

# Myth, Metaphor, and the Evolution of Self-Awareness

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## ABSTRACT

*Classic myths survive generation after generation, because they teach people how to perceive and respond to the surrounding world. Myths supply a set of embodied metaphors to live by. This paper examines the relationship between myth, metaphor, and self-awareness. The myth of Oedipus is revisited using lenses of interpersonal neurobiology and second-order cybernetics, where observers become self-referentially entangled with the observed. Whereas Freud interpreted the Oedipus story literally, this paper examines the myth self-referentially. By looking inward rather than outward, early relational trauma plus implicit learning provide clues to life's external riddles and uncertainties. Wisdom gleaned from this ancient myth lines up with contemporary computational studies, when the capacity for self-reference is interpreted as a Universal Turing Machine with full memory—both implicit and explicit—for its own past. A cybernetic perspective dovetails with research on the neurobiology of memory and cognitive studies from developmental psychology. The same mental skills required for self-reference and metaphorical thinking within individuals signal internal complexity and mature cognition collectively necessary to enter the modern arena of self-reflective consciousness.*

**Keywords:** Complexity, Metaphor, Myth, Oedipus, Paradox of Self-Reference, Psychoanalysis, Second-Order Cybernetics, Universal Turing Machines

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## INTRODUCTION

*Newtonian physics implied the universe was a vast machine—the quantum model showed there is no machine, but a mysterious entanglement with the observer. The area of preparation must now include the participant observer. Newtonian physics suggested an end to free will and creativity—the quantum model put the observer back into the universe as a participant/creator. (William Brandon Shanley)*

During ancient times, myths were passed on as stories told from generation to generation. Yet, for most of contemporary Western society, it is not ancient tales but instead modern science and math predominantly guide the way. Ancient tales—of Greek heroes and Gods, of Buddha, Arjuna, and the Ramayana—are still around, but have fallen largely into collective shadows. Especially in written form, the classics easily lose their luster compared with the bright icons and shiny features of computers, ipads, tablets, and other digital devices.

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Our collective excitement is drawn toward science partly because of its concrete power to transform information, communication, and the general quality of life. Science and especially physics comprise our culture's contemporary creation mythology (Marks-Tarlow, 2003). Whereas the 19<sup>th</sup> century Newtonian model of physics separated observers cleanly from the realm of the observed, 20<sup>th</sup> and 21<sup>st</sup> century models offer inner and outer worlds more fully and reflexively blended (see Orsucci & Sala, 2008; 2012). In gaming technologies, virtual avatars take the place of real bodies, while in medical research, thoughts drive prosthetic limbs (Peck, 2012).

Of all forms of contemporary science, inner and outer worlds appear blend in fantastic, even surreal ways, within quantum physics. Quantum entanglement, nonlocality, and the uncertainty paradox are just a few ideas that shake our sense of ordinary reality to the core. This is the stuff of modern fairytales, a good example of which is the book, *Alice and the Quantum Cat* (Shanley, 2011). Written in the tradition of Martin Gardner (1999), author of *The Annotated Alice*, Shanley introduces his book as "A Twenty-First Century Myth." Its chapters are written by physicists, e.g., Amit Goswami (e.g., 1995) and Fred Alan Wolf (e.g., 1995), and chaos and complexity theorists, e.g., John Briggs and David Peat (e.g., 2000), who regularly popularize physics in service of new ways to think, see, and be in the world. The book's main character, the Quantum Cat, is a blend of the Cheshire Cat, whose smile appears out of nowhere, and Schrödinger's Cat, who embodies the quantum paradox of existing and not existing simultaneously. With Alice as his sidekick, the Quantum Cat battles a sterile, Newtonian, mechanistic world, where observers and observed are so antiseptically separated as to threaten their very aliveness:

*In Newton's world, ambiguity was the enemy—mechanism stresses the absolute, the unchanging and the certain—things are 'either/or,' 'good/bad.' In the quantum world real-*

*ity is 'both/and'—a coexistence of mutually contradictory possibilities, all equally true, each one a potentially possible constituent of reality. Acausal, non-local synchronicities can give rise to events that seem to 'pop-up' out of thin air. There are no isolated, separate, closed systems in Nature. In this universe of wholeness, everything affects everything else, from the most fundamental particles to faraway galaxies at the edge of the universe.*

The central theme of Shanley's quantum tales is the Observer Effect, through which the awareness of observers forms deep, invisible foundations for material existence. With observers and observed intertwined to the point of full interpenetration, this world view implies a radically relational perspective. Here it becomes absurd to try to parse out isolated elements, people, or traditional concepts of cause and effect. Much akin to the worldviews revealed by Maya's veil within Hinduism or the Indra's net within Buddhism, the appearance of observers as separated from observed is mere illusion, born of evolutionary needs for survival. And so mythology of contemporary science dovetails with ancient mystical and spiritual traditions the world over (Marks-Tarlow, 2003; 2008).

Just as *The Quantum Cat* uses science to illustrate microscopic truths, so too does this paper use science to reveal deep truths implicit within the neurobiological weave of our social and relational worlds. After a section on myth broadly, I next return to the myth of Oedipus. I explore the Riddle of the Sphinx as a paradox of self-reference, which Oedipus is uniquely positioned to answer precisely because of his own traumatic origins. Within Oedipus's relentless search for truth, we will see how recursive, self-referential loops in consciousness increase cognitive capacity, enabling the leap from concrete to metaphorical thought. By using second-order, cybernetics to explore the dynamic, embodied unconscious of Oedipus, observer and observed remain hopelessly entangled, this time at macroscopic levels of body, brain, and relationship.

## THE SELF-REFERENTIAL ROLE OF MYTH

Throughout history, mythology has inspired the psychology of everyday life at implicit levels. Myths help to organize cultural categories and mores by supplying archetypal stories with roles, rules, and relationships that are prescriptive. Speculation exists that ancient and traditional peoples experienced myths quite literally (e.g., Jaynes, 1976), with people hearing the voices of Gods as if from the outside, speaking to them personally from above in order to guide the behavior of mortals below. Over time, people have come to hold myths more metaphorically, where they serve the role of “as-if” tales that point toward universal themes, predicaments, and solutions. Finally, over recent decades, the social sciences, particularly psychology, have shifted focus to view myths in increasingly symbolic and self-referential terms. Especially since Jung’s groundbreaking work (e.g., 1961), contemporary analyses examine myths as they illuminate the inner world and culture of the mythmakers themselves.

