

20, "Work and Family Roles: Selected Issues," Julia R. Steinberg, Maren True, and Nancy Felipe Russo focus on the interrelated issues of stereotyping and discrimination, gender segregation in the workplace, and employment rewards for women to understand how women's experience at work has particular implications for women's mental health and well-being. Other factors, such as women's lower expectations for compensation and women's denial of the role of gender injustice in their personal disadvantage, are also discussed. The authors also cover how multiple roles (i.e., making substantial economic contributions to their households and having the major responsibility for housework) affect their mental health. In "Women and Leadership" (chapter 21), Jean Lau Chin reviews literature and findings from a year-long dialog about women and leadership among feminist psychologists as a result of a presidential initiative, "Feminist Visions of Diverse Voices: Leadership and Collaboration," organized by the American Psychological Association in 2003. The author deconstructs existing theories of leadership (e.g., characteristics, competencies) and offers a framework for understanding women and leadership focusing on dimensions such as ethical, contextual, collaborative, and diverse leadership. In chapter 22, "Women's Career Development," Nancy E. Betz begins by suggesting that the use of one's abilities and multiple roles can help explain why careers are important to a woman's quality of life but that several barriers impede women's full exit from traditionally female occupations and equitable pay for comparable work. The author proposes that women's and girls' tendency to avoid math coursework is one of the most influential barriers to their career development. However, it may be more accurate to say that girls are discouraged from pursuing advanced math, which sets them up at an early age to experience barriers to their career development. Among the additional barriers offered are women's low self-efficacy in male-dominated careers, stereotypes, restricted vocational interests, multiple role concerns, and educational system obstacles. Less attention is given to intersectionalities and factors that support women's career choices and work satisfaction.

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THE RELATIONAL BRAIN

The Neuroscience of Human Relationships: Attachment and the Developing Social Brain

By Louis Cozolino. Norton Series on Interpersonal Neurobiology.
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The Neuroscience of Human Relationships is a companion volume to Cozolino's previous book, *The Neuroscience of Psychotherapy* (2002), in the Norton Series on Interpersonal Neurobiology (Daniel J. Siegel, MD, series editor). This book is a pleasure to read. It is richly illustrated with clinical examples and synthesizes knowledge from the neurophysiological and psychological domains with psychological perspectives that will allow both seasoned clinicians and beginning therapists "to integrate a brain-based understanding of human development, mental health, and mental illness" (p. 307) into their psychodynamic paradigms. The references are excellent. Best of all, the work reflects the author's ebullient spirit.

Interpersonal neurobiology, beginning with the work of Alan Schore (2003a), explores the neurophysiological and psychological systems, particularly the right orbital medial prefrontal cortex as it shapes attachment systems and is shaped by them. Cozolino, following Siegel, helps us to understand how the brain is a relational organ. He uses the constructs of the "social brain" and the "social synapse" to emphasize the power of human social engagement dynamics. Cozolino hopes to unveil the social synapse and explore some of its many mechanisms (p. 5). He defines the social synapse as the space between us that also serves as "the medium through which we are linked together into larger organisms such as families, tribes, societies, and the species as a whole" (p. 5).

In noting that the brain is a social organ and that researchers have been mapping the neural circuitry of social behavior since the 1970s (p. 11), Cozolino is following a well-established pathway. More than 100 years ago sociologists Durkheim and Weber defined society as a network of relationships. Psychologist Janet believed that private minds must have a social origin. Vygotsky, following Janet's path, concluded that intramentalization evolved from intermentalization (Valsiner & van der Veer, 2000). Cozolino is helping us continue to evolve our understanding of the dynamics of mind-brain interactions. His core questions are, "Which networks comprise the social brain? Which neural systems shape attachment? How is the brain built and rebuilt by relationships?"

How do brains regulate one another during moment-to-moment interactions? How do parents, therapists, and educators activate and guide neuroplastic processes?" (p. 8).

The book begins with an exploration of the biological evolution of the central nervous system and then moves epigenetically through human development from infancy to old age. Cozolino provides a wealth of information about social engagement and attachment systems and fear-driven dissociation systems, layer by layer and chapter by chapter, as he correlates human subjective experience over the life span with biogenetic, neurochemical, and neurophysiological and psychological information. As he reviews the structural and functional networks that make up the social brain, we move from the evolution of the triune brain, including its biogenetic characteristics, to its development in each individual, beginning in utero. The neurophysiological growth of the infant's brain is correlated to the attachment system, implicit and explicit memory systems, imitation and mirror neurons, and resonance, attunement, and empathy.

