

Brain Science as the Analytic Fourth: Commentary on Paper by Michael J. Gerson

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I support Michael Gerson’s aim to further the dialogue between neuroscience and psychoanalysis, especially in light of increasingly sophisticated brain imaging. Enhanced capabilities for simultaneous brain measurements inch interpersonal neurobiology ever closer to the psychoanalytic concept of intersubjective space. While it is inherently meaningful to distinguish between self and identity using lenses of brain science, Gerson’s argument would be significantly bolstered by a developmental perspective. 5
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In “Reconsidering Self and Identity Through a Dialogue Between Neuroscience and Psychoanalytic Theory,” Michael Gerson (this issue) argues for the conceptual language of dynamic systems theory while making a case to widen the foundation of psychoanalysis through multidisciplinary bridges into neuroscience. As Gerson notes, Freud’s (1895) grand vision in his “Project for a Scientific Psychology” was to anchor psychoanalytic theories of psyche and development to the foundation of underlying brain processes. Unfortunately, the science of Freud’s day fell short; ever since, psychoanalysts have rightly rebelled against overly narrow brands of reductionism that threaten to collapse mind into brain. 15

I remember well the first conference I attended in Los Angeles over a decade ago that promised a rapprochement between psychoanalysis and neurobiology. With a foot in both worlds, I was excited to partake in the event. Much to my distress, the program had been rigged from the start. A small group of psychoanalysts set out to ambush the lone neurobiologist. Under the banner of postmodernism, they branded every utterance out of the neurobiologist’s mouth as “scientism,” that is, as just another language on a par and no more privileged than any other language. The closed perspective of the presenters made for a terrible conference, much like the closed perspective of a psychoanalyst makes for a sterile psychotherapy. 20
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Staunch psychoanalytic thinkers are at times purists who attempt to uphold the complexity of clinical practice by separating the art of meaning-making from the science of empirical observation. Their aim is to protect the inner sanctum of psychoanalysis by drawing an inviolate circle around its hermeneutics. From this perspective, no form of science is considered nuanced or worthy enough to enter the sacred realm. Only during the past couple of decades has neuroscience come anywhere near the sophistication of psychoanalytic thought or theory. The rise 30

of nonlinear dynamics, especially complexity theory, provides a holistic perspective that is flexible enough to unify the science of clinical practice with its artful and even spiritual dimensions (see Marks-Tarlow, 2008). Concepts like chaos, fundamental unpredictability, and spontaneous emergence help to preserve the mystery, openness, awe, and ineffable qualities of a successful treatment. Meanwhile, the nascent discipline of interpersonal neurobiology (e.g., Badenoch, 2008; Cozolino, 2005; Marks-Tarlow, 2012; Schore, 1994, 2003a, 2003b, 2012) offers a relational paradigm that eliminates the danger of minds reduced to the workings of brains. Instead the causal loop is circular: Minds shape brains as much as the other way around. Within the context of early development, interpersonal neurobiology studies how the infant's immature brain is profoundly sculpted, tuned, and pruned by continual flows of emotional, informational, and arousal that circulate invisibly between babies and caretakers. 35 40

To keep abreast with this more complex relational perspective, brain imaging has advanced far enough to approach minute-to-minute embodied processes as they occur between people and within context. Consider a ground-breaking paper by the lab of Princeton University neuroscientist Uri Hasson (Stephens, Silbert, & Hassan, 2010). The group solved previous difficulties with the noise and physical clumsiness of fMRI machinery in order to make simultaneous measurements of two brains during real-time communication. They tracked the electrical activity in the brain of a speaker telling a story along with the brain of a listener hearing it. What the scientists discovered was widespread neural resonance between the two brains that extended far beyond the parietal and premotor areas that contain mirror neurons (specialized to fire whether a person makes an action or watches someone else making the same action), as well as beyond cortical areas related to speech production and reception. What is more, results also suggested that the greater the understanding displayed by the listener, the greater the brain synchrony with the speaker. Most remarkably, listeners who displayed the greatest understanding of the story revealed areas of neural resonance that actually *anticipated* the brains of speakers. Apparently, during excellent communication, not only do we follow the words of another person, but we also hang on to every nuance such that we can forecast what is to come. Psychologist Barbara Frederickson (2013) described Hassan's experiment this way: 45 50 55 60

Far from being isolated to one or two brain areas, really “clicking” with someone else appears to be a whole brain dance in a fully mirrored room. . . . Brain coupling, Hasson argues, is the means by which we understand each other. He goes even further to claim that communication—a true meeting of the minds—is a single act, performed by two brains. (pp. 44–45)