If one myth that rises above all others to signal entry into modern consciousness, it is the ancient Greek tale of Oedipus. This story has been analyzed throughout the millennia by well-known thinkers, such as Aristotle, Socrates, Nietzsche, Lévi-Strauss, Lacan and Ricoeur. Some (e.g., Lévi-Strauss, 1977; Ricoeur, 1970) have understood the myth as the individual quest for personal origins or identity. Others (e.g., Aristotle, 1982, Nietzsche, 1871/1999) have used sociopolitical and cultural lenses to focus on the tale’s prohibitions against the very taboos it illustrates. Indeed, this cautionary tale’s prohibitions against infanticide, patricide and incest helped to establish the modern day state. This was accomplished partly by erecting boundaries to protect society’s youngest and most vulnerable members, and partly by prohibitions serving as a kind of social glue to bind individuals into larger collective units. Evolutionarily, these prohibitions have pre-

vented inbreeding, while maximizing chances for survival and healthy propagation within the collective gene pool.

Perhaps the most prominent analyst of the Oedipus myth has been Sigmund Freud. At the inception of psychoanalysis, this myth proved central to Freud’s psychosexual developmental theory as well as to his topographical map of the psyche. That this tragic hero killed his father and then married and seduced his mother occupied the psychological lay of the land, so to speak, immortalized as the “Oedipal complex.” Whereas Freud (1900) viewed the myth quite literally, in terms of impulses and fantasies towards real people, his successor Jung (1956) interpreted it more symbolically, in terms of intrapsychic aspects of healthy individuation.

My main purpose in revisiting early origins of psychoanalysis that pivot around the Oedipal myth is to re-examine the narrative from a second-order cybernetic point of view. Cybernetics is the study of information; second-order cybernetics views information science self-referentially by implicating the observer within the observed (see Heims, 1991). From the vantage point of self-reference, the Oedipus story yields important clues about how the modern psyche became more complex via recursive loops in consciousness. Such internal feedback loops in body, brain, and mind allow implicit memories to become explicit, leading to an increased, more complex capacity for self-reflection.

In sections to follow, I refresh the reader’s memory first by briefly reviewing the Oedipus myth. Then I reason to a new level of abstraction, by applying the approach of Lévi-Strauss to treat the myth structurally. I view the Sphinx’s riddle as a paradox of self-reference and argue that both the riddle of the Sphinx and the life course of Oedipus bear structural similarities that signify the self-reflective search for origins. I examine the shift from a literal Freudian interpretation to a more symbolic Jungian one within the early history of psychoanalysis and then show how Freud’s interest in the Oedipus

myth was itself self-referentially re-enacted in real life through his struggles for authority with Carl Jung.

Next I follow Feder (1974) to examine Oedipus clinically. Oedipus' relentless search for the truth of his origins, combined with his ultimate difficulty accepting what he learns, appears at least partly driven by psychobiological symptoms of separation and adoption trauma combined with the physical abuse of attempted murder by his biological father. In the process, I link contemporary research on the psychoneurobiology of implicit versus explicit memory with a cybernetic perspective and the power of Universal Turing Machines able with full access to implicit and explicit memory. Finally, I claim that affective, imagistic, and cognitive skills necessary to move developmentally from concrete to metaphorical thinking, and eventually to full self-actualization, relate to implicit cognition within Lakoff's (1999) embodied philosophy as well as to mature, abstract cognition within Piaget's (e.g., Flavell, 1963) developmental psychology. Recursive loops in consciousness, by which the observer can be detected within the observed, signal enhanced internal complexity (Marks-Tarlow, 2008, 2012) and the power of self-reflection to break intergenerational chains of abusers unwittingly begetting abusers.

Please note that although I refer to Sigmund Freud amply throughout this paper, my purpose is primarily historical and contextual. I do not intend to appeal to Freud as the ultimate authority so much as the originator of psychoanalysis and precursor to contemporary thought and practice. Especially since Jeffrey Masson (1984) documented Freud's projection of his own neuroses onto his historical and mythological analyses, including the invention of patients to justify his theories, Freud largely has been de-centered, if not dethroned, within most contemporary psychoanalytic communities. Yet, contemporary neuropsychanalysis reinstates some of Freud's early claims about the nature of the human unconscious (Schore, 2011; 2012; Solms, 2004; Solms & Turnbaull, 2002). Meanwhile, through lens of interpersonal

neurobiology, one of the implicit themes drawn out by the myth of Oedipus highlights intersubjectivity as adopted by more present day forms of relational psychoanalysts (e.g., Bromberg, 1998; Mitchell, 1988; Stern, 1983). Along with revealing roots of these contemporary trends, I hope my reading of Oedipus helps to reinstate the majesty of this myth to the human plight, without sacrificing the many gains and insights gleaned by psychoanalysts and other psychotherapists since Freud's time.

## THE MYTH OF OEDIPUS

*There is an ancient folk belief that a wise magus can be born only from incest; our immediate interpretation of this, in terms of Oedipus the riddle solver and suitor of his own mother, is that for clairvoyant and magical powers to have broken the spell of the present and the future, the rigid law of individuation and the true magic nature itself, the cause must have been monstrous crime against nature—incest in this case, for how could nature be forced to offer up her secrets if not by being triumphantly resisted—by unnatural acts? (from Frederick Nietzsche's, The Birth of Tragedy)*

In the myth of Oedipus, which dates back to Greek antiquity, King Laius of Thebes was married to Queen Jocasta, but the marriage was barren. Desperate to conceive an heir, King Laius consulted the oracle of Apollo at Delphi, only to receive a shocking prophecy—the couple should remain childless. Any offspring of this union would grow up to murder his father and marry his mother. Laius ordered Jocasta confined within a small palace room and placed under strict prohibitions against sleeping with him.

But Jocasta was not to be stopped. She conceived a plot to intoxicate and mate with her husband. The plot worked, and a son was born. Desperate once again to prevent fulfillment of the oracle, Laius ordered that the boy's ankles be pinned together and that he be left upon a mountain slope to die. But the shepherd who was earmarked to carry out this order took pity on

the boy and delivered him instead to yet another shepherd. This second shepherd brought the wounded boy to King Polybus in the neighboring realm of Corinth. Polybus, who suffered from a barren marriage, promptly adopted the boy as his own. Due to his pierced ankles, the child was called "Oedipus." This name, which translates either to mean "swollen foot" or "know-where," is telling, given Oedipus' life-long limp plus his relentless search to "know-where" he came from. I return to the self-referential quality of Oedipus' name in a later section.