Because every chapter builds on the preceding one and offers an enormous amount of cutting-edge information, the accumulation of knowledge becomes intense. The reader must provide his or her own anchoring psychological theory consistent from an evolutionary and developmental perspective. Many of us currently rely on attachment and mentalization paradigms to enrich traditional libidinal, object relations, and relational theory. Basically these paradigms state that a secure early attachment leads to a child's ability to regulate his feelings appropriately and resiliently; evolve a perspective on himself and others; be the agent of his thoughts and actions; welcome his curiosity; and enrich his capacity to love himself and love and be loved by others. These integrated capacities lead to empathy. And empathy, which Cozolino correctly distinguishes from the sympathetic contagion of emotion, is our highest mentalizing capability.

Cozolino is absolutely right about the urgent need to translate the flood of brain research, especially neuroimaging, into an understanding of human subjectivity and vice versa. However, an equally important concurrent task for psychotherapists is to translate psychological paradigms of the last century into contemporary models. Cozolino uses the constructs *ego* and *superego* from Freud's structural theory. They remain a shorthand for some fundamental aspects of the self, but they will undoubtedly be replaced by terms that capture more fully the dynamic nature of the attachment capacities and the

executive, moral, and introspective functions of the evolving human self.

Cozolino holds the classic Darwinian view on human evolution, namely that it is driven by instinctual physical survival, not by the search for happiness. "Thus much of the brain's functioning is based upon primitive fight-or-flight mechanisms as opposed to conscious and compassionate decision making" (p. 29). Cozolino thinks this is why the conscious and unconscious management of fear and anxiety are core components of our attachment relationships and character (p. 29). This is certainly the history of our biogenetic evolution, and these ideas form the core of Freudian metapsychology. Cozolino equates happiness with the absence of fear. However, Jaak Panksepp (1998) has demonstrated that mammals have a ludic area in the complex periaqueductal gray (PAG) zone of the midbrain. Laboratory mice engage in play, and their "laughter" can be heard in the ultrasonic range. When the neurotrophins oxytocin and vasopressin stimulate the PAG, positive attachment emotions, pleasurable sexuality, and playfulness exist in us.

Cozolino asks rhetorically, "But what does it mean to be 'fittest' in our modern society . . . [when the] freeway is our savanna?" (p. 13). I agree with his notion that the fittest will be the "the average citizen with a solid sense of self, navigating daily challenges and relationships comfortably" (p. 14). "The fittest will be those who are nurtured best" (p. 14). A point that is often overlooked, which Cozolino makes implicitly, is that for the past 12,000 years, our central mode of evolution has been cultural. This includes our wars, religions, governments, music, literature, architecture, fashion, and everything we, as humans, have believed or executed, both good and bad, including our freeways. Walter Freeman (1999) thinks the basic task of our brains is to create meaning. Arnold Modell (2003) believes imagination characterizes our brain functions, and George Lakoff (1987) states that metaphor is the link between conscious experience and unconscious memory. Perhaps we are not as lucky as mice, which can live only in the present moment. Our human, languaged consciousness, which includes our narrative memory, allows us to live in three time zones: the past, present, and future. This means that both our fear of nonexistence and our desire for happiness are shaped by our cultural evolution. Our capacity to change through both cultural and biological evolution will be challenged as we become a global society. Cozolino and I agree that we want to tame human aggression and find more

ways of creating individual self-esteem, happiness, and group harmony.

In chapter 5, Cozolino relates Freud's notion of the unconscious to right-brain functions because they develop earlier, are guided by emotional and bodily reactions, and manifest a nonlinear mode of processing that allows for multiple overlapping realities (p. 67). He also realizes that these characteristics correspond to Freud's conception of primary process thinking of early childhood as well as dreaming (p. 68). Our remembered dreams, when our brain and mind are cut off from external sensations and motoric activity, express this mode of thought. A person in a psychotic state, unable to think in a linear manner that relates logically to the world around him or her, is said to exhibit primary process rather than secondary process thinking. The point I hope to underscore with Cozolino is that in all these examples, we are talking about conscious expression of thought and feelings. Many people confuse primary process activity with implicit and procedural memory systems, which are unconscious networks of relationships with emergent properties. We realize now that all knowledge processing is an unconscious function just like all motoric and emotional networking. These structural and functional relationships represent implicit neural networks that operate just before conscious experience.

