generated with no apparent relation to the external world. They seem impalpably internal. (p. 4)

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Evolution, over these millions of years, has given rise to the complex organ that is our brain. *Somehow*, through the interactions among its 100 billion neurons, which are themselves connected by trillions of synapses, our conscious experience of the world and of ourselves emerges.

To be clear, a study of the conscious mind alone could not lead to a complete understanding of the brain. Far removed from the classic Freudian psychoanalysis of old that addressed the subconscious solely as a breeding ground for repression, desire, and dysfunction, modern neurobiology recognizes that the unconscious activities of our brains—the work of the mind that is done without our conscious participation—are a crucial part of the same evolutionary legacy that yielded consciousness. As Alan Hobson (2009) observes,

> The brain still tends to keep most of its activity out of consciousness, but what it excludes or admits is governed more by rules of activation, neuromodulation, input–output gating than by the predominance of repression. The unconscious is now seen as a useful lookup system for the conscious brain rather than a seething source of devils aiming at the disruption of consciousness. Consciousness itself is, thus, a tool for the investigation of itself as well as for the study of that part of the unconscious that is dynamically repressed. (p. xi)

Throughout his writings, Sigmund Freud articulated his ideas through the organizing concepts of the "self" and the "object," separate and distinct from each other. For Freud, the people interacting with the *self* were the *objects* of the self's drives and desires. Ironically, neuroscientists today tend to view consciousness as the integrated neural function that brings together the object and the self.

Expanding upon the role of consciousness in weaving together self and object, Llinás's (2001) research has shown that the brain is predominantly a closed system, placing the highest priority not on objectively processing extrinsic images (i.e., external stimuli), but on subjectively generating intrinsic (i.e., produced and received internally) imagery. The former concerns what we observe; the latter concerns, broadly, how we feel about it.

Damasio (1999) defines consciousness as *the feeling of what happens*. In his most recent work (2018), he notes,

> The aspect of mind that dominates our existence, or so it seems, concerns the world around us, actual or recalled from memory. . . . And yet, a remarkable yet, there is a parallel mental world that accompanies all those images, often so subtle that it does not demand any attention for itself, but occasionally so significant that it alters the course of the dominant part of the mind, sometimes arrestingly

> so. That is the parallel world of affect, a world in which we find feelings traveling alongside the usually more salient images of our minds. (p. 99)

For Damasio (2018), the complete absence of feelings would spell a suspension of being. This should not be taken as a poetic metaphor. The research of Rodolfo Llinás and his colleagues has shown clearly that damage to the neural circuitry that mediates *intrinsic* subjectivity, conscious and nonconscious, causes coma and vegetative states. In contrast, damage to the neural circuitry that mediates the processing of *extrinsic* information—sensory information from the outside world—produces only a loss of the particular sensory modality that was mediated by that specific damaged circuitry.

This research, in addition to the neuroimaging work of Marcus Raichle (2006, 2009) and the subsequent discovery of the brain's default mode network (to which the press has also given catchier names, such as "the brain's dark energy" or "the daydreaming network"), has reignited a long-standing interest in the significance of the brain's intrinsic activity. Hence Christof Koch (2012) notes that "just as light presupposes its absence, darkness, so consciousness presupposes the unconscious."

CONSCIOUSNESS AND EMDR

Consciousness and EMDR have long been intimately related, albeit under a different name. Whereas the field of neurobiology has utilized the term *consciousness* to denote the processes of sensation, perception, learning, cognition, emotion, somatosensory integration, and memory, the discipline of psychology has chosen to use the term *information processing*. Accordingly, they will be used interchangeably here. If we tend to favor the term *consciousness* in this book, it is only because it *feels* more human.

Over the past 25 years, EMDR has evolved into a comprehensive therapeutic approach guided by the adaptive information processing (AIP) model (Shapiro, 2001, 2018). In 1990, the name change, from *Eye Movement Desensitization (EMD)* to *Eye Movement Desensitization and Reprocessing (EMDR)*, heralded a change in orientation from the initial behavioral formulation of simple desensitization of anxiety to a more integrated information processing paradigm. This evolution ushered in the *accelerated information processing model* (Shapiro, 1995), which illustrated a clinically grounded understanding of the underlying principles governing perception and integration of new information within cognitive, memorial, and emotional frameworks. In 2001, this continued evolution brought us the aforementioned AIP model. Francine Shapiro (2001, 2018) has argued that the utility of these models lies in their ability not only to explain, but also to predict clinical outcomes.

As we shall see throughout this book, consciousness and EMDR are inextricably intertwined: We thus possess an information processing paradigm that provides an integrated approach incorporating and interpreting key aspects of such diverse modalities as psychodynamic, behavioral, cognitive, gestalt, ego-state, and body-oriented therapies. If the neurobiology of consciousness enables our understanding of the neural interrelationship between self and object, EMDR has given us both tools to use and mysteries to solve in the repair of the self and its relation to its objects.

THE PROGRESS OF SCIENCE

In light of the aforementioned facts, the understanding of the human mind in biological terms has emerged as one of the most important challenges for science in the 21st century. Our goal in this endeavor has been to understand the biological underpinnings of sensation, perception, cognition, learning, memory, emotion, and sensory integration.