As Oedipus matured, he overheard rumors that King Polybus was not his real father. Oedipus was eager to investigate his true heritage, and unwittingly following in the footsteps of his biological father, he visited the oracle at Delphi. The oracle grimly prophesized that Oedipus would murder his father and marry his mother. Oedipus was horrified by the prophesy; much like his biological father before him, he attempted to avoid this fate. Still believing Polybus his real father, Oedipus decided not to return home. Instead, he took the road from Delphi towards Thebes, rather than back toward Corinth.

Unaware of the underlying situation, Oedipus met his biological father, who appeared to him as a stranger at the narrow crossroads of the three paths both separating and connecting the cities of Delphi, Corinth and Thebes. King Laius ordered the boy out of the way in order that royalty may pass. Oedipus responded that he himself was a royal prince of superior status. Laius ordered his charioteer to advance in order to strike Oedipus with his goad. Enraged, Oedipus grabbed the goad, in the process striking and killing Laius plus four of his five retainers. This left a single witness to tell the tale.

Upon Laius' death appeared the Sphinx, a lithe monster perched high on the mountain. This creature possessed the body of a dog, the claws of a lion, the tail of a dragon, the wings of a bird and the breasts and head of a woman. The Sphinx began to ravage Thebes, stopping every mountain traveler attempting to enter the city unless they solved her riddle:

*What goes on four feet in the morning, two at midday and three in the evening?*

Whereas the priestess of the Oracle at Delphi revealed a glimpse of the future to her visitors, often concealed in the form of a riddle, the Sphinx, by contrast, killed anyone unable to answer her riddle correctly. The Sphinx either ate or hurled her victims to their death on the rocks below. Until the arrival of Oedipus, the riddle remained unsolved. With no visitors able to enter the city, trade in Thebes had become strangled and the treasury depleted.

Confronted by the Sphinx's riddle, Oedipus responded correctly and without hesitation, to indicate that it is "mankind" who crawls on four legs in the morning, stands on two in midday and leans on a cane as a third in the twilight of life. The Sphinx was horrified at being outwitted, and responded by self-referentially applying the punishment she had meted out to others to herself: she cast herself to her death on the rocks far below. As a consequence, Thebes was freed. As reward for saving the city, Oedipus was offered its throne plus the hand of the deceased king's widow Jocasta. Still unaware of his true origins, Oedipus accepted both honors. He ruled Thebes and married his mother, with whom he multiplied fruitfully. In this manner, Oedipus fulfilled the second part of the oracle.

But the city of Thebes was not finished suffering and soon was stricken with a horrible plague and famine, rendering all production barren. Out of eagerness to end the affliction, Oedipus once again consulted the oracle. This time, he was told that in order to release Thebes from its current plight, the murderer of Laius must be found. Because he wanted only what was best for the city, Oedipus relentlessly pursued a quest for truth. He made an important declaration: whenever Laius' murderer was found, the offender would be banished forever from Thebes.

In line with his blind search for Laius' murderer, Oedipus called in the blind prophet Tiresias to help. But Tiresias refused to reveal what he knew. In the meantime, Jocasta intuited

the truth and dreaded the horror of her sins exposed. Unable to bear what she saw, Jocasta committed suicide by hanging herself. Soon Oedipus discovered that the one he sought was none other than himself. After learning that he had indeed fulfilled the Oracle by murdering his father and marrying his mother, Oedipus was also unable to bear what he saw. Tearing off a brooch from Jocasta's hanging body, Oedipus blinded himself. He then faced the consequence that he himself had determined most just. As Laius' banished murderer, Oedipus was led into exile by his sister/daughter Antigone.

Here ended the first of Sophocle's tragedies, "King Oedipus." The second and third of this ancient Greek trilogy, "Antigone" and "Oedipus at Colonus," detail Oedipus' and his sister/daughter's extensive wanderings. Oedipus' tragic insight into unwittingly having committed these crimes of passion brought the mature man eventually out of suffering and into wisdom. In later years, Oedipus reached a mysterious end in Colonus, near Athens, amidst the utmost respect from his countrymen. Despite his sins, Oedipus ended his life with the blessings of the Gods. In completion of one more self-referential loop, Oedipus' personal insight informed the very land itself, as Colonus became an oracular center and source of wisdom for others.

## NEW TWISTS TO AN ANCIENT MYTH

To Freud, the tale of Oedipus was initially conceived in terms of real sexual and aggressive impulses towards real parents. Later, he revised his seduction theory, by downplaying incestuous desires to the level of fantasy and imaginary impulses. Within Freud's three-part, structural model of the psyche, the Id was the container for unbridled, unconscious, sexual and aggressive impulses; the Super-Ego was a repository for social and societal norms; and the Ego was assigned the difficult task of straddling these two inner, warring factions, by *mounting defenses* and mediating the demands and restrictions of outside reality. We easily detect the influence of

Freud's military background within metaphors he chooses to detail his *conflict model* of the psyche (Berkower, 1970).

According to Freud, symptoms formed out of the tension between conscious and unconscious factors, including conflicting needs both to repress and express. Among many different kinds of anxiety Freud highlighted, an important symptom was castration anxiety. This was the fear that one's incestuous desire for one's mother would be discovered by the father and punished by him with castration. Both desire for the mother and fear of castration became sources of murderous impulses towards the father. Working through these feelings and symptoms consisted of lifting the repression barrier and thereby gaining insight into the unconscious origins of the conflict.

Note that Freud's developmental model of the psyche was primarily intrapsychic. Because he emphasized the Oedipal complex as a Universal struggle within the internal landscape of all (the adaptation for girls became known as the "Electra" complex, in honor of another famous Greek tragedy), it mattered little how good or bad a child's parenting. Most contemporary psychoanalytic theories, such as object relations (e.g., Klein, 1932), self-psychology (e.g., Kohut, 1971), intersubjectivity theory (e.g., Stolorow, Brandchaft & Atwood, 1987), and relational psychoanalysts (e.g., Bromberg, 1998; Mitchell, 1988; Stern, 1983); have abandoned the importance of the Oedipus myth partly by adopting a more interpersonal focus. Within each of these newer therapies, psychopathology is believed to develop out of real emotional exchanges (or the absence of them) between infants and their caregivers. Symptoms are maintained, re-enacted, and ideally altered within the relational context of the analyst/patient dyad.