Cozolino is drawing some pretty tight correlations between phenomena of the mind and brain that reflect the biopsychosocial continuum. Clinicians who have not yet added brain functioning to their psychodynamic paradigms and who do not keep the brain in mind may not appreciate the daunting task of translating between neurophysiological or psychological functioning and human subjectivity. Currently many neuroscience researchers think that this translation cannot be accomplished in a meaningful way with our present state of knowledge, especially through neuroimaging. Neuroimaging is an amazing advance, but even in its functional form, it is only a photo of the complexity of events in the brain of a hundred billion neurons and a hundred trillion connections. Perhaps a comparison to bridge this complexity is of snapshots taken by helicopter over the Brazilian rain forest.

Furthermore, we clinicians must recognize that neurophysiological excitement and inhibition are not equivalent to psychological excitement and inhibition, and the only correlations we can really draw remain metaphorical. There is a danger in taking metaphors too literally and drawing correlations too

tightly. Many researchers working at the interface of the mind and brain believe that there is currently no real knowledge of what happens in the brain or where it happens when behavioral change occurs, whether it is change in the moment or long lasting, semipermanent change that is the result of many years of psychotherapy. For them our correlations are mere conjectures. We appreciate that our conjectures rest on metaphors and do not presume that they have the causality needed in the physical sciences. However, when we think about the change from Einstein's description of matter and energy to current quantum dynamics, we realize that no one has a handle on the ultimate truth. Many of us think that we must make these conjectures in order to translate between the mind-brain domains because our updated paradigms will improve our clinical skills. We understand that our self-corrections will be continuous, and we find that integrating information from all these domains is one of our most exciting contemporary challenges.

Cozolino draws on many authorities such as Damasio (1999), LeDoux (1996), and Schore (2003b), who concentrate on neocortical structures, perhaps reaching down to the amygdala, basal ganglia, and thalamus. This represents a top-down model of the mind-brain that needs to be complemented by a bottom-up model representing subcortical structures and functions of the paleomammalian brain. Porges's polyvagal theory (2007), which describes both a bottom-up and top-down model of social engagement, is an example of this. Another bottom-up theory, which is consistent with the evolution-based relational perspective of the brain and is complemented by neural net theory, comes from Jaak Panksepp's (1998) exploration of the midbrain.

Panksepp, whom Cozolino references, states that there is no place in the mind-brain that is not influenced by emotions. He discovered a number of prototypic emotional systems in the PAG zone of the midbrain of small mammals. These include a distributed system for attachment (oxytocin, vasopressin) valences expressed in sexual arousal, maternal nurturance, and play and a fear and rage system that organizes organism defense and affective attack. The attachment system is differentially aroused during the distress of separation and the pleasure of closeness. Panksepp also discovered the origin of the dopamine-driven seeking and expectancy or reward system in this midbrain region in the ventral tegmental area. He believes that these structural and functional midline networks constitute the lower core self and that their fibers carry

information to the higher midline core self of the orbital medial prefrontal cortex, anterior cingulate, insula, and other midline limbic areas (Panksepp & Northoff, 2009). The lower core self orients self to itself, whereas the higher cortical areas orient self to the world, to the external environment.

In Panksepp's integrative system emotions and motivations are instinctual but expand beyond sex and aggression. Panksepp defines this as the primary process network. (Note how different this definition is from Freud's.) Learning and memory networks of the neocortex then become secondary processes, and higher cognitive reasoning and planning functions become tertiary processes. In this bottom-up paradigm, the emotions form the base. Above them sit memory and learning. Next up is thinking, and planning is on top. Panksepp has shown that without these subcortical areas, the forebrain is devoid of experience.

Cozolino emphasizes the social brain and the social synapse because he believes that our experience of the world is constructed around the notion of the isolated self (p. 3). This position creates an either-or paradigm. However when we look at history, we can create an explanation that includes both our biological ability for contagion of emotion and our hard-won cultural evolution of individuality. During most of our evolution, group survival and group practices took precedence over the individual. (And we may be further along in the development of individualism than our Eastern cousins. In current studies of visual interpretation, Westerners pick out the item that stands out from the group, whereas Easterners focus on the items that enfold the image into a unified whole.)

The West's evolution of individuality began a mere 2,500 years ago in ancient Greece, where Aristotle was looking at humans as social animals and at society as something in nature that precedes the individual (Aristotle, *Politics*, ca. 328 B.C.E.). Over roughly two millennia, Western individuality suffered many discontinuities, including the centuries of primitivism in medieval Europe. Individuality, with its core value of individual freedom, was revived after the Reformation, because Western Europeans engaged in one of the most profound cultural evolutions in our history, namely the spread of literacy. Maryanne Wolf (2007) has demonstrated that the acquisition of reading and writing restructures brain networks that create more complex, abstract thought than the brain of the oral tradition. The 17th century was the period of Descartes, Spinoza,

and Newton, when we reinvented the scientific method.