Gerson's aim to further the dialogue between neuroscience and psychoanalysis is important in light of experiments such as this. If neural synchrony exists between strangers who do not even have the advantage of meeting face-to-face, imagine what might be revealed when this technology can be applied to the exquisite intimacy of psychotherapists sitting in their offices with patients during highly charged emotional moments. From here, it represents but a short leap to visualize how degree and quality of brain resonance might one day serve as a sensitive gauge of effective psychotherapy. Should this day ever come, it would affirm Gerson's aim to bridge the two disciplines. Yet this possibility also would contrast with Gerson's assertion that psychoanalysis captures idiographic data applying to the level of the individual, while neuroscience captures nomothetic data applying to the level of the group. 65 70

Neuroscientist Francisco Varela (Varela & Shear, 1999) anticipated the potential for brain imaging to merge subjective and objective levels by capturing first person perspectives using third 75

person techniques. With the introduction of simultaneous measurement of brain activity, neural technology now ventures into intersubjective space. Indeed, brain imaging techniques used by Hassan's lab offers possibilities for a unique neural stamp for each idiosyncratic therapeutic dyad during each novel moment. Perhaps one day we will literally visualize the containing and germinating functions of psychotherapists. And if deep empathy includes anticipating the brain frequencies of patients, physical evidence may soon be available for how psychoanalysts succeed in "downloading" higher complexity into the psyches of patients. The immanent potential of brain imaging to capture intersubjective moments extends Ogden's analytic third into a newly emergent level of observation—what I call the "analytic fourth" in the title of this commentary.

Overall, Gerson's paper is forward-looking, and he is among an expanding number of psychoanalytic thinkers interested in bridging neuroscience with psychoanalysis. In his words:

Whereas neuroscience addresses human ontology through the physical, functional, and material organization of the brain, psychoanalysis is concerned with the meaning and significance of ontological experience . . . This is not to assert that psychoanalysis should aspire to be a branch of neuroscience or vice versa, but that both share a common interest in understanding the human condition and mitigating human suffering.(p. 4)

Whether during psychotherapy, in journal offerings, or an aspect of conferences, open exchanges between people predicated upon mutual understanding are critical to healthy dynamics. A complexity view of mental health (Marks-Tarlow, 2008; Siegel, 1999) emphasizes the free flow of energy and information across open boundaries in order for systems to self-organize to higher levels of complexity. In a paper published posthumously in the pages of this journal, Esther Thelen (2005) offered the metaphor of development as a stream, both dynamic and ever-changing, yet retaining the capacity for a stable course. I believe this metaphor of fluidity and stability amidst continual change applies as much to development of our field as it does to the development of individuals.

CONCEPTS OF SELF VERSUS IDENTITY

Beyond broad discourse between psychoanalysis and neuroscience, the main agenda of Gerson's paper is to distinguish "self" from "identity" by using neuroscience as an anchor for greater universality and specificity. After reviewing relevant psychoanalytic, psychological, and sociological literature, Gerson notes significant variability in how "self" and "identity" have been defined. He identifies common elements for each term and then addresses these elements from the perspective of neurobiology. This seems a reasonable and solid approach. As nonlinear neuroscientist György Buzsáki (2006) notes, certain top-down psychological concepts ultimately may not be considered "real" if they cannot be mapped onto corresponding brain mechanisms. Meanwhile, a deep understanding of brain processes might generate relationships and qualities different from what our terms suggest.

One example of the gap between common usage and brain circuitry is highlighted by the research of Benjamin Libet and Kosslyn (2005), which examines the timing of events in the brain versus in those in the mind. Libet's and Kosslyn's results are startling, as they call into question the very notion of free will. His carefully constructed series of experiments surround a simple act—deciding when to move a finger. Libet and Kosslyn found parts of the brain that fire

significantly *before* subjects indicate awareness of conscious intention to initiate the act. Libet and Kosslyn concluded that even our most basic decisions derive from unconscious rather than conscious sources. He claims that the most conscious awareness has to offer is the possibility for “free won’t,” that is, the capability to interrupt unconsciously generated actions before they are fully consummated. While the denial of free will remains controversial, the idea that all action derives from unconscious and not conscious sources is neither alien nor terribly uncomfortable for most psychoanalysts. Beginning with Freud’s assertion that conscious life is merely the “tip of the iceberg,” we remain fascinated by unconscious affects, motivations, and actions.

As Libet’s and Kosslyn’s research reveals, our psychological concepts often imply top-down, cognitive control for functions that neurobiology reveals to be self-organized, in bottom-up fashion, from subcortical nonconscious origins. It is precisely here, in my opinion, that Gerson’s concept of identity falls into a similar cognitive trap. I find this aspect of his paper less successful toward the goal of bridging the conceptual gap between the physical world of neuroscience and the experiential world of psychoanalysis. In contrasting the reflexive “I” of the self with the reflective “me” of identity, Gerson concludes that the self is characterized by implicit, body-based perceptions and emotions, while identity is constructed from higher-order, explicit cortical levels of thinking and language.