## LIFE IMITATING THEORY

Prior to these relational theories, near the origins of psychoanalysis, the myth of Oedipus took on an ironic, self-referential twist when it became embodied in real life. Carl Jung, a

brilliant follower of Freud, had been earmarked as the “royal son” and “crown prince” slated to inherit Freud’s psychoanalytic empire (see Jung, 1961; Kerr, 1995; Monte & Sollod, 2003). The early intimacy and intellectual passion between these two men gave way to great bitterness and struggle surrounding Jung’s creative and spiritual ideas. In his autobiography, Jung (1961, p. 150) describes Freud as imploring: “My dear Jung, promise me never to abandon the sexual theory. This is the most essential thing of all. You see, we must make a dogma of it, an unshakable bulwark... against the black tide of mud... of occultism.”

For Jung, Freud’s topography of the psyche maps only the most superficial level, the “personal unconscious,” which contains personal memories and impulses towards specific people. Partly on the basis of a dream, Jung excavated another, even deeper, stratum he called the “collective unconscious.” This level had a transpersonal flavor, containing archetypal patterns common in peoples of all cultures and ages.

By acting as if there was room only for what Jung called the “personal unconscious” within the psyche’s subterranean zone, Freud appeared compelled to re-enact the Oedipus struggle in real life. He responded to Jung as if to a son attempting to murder his symbolic father. This dynamic was complicated by yet another, even more concrete, level of enactment: both men reputedly competed over the loyalties of the same woman, initially Jung’s patient and lover, later Freud’s confidant, Sabina Spielrein, (see Kerr, 1995).

Freud and Jung acted out the classic Oedipal myth at multiple levels, with Jung displacing Freud both professionally (vanquishing the King) and sexually (stealing the Queen). An explosion ensued when the conflict could no longer be contained or resolved. As a result, the relationship between Freud and Jung severed permanently. Jung suffered what some believe was a psychotic break (see Hayman, 1999), while others termed it a “creative ill-

ness” (see Ellenberger, 1981), from which he recovered to mine the symbolic wealth of his own unconscious.

Jung overcame his symbolic father partly by rejecting the Oedipus myth in favor of Faust’s tale. “Jung meant to make a descent into the depths of the soul, there to find the roots of man’s being in the symbols of the libido which had been handed down from ancient times, and so to find redemption despite his own genial psychoanalytic pact with the devil” (Kerr, 1995, p. 326). After his break with Freud, Jung self-referentially embodied his own theories about individuation taking the form of the hero’s journey.

Whereas Jung underscored the sun-hero’s motif and role of mythical symbols, mythologist Joseph Campbell (1949/1973) differentiated three phases of the hero’s journey: separation (from ordinary consciousness), initiation (into the night journey of the soul) and return (integration back into consciousness and community). This description certainly fits Jung’s departure from ordinary sanity, his nightmarish descent into haunting symbols, if not hallucinations, and his professional return to create depth psychology. Jung’s interior descent and journey is chronicled in writing and pictures in the *Red Book*. Although this 205 journal was written between 1914 and 1930, following Jung’s fallout with Freud, it was released publicly only in 2009, due to decades of suppression by Jung’s heirs.

Jung and his followers have regarded the Oedipus myth less literally than Freud. In hero mythology, as explicated by one of Jung’s most celebrated followers, Eric Neumann (1954/93), to murder the father generally and the King in particular, was seen as symbolic separation from an external source of authority, in order to discover and be initiated into one’s own internal source of guidance and wisdom.

Whereas Freud viewed the unconscious primarily in terms of its negative, conflict-ridden potential, Jung recognized the underlying universal and positive potential of the fertile

feminine. But in order to uncover this positive side, one first had to differentiate and confront the destructive shadow of the feminine. At the archetypal level, some aspects of the feminine can feel life threatening. To defeat the Sphinx was seen as conquering the Terrible Mother. In her worst incarnation, the Terrible Mother reflected the potential for deprivation and destructive narcissism within the real mother. In some cultures, e.g., the Germanic fairytale of Hansel and Gretel, the Terrible Mother appeared as the Vagina Dentate, or toothed vagina, a cannibalistic allusion not to the Freudian fear of castration by the father, but rather to the Jungian anxiety about emasculation by the mother.

Symbolically, once the dark side of the Terrible Mother was vanquished, her positive potential could be harvested. To have incest and fertilize the mother represented overcoming fear of the feminine, of her dark chaotic womb, in order to tap into riches of the unconscious and bring new life to the psyche. Psychologically we can see how Sphinx and incest fit together for Neumann (1954/93): The hero killed the Mother's terrible female side so as to liberate her fruitful and bountiful aspect. For Jung, to truly individuate was to rule the kingdom of our own psyche, by overthrowing the father's masculine influence of power, the ultimate authority of consciousness, while fertilizing and pillaging the mother's feminine territory, that of the unconscious. By breaking with Freud and finding his way through his psychosis, Jung killed the King and overcame the Terrible Mother to harvest her symbolism for his own creative development, both in theory and self.

Judging from the drama of real life, both Freud and Jung arrived at their ideas at least partly self-referentially by living them out. Along with affirming Ellenberger's (1981) notion of "creative illness," this coincides with Stolorow's thesis that all significant psychological theory derives from the personal experience and worldview of its originators (Atwood & Stolorow, 1979/1993).

## RIDDLE AS PARADOX

As mentioned, in the last several decades, the Freudian interpretation of the Oedipus story largely has been laid aside. With the early advent of feminism, the significance of the tale to a woman's psyche was challenged. With the recognition that sexual abuse was often real and not just fantasy, later feminist thought challenged Freud's early abandonment of his seduction theory. As knowledge about the neurophysiology of the posttraumatic stress condition increased, so has clinical interest in "vertical," dissociative splits between cortical and subcortical aspects of the brain (e.g., Lanius, Vermetten & Pain, C., 2010; Rothschild, 2000; Schore, 2007; 2012), versus the "horizontal" splits maintaining Freud's repression barrier (see Kohut, 1977). Greater relational emphasis among contemporary psychoanalysts shifts interest towards early mother/infant attachment dynamics, as well as toward here-and-now relations between psychotherapist and patient. Finally, the current climate of multiculturalism disfavors any single theory, especially one universalizing development.

In the spirit of Levi-Strauss, I propose a different way of looking at the Oedipus myth. I aim to harvest meaning primarily by sidestepping narrative content to derive an alternative interpretation both structural and cybernetic in nature. When understood literally, both the "improbable" form the Sphinx embodies plus her impossible-seeming riddle present paradoxes that appear to contradict all known laws of science. Surely no creature on earth can literally walk on four, two and then three limbs during the very same day. With the possible exception of the slime mold, no animal changes its form of locomotion this radically; and not even the slime mold undergoes such complete metamorphosis in the course of a single day.