Cozolino notes correctly that Western science has emphasized looking more deeply into individual units. The scientific method, which was the beginning of our empirical and deductive examination of matter, began to turn correlation into causality. Four hundred years ago the Western social brain believed that comets were heavenly portents. We practiced astrology and witch burning. It was then, not a century ago, "that anatomists and physicians thought that the seat of consciousness resided in the heart with the brain serving only as the body's air conditioner, cooling the blood as it passed through" (p. 6). Since the 17th century, the scope and the explanatory and predictive power of science have been accelerating in an exponential fashion.

As noted earlier, our predecessors created good definitions of mind, brain, and society a century ago. Their experience of daily reality inspired their definitions, and their definitions, in turn, shaped their reality. We see in the cultural evolution of society that every generation redefines what it means by a concept, because its experience and hence understanding of that concept have changed. We see this most clearly in the evolution of art, fashion, language, and music. Today's automobile, plane, and phone bear little resemblance to the originals. The same holds true of our contemporary understanding of dark matter, molecular biochemistry, genomics, society, mind, and brain. Our predecessors would be amazed at contemporary paradigms. We conceive of individual units in intricate web connections or relationships that create networks with emergent properties. Structures are networks of relationships, and relationships define reality (Palla, Derenyi, Farkas, & Vicsek, 2005). Today both the physical and social sciences are understood through this relational perspective.

Psychoanalysis spent most of the 20th century exploring the private, intrapsychic subjective domain of human experience. As a necessary corrective, we began to explore attachment and relational paradigms about three decades ago. In infancy, co-construction of experience is crucial to the epigenetic unfolding of feeling, thought, and memory processes. However, the toddler who recognizes himself or herself in a mirror is already able to consciously and then unconsciously hold in mind private thoughts and feelings. This ability represents the earliest expression of conscious withholding from others and the beginning of Freud's dynamic unconscious. Deception, which our

species has perfected, may also begin at this time. We are very adept at hiding our private experience from ourselves and others. As we continue to grow, our individual perspective is increasingly shaped by our individual emotions, motivations, and thoughts. These all reflect our interconnections with others but are then recursively recontextualized within ourselves. Co-construction of experience occurs not just with those directly present but also with those who came before through their writings, art, music, philosophy, and scientific thought. And most importantly, we have dialogs with ourselves; we exist in relation to ourselves. That is the essence of human imagination, language, and consciousness, which thrive on both imitation and innovation (Tomasello, 1999). This is what promotes the continuous cultural evolution of the human self.

The relational perspective has been a wonderful and necessary addition, but it does not take precedence over the intrapsychic one. Had Freud, Jung, and Janet begun by studying the intersubjective experience, we would now be focusing on the private, intrapsychic experience of the brain–mind. Dreams illustrate this concept well. No one has ever been able to convey to another the dream sounds, colors, architectural wonders, or narratives—the total phenomenological complexity of a single dream. The best we can do is create skeletal shadows of our dreamscapes.

Cozolino has produced a very instructive book, emphasizing the necessity and achievability of productive, harmonious, and loving social relationships, which he calls the social synapse of the social brain. He teaches therapists to bridge the biopsychosocial domains and begin to use integrated systems of brain–mind functions in their psychodynamic paradigms. Those of us who have had the privilege of witnessing change in our patients believe that therapy has the potential to change the default, implicit emotional and motivational systems of the brain–mind created in infancy at the most elementary levels. And we believe that change is created through the reworking, implicitly and explicitly, of the attachment relationship.

Even though many of us understand that our paradigms will evolve tomorrow, this translation endeavor is of the utmost importance today as neuroscience threatens to override human subjective experience in the clinic. For many reasons (including the economics of health care and the infusion of research money), psychiatry and psychology are becoming

more centered on expedient treatments and psychopharmacological fixes. This trend will probably accelerate as our ever more sophisticated technology takes us into the domain of genetic and epigenetic research and genetic tweaking, and we, as a global species, evolve into cyberspace.

I recommend this book enthusiastically to all my colleagues. Over the past 6 months, I have found myself rereading chapters and enriching my own ability to integrate brain–mind areas that were previously isolated islands of thought.

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