In Gerson’s words:

There is consistent evidence that subjective and objective perspectives on experience are fundamental to the distinction between self and identity. Self is distinguishable as a subjective, reflexive, affective process of awareness, whereas identity refers to a process of awareness that is objectified, linguistically structured, and reflective . . . Whereas self may be experienced as core or prototypical for one’s being, the process is fluid and contiguous with the body, sensations, and perceptions. Identity is an abstraction extended from self that is contiguous with social engagement. (p. 29)

Gerson presents neurobiological evidence for his claims. He cites the dual-self model of Damasio (2010) as well as Fogel’s (2009) distinction between embodied and conceptual self-awareness. Fogel’s notion of embodied self-awareness represents the quick moving, minute-to-minute flow of perceptual and affective processes. By contrast, Fogel’s conceptual form of self-awareness captures the more congealed, intellectualized self-reflection that extends over longer time frames and is articulated by thought and language.

While these distinctions make sense on the surface, because Gerson lacks a developmental account of his ideas, his description is misleading. Psychoanalytic theory took a profound leap when the developmental perspective of infant observation was introduced, as offered by Mahler, Pine, and Bergman (1973) and more recently by Daniel Stern (1985) and Beatrice Beebe (2005). In similar fashion, it is helpful to identify the neurobiological origins of self versus those of identity. To do so reveals a subtle interplay and dialectic tension between these two concepts that can’t be detected without a developmental view. Next I springboard off Gerson’s paper to outline how self and identity might emerge toward the beginning of life.

NEUROBIOLOGICAL ORIGINS

Gerson contrasts self and identity as distinct neural networks. He presents the self in terms of right-brain, implicit, nonverbal circuitry, as derives from an early proto-form of embodied self.

I agree with this side of his formulation. I would here like to add some developmental details. Most likely, this proto-form of self begins during the third trimester of pregnancy, when subcortical limbic structures like the amygdala, which Allan Schore (2012) associates with the Freud's deep unconscious, first come online. During the first two months of postnatal development, the burgeoning self's sentient sensibility centers around coordinating and calibrating emotion and motivational urges plus movement of the body in light of all five senses of sight, hearing, touch, and taste. As higher level limbic structures mature and become myelinated (a fatty sheath is added that speeds up neural conductance) in months to come, the nascent self of Gerson's reflexive awareness becomes fully operational during the first two years of life as an aspect of the developing right-brain.

Neuroresearcher Bud Craig (2009) presents a neural account of subjective awareness that implicates the right anterior insula plus right anterior cingulate cortex. These two limbic structures appear to act in concert as sensory and motor aspects, respectively, of a consciously felt sense of self. Craig proposes a multistaged, structural model progressing from the posterior, through the mid- to anterior insula. Initially, primary interoception (feelings connected with the body's physiological condition) is represented in the posterior insular cortex as a kind of somatotopic map. This map serves as a body-based foundation into which emotional, environmental, hedonic, motivational, social, and cognitive information can be integrated and then re-presented by the anterior insula. The result is a series of "global emotional moments," akin to Stern's (2004) "now" moments that constitute the sentient self.

Craig's version of subjective awareness corresponds to Damasio's (1996) "somatic marker" notion as well as Damasio's (1995) concept of the neural self. This core self remains tied throughout life to embodied, minute-to-minute, perceptual and emotional processes, serving as an embodied foundation upon which to differentiate inner from outer environments. Because the proto-self develops preverbally, by the time we reach adulthood, a flood of words or thoughts can easily drown out our awareness of this embodied core. Since the "I" of the sentient self is richest when the mind is quieted and the senses are opened, the popularity of mindfulness and other meditation techniques helps us to reengage with this somatic core.

Next I move to Gerson's contrasting concept of identity. Because he ties the formation of reflective awareness to language, Gerson implies the emergence of identity quite a bit later in development, typically during the second year of life when dominance shifts over from right-brain development of emotional and social foundations to left-brain development of words, thoughts, and narratives. Here is where my primary disagreement with Gerson arises, for I believe that a proto-form of identity also emerges during the first two years of life, well before language. Because this proto-identity is also emotionally and relationally shaped during the early months of experience-dependent maturation (Schore, 2003a, 2003b, 2012), its development would also take place when the right brain is dominant.