The Sphinx's riddle presents the type of "ordinary" paradox that science faces all the time. Here, paradox is loosely conceptualized

as a set of facts that contradicts current scientific theory. Just as Darwin's embodied evolution proceeds in fits and starts (e.g., Gould, 1977), so too does the abstract progression of scientific theory. Kuhn (1962) described the erratic evolution of scientific theory, when resolution of ordinary contradiction leads to abrupt paradigm shifts that offer wider, more inclusive contexts in which to incorporate previously discrepant facts.

Beyond this type of "ordinary" scientific paradox, the Sphinx's riddle was essentially a paradox of self-reference (Marks-Tarlow, 2008a, 2008b, and 2008c). Within the history of mathematics, paradoxes of self-reference have arisen since ancient Greek times. A good example is The Liar: "This sentence is a lie," which is true only if false, and false only if true. Paradoxes of self-reference ultimately destroyed all hopes of mathematics supplying a logical foundation that is entirely complete and consistent. Instead, paradoxes of self-reference require creative leaps outside of their normal parameters, which is exactly what Oedipus accomplished by solving the Sphinx's riddle. The solution—humanity—required a leap under the surface to deep understanding of the nature of being human, including knowledge of self. In order to know what crawls on four legs in the morning, walks on two in midday and hobbles on three in the evening, Oedipus had to understand the entire human life cycle. He needed to possess intimate familiarity with physical changes in the body, ranging from the dependency of infancy, through the glory of maturity, to the waning powers of old age.

To approach the riddle without self-reference was to look outwards, to use a literal understanding, and to miss a metaphorical interpretation. To approach the riddle with self-reference was to seek knowledge partly by becoming introspective. At a deep, somatic level, Oedipus was uniquely positioned to apply the riddle to himself. Almost killed at birth and still physically handicapped, he harbored virtual, vestigial memories of death in life. His limp and cane were whispers of a helpless past and harbingers of a shattered future.

Self-referentially, Oedipus' own life trajectory showed the same three parts as the Sphinx's riddle. Through the kindness of others Oedipus survived the traumatized helplessness of infancy. In his prime, he proved more than able to stand on his own two feet—strong enough to kill a king, clever enough to slay the proverbial monster, and potent enough marry a queen and spawn a covey of offspring. Ironically, in the case of our tragic hero, it was Oedipus' very insight into his own origins that led to the loss of his kingdom and wife/mother, leaving him to hobble around blindly in old age, physically leaning on his cane, and emotionally learning upon the goodness of others, primarily his daughter/sister, Antigone.

The namesake and body memories of Oedipus connected him with chance and destiny, past and future, infancy and old age. Recall that the name Oedipus means both "swollen foot" and "know-where." Feder (1974/1988) analyzed the Oedipus myth in terms of the clinical reality of adoption trauma. Like many adopted children, Oedipus was relentlessly driven to seek his own origins in order to "know where" he came from both genetically and socially.

Taking this approach a step further, we can see the impact of early physical abuse—attempted infanticide—on the neurobiology of different memory systems. Oedipus "knows where" he came from implicitly in his body due to his "swollen foot," even while ignorant of traumatic origins explicitly in his mind. This kind of *implicit memory* has gained much attention in recent clinical lore (e.g., Bucci, 2011; Cortina & Liotti, 2007; Fosshage, 2011; Mancia, 2006; Marks-Tarlow, 2011, 2012, 2013; Rothschild, 2000; Ruth-Lyons, 1998; Schore, 2010, 2011, 2012; Siegel, 2001). In early infant development, *implicit memory* is the first kind to develop. Implicit learning includes unconscious processing of exteroceptive information from the outer world as well as interoceptive information from the inner world. Such information helps tune ongoing perception and emotional self-regulation in the nonverbal context of relationships with others. In this way contingent

versus non-contingent responses of caretakers become hardwired into the brain and body via particular neural pathways. While alluded to by others, e.g., Ornstein (1973) and Allan Schore (2001; 2010; 2011; 2012) specifically proposed that implicit memory exists within the right, nonverbal, hemisphere of the human cerebral cortex to constitute the biological substrate for Freud's unconscious instincts and memories. Although hotly contested, neurobiological evidence mounts for Freud's repression barrier as hardwired into the brain (e.g., Solms, 2004).

Schore proposed a vertical model of the psyche, where the conscious, verbal, mind is localized in the left hemisphere of the brain, while the unconscious and body memory is mediated by the nonverbal right hemisphere (for most right handed people). The hemispheres of the brain and these different modes of processing are conjoined as well as separated by the corpus callosum, with the perspective of only one hemisphere coming forward at any given time (McGilchrist, 2009). Early trauma plus his secret origins caused a haunting and widening of the gap between what Oedipus' body knew versus what Oedipus' mind knew. Oedipus' implicit memory of his early abandonment and abuse became the invisible thread that provided deep continuity despite abrupt life changes. His implicit memory offered a clue to the commonality beneath the apparent disparity in the Sphinx's three-part riddle.

Structurally, to solve the riddle became equivalent to Oedipus' self-referential quest for explicit memory of his own origins. This interpretation meshes with anthropologist Lévi-Strauss' (1977) emphasis on structural similarities within and between myths, plus the near universal concern with human origins. It also dovetails with Bion's (1983, p. 46) self-referential understanding of the Sphinx's riddle as "man's curiosity turned upon himself." In the form of self-conscious examination of the personality by the personality, Bion uses the Oedipus myth to illuminate ancient origins of psychoanalytic investigation.

## METAPHORICAL THINKING IN COGNITIVE DEVELOPMENT

In order to solve both the riddle of the Sphinx as well as that of his own origins, Oedipus had to delve beneath the concrete level of surface appearances. Here he'd lived happily, but in ignorance, as children and innocents are reputed to do. Ignorance may have been bliss, but it did not necessarily lead to maturity. Prior to Oedipus solving the riddle, humankind lived in an immature state, an idea supported by the work of Julian Jaynes (1976). Writing about the "bicameral mind," as mentioned earlier, Jaynes speculated that ancient humanity hallucinated gods as living in their midst. Here myths were concretely embodied, serving as external sources of authority before such executive functions became internalized within the cerebral cortex of the modern psyche, including our increased capacities for self-reflection, inner guidance and self-control, all functions of the frontal lobes.