The progress that researchers have made in the field of neuroscience, unthinkable even a few decades ago, has made possible our present understanding of the mind. This endeavor, once considered to be prescientific and impossible, has yielded a great deal of results and possesses significant momentum. Ironically, these new insights did not come from the disciplines traditionally concerned with the mind—philosophy or psychology—but rather from the merger of these disciplines with biology, a new synthesis made possible by the remarkable achievements in molecular biology. The discovery of the structure of DNA by James Watson and Francis Crick in 1953 revolutionized biology, giving it a foundational framework for comprehending the mechanisms underlying the gene's ability to control the functioning of cells. This breakthrough led to a basic understanding of gene regulation and gene-related cell function, propelling an objective understanding of the science of biology to a level equal to that of physics and chemistry.

Imbued with this new knowledge, biology turned its focus to its loftiest goal: the understanding of the biological nature of the human mind. The result has been a new science of mind, a science that has harnessed the power of molecular biology to examine the great remaining mysteries of life.

MIND AND BRAIN

This new science is grounded by five principles.

First: Mind and brain are inseparable. The brain is a multifaceted biological organ of vast computational abilities, and it constructs our sensory experiences, regulates our thoughts and emotions, and mediates our actions.

Our brain is responsible not only for straightforward motor behaviors like running and eating, but also for the complex and multifaceted acts considered quintessentially human, such as thinking, speaking, and creating works of art.

Second: Each mental function in the brain, from the simplest reflexes to the most creative acts of language, music, and art, is carried out by specialized neural circuits located throughout different regions of the brain. It has been noted by many in the neuroscience community that it is preferable to refer to the set of mental operations carried out by these specialized neural circuits as *biology of mind*, rather than *biology of the mind*, as the latter might inaccurately imply that there is a unique, singular place—a single location in the brain—that carries out mental operations.

Third: All of these circuits are composed of the same elementary signaling units, namely, neurons.

Fourth: These neural circuits use specific molecules to generate signals within and between nerve cells.

Finally, the specific signaling molecules have been conserved and retained through millions of years of evolution. Some of them were present in the cells of our most ancient ancestors and can be found today in our most distant and primitive evolutionary relatives.

We thus gain from this new knowledge regarding the science of mind not only insights into ourselves—how we perceive, learn, remember, feel, and act—but also a new perspective of ourselves within the context of biological evolution. This allows us to appreciate that the human mind evolved from molecules used by our most primitive ancestors, and that the extraordinary conservation of the molecular mechanisms that regulate life's various processes also applies to the processes of our own mental life.

SCIENTIFIC GROWTH OF EMDR

The search for EMDR's mechanisms of action began in the early 1990s, initially proceeding slowly and tentatively. As we entered the new millennium, the pace accelerated. Theoretical models, grounded in the empirical findings of related neurobiological research, became more detailed and prevalent. In parallel, neurobiological studies became increasingly widespread, utilizing psychophysiological and neuroimaging examinations of EMDR treatment.

In the years of EMDR's infancy, few were interested in the neurobiology of EMDR: A talk speculating on EMDR's neural mechanisms would attract 30 people (on a *good* day). As with other aspects of neuroscience, interest in EMDR has exploded. Workshops held worldwide, focused solely on the topic of the neurobiology of EMDR, routinely draw crowds in the hundreds. It has become apparent that nonscientists are prepared to

make the effort to understand the key issues of brain science if scientists are willing to make the effort to explain them.

OUTLINE OF THE BOOK

This book is thus written with language that is not only technical but also suitable as an introduction to the neural underpinnings of consciousness and EMDR. Pertinent neuroscience research related to our understanding of consciousness, information processing, and traumatic disorders of consciousness is reviewed and examined.

The reader is first presented with basic research in the neurosciences relevant to online/wakeful information processing, which includes sensation, perception, somatosensory integration, cognition, memory, emotion, language, and motricity (motor function). Recent findings regarding the default mode network, and its implications for unconscious/nonconscious functioning, are examined. In addition, offline/sleep information processing is examined with respect to slow-wave sleep and cognitive memorial processing as well as REM/dream sleep and its function in emotional and semantic memory processing.

The second section examines the neuroscience research relevant to disorders of consciousness, which include (in brief) anesthesia, coma, and other neurological disorders. Major focus is given to the disorders of type I posttraumatic stress disorder (PTSD), complex PTSD/dissociative disorders, and personality disorders.

The third section presents the reader with an examination of neuroscience research relevant to chronic trauma and autoimmune function. A number of medical illnesses, collectively known as "medically unexplained symptoms," are examined. These include fibromyalgia, chronic fatigue syndrome, reflex sympathetic dystrophy, systemic lupus erythematosus, type 1 diabetes, Hashimoto's thyroiditis, Graves' disease, multiple sclerosis, Sjögren's syndrome, and rheumatoid arthritis. These are the most extensively researched disorders. An additional 25 disorders are described, which despite having been investigated for the past 15 years, have only recently become accepted by mainstream medicine as hyperimmune inflammatory illnesses. The aforementioned disorders are examined from the perspective of hypocortisolemia and the autoimmune hyperactivity resulting from the unusual neuroendocrine profile of persons with PTSD. Additionally, hypocortisolemia also is examined as a result of in utero glucocorticoid (cortisol) programming.

The fourth and final section examines the foregoing material with respect to the AIP model. Treatment implications vis-à-vis the various types of PTSD and the presentations of medically unexplained symptoms are explored in detail.

To the reader who is fluent in this material, it will become immediately apparent that my thinking has been greatly influenced by the works of Antonio Damasio, Rodolfo Llinás, Jaak Panksepp, and Allan Schore. Their empirical and descriptive writings have enabled me to extract form out of the empirical chaos that has engulfed the study of consciousness and information processing.

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