The Sphinx's riddle was a self-referential mirror reflecting and later enabling explicit memory and knowledge of Oedipus' traumatic origins. Upon successfully answering the riddle, Oedipus bridged the earlier, developmental territory of the "right mind" with the evolutionarily and developmentally later left-brain (see Schore, 2001). In the process, Oedipus healed and matured on many levels. Not only did he address his castration fears by conquering the Terrible Mother in the form of the Sphinx after killing the Terrible Father, but also and perhaps more significantly, Oedipus made the leap from concrete to metaphorical thinking. By understanding "morning," "midday" and "evening" as stages of life, he demonstrated creativity and mental flexibility characteristic of internal complexity.

Cognitive linguists Lakoff and Johnson (1980) have suggested that metaphor serves as the embodied basis for all abstract thinking. More recently, Lakoff and Johnson (1999) argued that metaphor forms part of the implicit

memory of the cognitive unconscious, where its immediate conceptual mapping is hard-wired into the brain. These researchers speculate that all cognitive activity is embodied, because it derives from a primary set of metaphors that surround how the body moves, functions and interacts in the physical and social world in which we are embedded. Verticality and balance are among Lakoff and Johnson's primary metaphors. This makes a great deal of sense given early developmental milestones. Babies universally shift from the horizontal posture of lying down to more vertical postures by first rolling over, then sitting upright, crawling and eventually rising up to balance and walk on two legs. Each shift is associated with increased mobility, agency and potency in the world. Psychoanalyst Arnold Modell (2003) has picked up on the relevance of Lakoff and Johnson by writing extensively on how the body uses metaphor to bridge disconnected experience, create somatic templates, and weave the illusion of constancy amidst continual change. Meanwhile, I have emphasized the role of spontaneous, embodied metaphors during psychotherapy as portmanteaus, or double signs that represent the core problems to be addressed in therapy, while simultaneously pointing toward their solutions.

Lakoff and Johnson's notions of embodied metaphors also dovetail with Piaget's developmental epistemology (e.g., Flavell, 1963). Though many details are still disputed, overall Piaget's theory has remained one of the most important and universal accounts of intellectual development to date (see Sternberg, 1990). Using careful observation and empirical studies, Piaget mapped the shift from a sensorimotor period of infancy, through the pre- and concrete operations of early childhood, into a formal operations stage of later childhood characterizing the adult, "mature" mind. Piaget's hallmark of maturity involved freedom from the particulars of concrete situations. This grants cognitive flexibility necessary for both abstract and metaphorical thinking. In sum, Oedipus's leap from concrete to metaphorical thinking can be understood both as an important developmental step for the individual as well as an important

historical leap in the history of collective consciousness.

## SELF-REFERENCE AND UNIVERSAL TURING MACHINES

So far, I have suggested that self-reference is central to a metaphorical solution of the Sphinx's riddle. But self-reference also proves to be an essential part of cybernetics, the sciences of information. A computational model views the human psyche as a recursive system, where present behavior depends upon how it has processed its past behavior. Within abstract machines, different computational powers depend deterministically upon a system's retrospective access to memory.

In computational science, power is ranked according to "Chomsky's hierarchy." At the bottom of the hierarchy lies the finite state automaton. This machine possesses only *implicit* memory for its current state. In the middle lies the push-down automaton. This machine possesses *explicit* memory, but with only temporary access to the past. At the top of Chomsky's hierarchy lies the Universal Turing Machine. This abstract machine possesses unrestricted, permanent and explicit memory for all past states.

Cyberneticist Ron Eglash (1999) provides a text analogy to contrast these differences: The least powerful machine is like a person who accomplishes all tasks instinctively, without the use of any books; in the middle is a person limited by books removed once they've been read; at the top is a person who collects and recollects all books read, in any order. The power of the Universal Turing Machine at the top is its capacity to recognize all computable functions.

The point at which complete memory of past actions is achieved marks a critical shift in computational power. It is the point when full self-reference is achieved, which brings about the second-order, cybernetic capacity of a system to analyze its own programs. My reading

of the Oedipus myth illustrates this very same point—that powerful instant when full access to memory dovetailed with self-reference to signal another step in the “complexification” of human consciousness (Marks-Tarlow, 2008).

## THE RIDDLE AS MIRROR

Just as the Sphinx presented a paradigm of self-reference to hold a mirror up to Oedipus, the myth of Oedipus also holds a mirror up to us as witnesses. The story of Oedipus reflects our own stories in yet another self-referential loop. Like Oedipus, each one of us is a riddle to him or herself. The tale rocks generation after generation so powerfully partly because of this self-referential quality, which forces each one of us to reflect upon our own lives mythically.

Throughout the tale, there is dynamic tension between knowing and not-knowing—in Oedipus and in us. Oedipus starts out naïvely not-knowing who he is or where he came from. We start out knowing who Oedipus really is, but blissfully unaware of the truth in ourselves. By the end of the tale, the situation reverses: Oedipus solves all three riddles, that of the Oracle of Delphi, that of the Sphinx and that of his origins, while ironically, we participant/observers are left not-knowing. We harbor a gnawing feeling of uncertainty—almost as if another riddle has invisibly materialized, as if we face the very Sphinx herself, whose enigma must be answered upon threat of our own death.

Eglash (1999) notes that the power of the Universal Turing Machine lies in its ability *not to know* how many transformations, or applications of an algorithm a system would need ahead of time, before the program could be terminated. *Paradoxically, to achieve full uncertainty about the future and its relationship to the past is symptomatic of increasing computational power.* This kind of fundamental uncertainty is evident collectively within the modern sciences and mathematics of chaos theory, stochastic analyses, and various forms of indeterminacy. For example, Heisenberg’s uncertainty principle states the impossibility of

precisely determining both a quantum particle’s speed as well as its location at the same time. Meanwhile, chaos theory warns of the impossibility of precisely predicting the long-term future of highly complex systems, no matter how precise our formulas or capacity to model their past behavior.

Experientially, we must deal with fundamental uncertainty with respect to the riddle of our own lives (see Marks-Tarlow, 2003), leaving us ultimately responsible to glean meaning from this self-reflective search. The Oedipus myth presents a self-referential mirror through which each one of us individually enters the modern stage of self-reflective consciousness. Capabilities for full memory, to consider the past and future, to contemplate death, to confront paradox, to self-reflect and to consider self-reference all represent critical levels of inner complexity that separate human from animal intelligence, the infant from the mature individual, plus the weakest from the most powerful computing machines.

## CONCLUSION

I end this paper by speculating how this complex state of full self-reference serves as a prerequisite to a fully self-actualized human being. To have thorough access to memory for the past plus the cognitive flexibility not to have to know the future represents a state of high integration between left and right brain hemispheres, between body and mind, and between implicit, procedural memory versus explicit memory for events and facts. Such integration maximizes our potential for spontaneous response and creative self-expression that is the hallmark of successful individuation.

Furthermore, I argue that this complex state of “good-enough” self-reflective awareness is necessary to break the tragic intergenerational chain of fate and trauma symbolized by Greek tragedy in general and the Oedipus myth in particular. At the heart of the Oedipus myth lies the observation, echoed by a Greek chorus, that those born into abuse unwittingly grow up to

become abusers. Laius' unsuccessful attempt to kill his son all but sealed Oedipus' fate to escalate this loop of violence by successfully killing his father.

The only way out of the fatalistic tragedy of abusers begetting abusers is to possess enough insight to unearth violent instincts before the deed is done, to exert sufficient self-control to resist and transcend such instincts, plus to tell a cohesive, self-reflective narrative. Multigenerational, prospective research within the field of attachment (e.g., Siegel, 1999) suggests that the best predictor of healthy, secure attachment in children remains the capacity for their parents to tell a cohesive narrative about their early childhood. It matters little whether the quality of this narrative is idyllic or horrific. What counts instead is whether parents possess the self-reflective insight to hold onto specific memories concerning their origins, which can be cohesively woven into the fabric of current life without disruption. This kind of self-referential reflection carries the full computational power of Universal Turing Machine. This provides the necessary mental faculties to break intergenerational chains of emotional and physical abuse. It also allows for creative self-actualization, without a pre-determined script, set upon the stage of an open future.

In life, people gain self-awareness by looking into the mirror of experience self-referentially. By looking backwards self-referentially toward past experience, we glean knowledge and meaning for dealing with present circumstances and moving toward the future wisely. Interestingly, within the field of neurobiology, there is current speculation that the brain itself is deeply intentional and forward looking, right down to the level of single cells (Freeman, 1999). Rather than representing static pictures from the past, memory is dynamically reconfigured according to ever-shifting present contexts (see Marks-Tarlow, 2008), as it serves the primary function of navigating through uncertainty toward the future. Indeed, the hippocampus, which is the main structure in the mammalian brain devoted to encoding long term memories, evolved out of the part of the brain that depends

upon place cells to record the what and where of current environmental context.

The role of uncertainty in moving with fullest complexity and computational power into the future is evident within new data mining techniques. Without knowing what is sought, these computational algorithms can sift through a mountain of material until clear patterns emerge. Whether such techniques are used wisely in ways consistent with humanistic values, increased self-awareness, and humanitarian aims, or whether they are abused in service of decreasing personal freedoms and further eroding the environment, only time will tell. Either way, both in the wetware of the human brain and in software of the computer, recursive loops continue to ensure that past, present, and future lose distinctive orientations, while observers continue to blend ever more seamlessly with the observed.

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## REFERENCES

- Aristotle, . (1982). *Poetics*: Vol. 23. *Loeb Classical Library*. Cambridge, MA: Harvard University Press.
- Atwood, G., & Stolorow, R. (1979/1993). *Faces in a cloud: Intersubjectivity in personality theory*. Northvale, NJ: Jason Aronson.
- Berkower, L. (1970). The military influence among Freud's dynamic psychiatry. *The American Journal of Psychiatry*, 127(2), 85–92. PMID:4919635
- Bion, W. (1983). *Elements of psycho-analysis*. Northvale, NJ: Jason Aronson.
- Briggs, J., & Peat, D. (2000). *Seven life lessons of chaos: Spiritual wisdom from the science of change*. New York, NY: Harper Perennial.
- Bromberg, P. (1998). *Standing in the spaces*. Hillsdale, NJ: Analytic Press.

- Bucci, (2011). The interplay of subsymbolic and symbolic processes in psychoanalytic treatment: It takes two to tango – But who knows the steps, who's the leader? The choreography of the psychoanalytic interchange. *Psychoanalytic Dialogues*, 21, 45-54.
- Campbell, J. (1949/1973). *The hero with a thousand faces*. Princeton, NJ: Bollingen Series, Princeton University.
- Cortina, M., & Liotti, G. (2007). New approaches to understanding unconscious processes: Implicit and explicit memory systems. *International Forum of Psychoanalysis*, 16, 204–212. doi:10.1080/08037060701676326
- Eglash, R. (1999). *African fractals: Modern computing and indigenous design*. Rutgers University Press.
- Ellenberger, H. (1981). *The discovery of the unconscious*. New York, NY: Basic Books.
- Feder, L. (1974). Adoption trauma: Oedipus myth/clinical reality. In G. Pollock, & J. Ross (Eds.), *The Oedipus papers*. Madison, CT: International Universities Press.
- Flavell, J. H. (1963). *The developmental psychology of Jean Piaget*. New York, NY: Van Nostrand. doi:10.1037/11449-000
- Fosshage, (2011). How do we “know” what we “know?” and change what we “know?” *Psychoanalytic Dialogues*, 21, 55-74.
- Freeman, W. (1999). Consciousness, intentionality, and causality. *Journal of Consciousness Studies*, 6, 143–172.
- Freud, S. (1900). *The interpretation of dreams* (J. Strachey, Trans.). New York, NY: Basic Books.
- Gardner, M. (1999). *The annotated Alice*. New York, NY: Norton.
- Goswami, A. (1995). *The self-aware universe*. Los Angeles, CA: Tarcher.
- Gould, S. J., & Eldredge, N. (1977). Punctuated equilibria: The tempo and mode of evolution reconsidered. *Paleobiology*, 3, 115–151.
- Hayman, D. (1999). *The life of Jung*. New York, NY: W.W. Norton.
- Heims, S. (1991). *The cybernetics group*. Cambridge, MA: The MIT Press.
- Jaynes, J. (1976). *The origin of consciousness in the breakdown of the bicameral mind*. Boston, MA: Houghton Mifflin.
- Jung, C. (1956). Symbols of transformation. In *Collected works*. London, UK: Routledge & Kegan Paul.
- Jung, C. (1961). *Memories, dreams, reflections*. New York, NY: Random House.
- Jung, C. (2009). *The red book*. New York, NY: Norton.
- Kerr, J. (1995). *A most dangerous method*. New York, NY: Vintage Books/Random House.
- Klein, M. (1932). *The psycho-analysis of children*. London, UK: Hogarth.
- Kohut, H. (1971). *The analysis of the self*. New York, NY: International Universities Press.
- Kohut, H. (1977). *The restoration of the self*. New York, NY: International Universities Press.
- Kuhn, T. (1962). *The structure of scientific revolutions*. Chicago, IL: University of Chicago Press.
- Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. Chicago, IL: University of Chicago Press.
- Lakoff, G., & Johnson, M. (1999). *Philosophy in the flesh: The embodied mind and its challenge to Western thought*. New York, NY: Basic Books.
- Lanius, R., Vermetten, E., & Pain, C. (2010). *The impact of early life trauma on health and disease: The hidden epidemic*. Cambridge, UK: Cambridge University Press. doi:10.1017/CBO9780511777042
- Lévi-Strauss, C. (1977). *Structural anthropology 1* (C. Jacobson, & B. G. Schoepf, Trans.). Harmondsworth: Penguin.
- Lyons-Ruth, K. (1998). Implicit relational knowing: Its role in development and psychoanalytic treatment. *Infant Mental Health Journal*, 19(3), 282–289. doi:10.1002/(SICI)1097-0355(199823)19:3<282::AID-IMHJ3>3.0.CO;2-O
- Mancia, M. (2006). Implicit memory and early un-repressed unconscious: Their role in the therapeutic process (How the neurosciences can contribute to psychoanalysis). *The International Journal of Psycho-Analysis*, 87, 83–103. PMID:16635862
- Marks-Tarlow, T. (2003). The certainty of uncertainty. *Psychological Perspectives*, 45, 118–130. doi:10.1080/00332920308403045
- Marks-Tarlow, T. (2008a). *Psyche's veil: Psychotherapy, fractals and complexity*. London, UK: Routledge.
- Marks-Tarlow, T. (2008b). Alan Turing meets the sphinx: Some new and old riddles. *Chaos & Complexity Letters*, 3(1), 83–95.

- Marks-Tarlow, T. (2008c). Riddle of the sphinx: A paradox of self-reference revealed and revealed. In *Reflecting interfaces: The complex coevolution of information technology ecosystems*. Hershey, PA: Idea Group. doi:10.4018/978-1-59904-627-3.ch002
- Marks-Tarlow, T. (2012). *Clinical intuition in psychotherapy: The neurobiology of embodied response*. New York, NY: Norton.
- Marks-Tarlow, T. (2013). *Awakening clinical intuition*. New York, NY: Norton.
- Masson, J. (1984). *The assault on truth: Freud's suppression of the seduction theory*. Horizon Book Promotions.
- McGilchrist, I. (2009). *The Master and his emissary: The divided brain and the making of the Western world*. Yale University Press.
- Michell, S. (1988). *Relational concepts in psychoanalysis: An integration*. Cambridge, MA: Harvard University Press.
- Modell, A. (2003). *Imagination and the meaningful brain*. Cambridge, MA: MIT Press.
- Monte, C., & Sollod, R. (2003). *Beneath the mask: An introduction to theories of personality*. New York: John Wiley & Sons.
- Neumann, E. (1954/1993). The origins and history of consciousness. Princeton, NJ: Princeton.
- Nietzsche, F. (1999). *The birth of tragedy and other writings (Cambridge texts in the history of philosophy)*. Cambridge, UK: Cambridge University Press. (Original work published 1871)
- Ornstein, R. (Ed., 1973). The nature of human consciousness. San Francisco: W.H. Freeman.
- Orsucci, F., & Sala, N. (2008). *Reflexing interfaces: The complex coevolution of information technology ecosystems*. Hershey, PA: IGI Global. doi:10.4018/978-1-59904-627-3
- Orsucci, F., & Sala, N. (2012). *Complexity science, living systems, and reflexing interfaces: New models and perspectives*. Hershey, PA: IGI Global. doi:10.4018/978-1-4666-2077-3
- Peck, M. (2012). *Prosthetics of the future: Driven by thoughts, powered by bodily fluids*. Retrieved from <http://spectrum.ieee.org/tech-talk/biomedical/devices/prosthetics-of-the-future-driven-by-thoughts-powered-by-bodily-fluids>
- Pollock, G., & Ross, J. (1988). *The Oedipus papers*. Madison, CT: International Universities Press.
- Ricoeur, P. (1970). *Freud and philosophy*. Cambridge, MA: Yale University Press.
- Rothschild, B. (2000). *The body remembers: The psychophysiology of trauma and trauma treatment*. New York, NY: W. W. Norton.
- Schore, A. (2001). Minds in the making: Attachment, the self-organizing brain, and developmentally-oriented psychoanalytic psychotherapy. *British Journal of Psychotherapy*, 17(3), 299–328. doi:10.1111/j.1752-0118.2001.tb00593.x
- Schore, A. (2010). The right-brain implicit self: A central mechanism of the psychotherapy change process. In J. Petrucelli (Ed.), *Knowing, not-knowing and sort of knowing: Psychoanalysis and the experience of uncertainty* (pp. 177–202). London, UK: Karnac.
- Schore, A. (2011). The right brain implicit self lies at the core of psychoanalytic psychotherapy. *Psychoanalytic Dialogues*, 21, 75–100. doi:10.1080/10481885.2011.545329
- Schore, A. (2012). *The science of the art of psychotherapy*. New York, NY: Norton.
- Shanley, W. (Ed.). (2011). *Alice and the quantum cat*. Pari, Italy: Pari Publishing.
- Siegel, D. (2001). Memory: An overview, with emphasis on developmental, interpersonal, and neurobiological aspects. *Journal of the Academy of Child & Adolescent Psychiatry*, 40(9), 997–1011. doi:10.1097/00004583-200109000-00008 PMID:11556645
- Solms, M. (2004). Freud returns. *Scientific American*, 83–89. PMID:15127665
- Stern, D. (1983). Unformulated experience: From familiar chaos to creative disorder. *Contemporary Psychoanalysis*, 19, 71–99. doi:10.1080/00107530.1983.10746593
- Sternberg, R. (1990). *Metaphors of mind: Conceptions of the nature of intelligence*. Cambridge University Press.
- Stolorow, R., Brandchaft, B., & Atwood, G. (1987). *Psychoanalytic treatment: An intersubjective approach*. Hillsdale, NJ: The Analytic Press.
- Wolf, F. (1995). *The dreaming universe: A mind-expanding journey into the realm where psyche and physics meet*. New York, NY: Touchstone.