I place the onset of identity around the third month of life, coming online hand-in-hand with Trevarthan's (2001) period of primary intersubjectivity. According to this account, a primitive, subcortically-mediated form of identity emerges as a by-product of increased relational engagement with primary caretakers. This shift occurs as the attachment system engages and babies start to form secure or insecure bonds with primary caregivers. Schore's (1994, 2003a, 2003b, 2012) regulation theory suggests that the neurobiology of attachment progresses through three developmental levels. The deepest stage surrounds the amygdala, a limbic structure regulating primary emotions, both negative and positive, as well as determinations of danger versus

safety in the infant's environment. The middle level of regulation involves the anterior cingulate, another limbic structure that becomes myelinated and functional as the infant's primary sensibilities and emotions become directed toward connecting with primary caretakers. The highest level of Schore's model implicates the orbitofrontal cortex as the highest cortical level of emotion regulation, which sets in around 10 to 12 months. This is also the stage, stranger anxiety also sets in. 205

It is during this middle stage of regulation, during Trevarthan's period of primary intersubjectivity, that I speculate proto-identity comes online as extensive feedback loops are established between mother and child. During this period, baby gazes intently into mother's eyes in order to "find" herself there. The proto-identity of "me" is the baby's experience of herself as reflected in the eyes, emotional responses, and bodily reactions of mother and other primary caregivers. These relational circuits work like a positive feedback loops to amplify positive emotion, joy, and exuberance of simply being together to explore the contours of each other. Every time baby finds herself in the glint of her mother's eye, a big squirt of dopamine is the reward, priming the SEEKING circuit, the granddaddy of all motivational systems (Panksepp, 1998). Babies' universal urges to seek themselves within the eyes of others, set them up for the implicit, emotional feel of finding and establishing identity via outer relationships, rules, and roles throughout life. 210 215 220

During these early intersubjective encounters, if the infant encounters the eyes, face, and body of a mother who is attuned and filled with love, admiration, and understanding, who can respond with sensitivity to her changing feelings and needs, then baby's proto-identity or nascent sense of "me" will be filled with a sense of goodness, warmth, continuity, and self-worth. By contrast, if the eyes, face, and body of a misattuned mother are instead filled with fear, resentment, or hate, then baby's proto-identity will become wracked with fear, pain, and isolation, eventuating in a sense of badness or unworthiness. Worst of all, if mother's eyes, face, and body are vacant and completely unresponsive, then baby's proto-identity will run the risk of turning up empty. This can lead later to shattered identity, fragmented perceptions, or dissociated emotions, what Philip Bromberg (e.g., 2006) calls "not-me" states. 225 230

When early implicit relational experiences are highly traumatic, babies easily wind up becoming adults who question their visibility to others or even their very existence in the world. Here is one place where self and identity become merged. In the neurobiological account I just offered, both proto-self and proto-identity implicate the anterior cingulate as an important neural structure. If this is so, then within a nonlinear dynamical framework, this points toward multistability. Multistability occurs when different attractor states, such as varying emotions or self-states, employ the same underlying neural circuitry in different configurations. This might occur, for example, if the same neurons function in different capacities under the influence of different neurotransmitters. 235 240

THE "ME" AS AN OBJECT

According to my model, during the stage of proto-identity formation, the "me" is located externally, as when the baby becomes reflected from the outside in, through the eyes of others. In this sense, proto-identity is located *outside* the core self and apart from the primary subjectivity of the baby. However, at these early stages, identity is not yet objectified. This comes later. When 245

Gerson states, “I would argue that all reflective representations of self would be more accurately termed identities, as they are constituted by an emergent objectification of self” (p. 10), I believe he confuses the “object” of early object relations with the “object” of objectification as a later, more abstract and disembodied aspect of development.

As stated, I believe proto-identity arises a couple of months after the earliest glimmers of the proto-self as a primary subjective experience. Initially, both self and identity arise in real time, as a series of sentient global moments, established during preverbal stages of infancy, primarily as facets of implicit relational learning and memory. Only many months and years later, with the advent of language, thought, and narrative, does the more objectified perspective of identity congeal and self-organize to new emergent levels of complexity. Only when higher cortical areas come online such that identity is fully mature can it disconnect from embodied, relational roots to achieve ever more autonomous, intrapsychic functioning. At this point, identity accords to Gerson’s formulation of a left-brain, explicit, verbally driven construct. Once this more objectified, self-reflective eye of identity congeals into longer time scales and become tied to externally derived perspectives, children become capable of seeing themselves through the eyes of imagined others, whether or not those people are physically present. Only then are they able to compare themselves to others or yammer away internally about how they appear, what status in life they have achieved, and so on.

To sum up, I assert that objectifications of the self in fact do surround identity, but only following maturation. Initially, identity derives its origins through implicit relational exchanges, just like the sentient subjective self does. Only after fuller maturation of the brain does identity implicate higher cortical areas connected with explicit levels of language and thought. Both self and identity originate within right-brain, nonverbal, body-based perceptions and emotions that surround baby’s earliest experiences of intersubjectivity. In sections to come, I draw out implications of this perspective.

IMPORTANCE OF NONLINEAR DYNAMICS

By omitting the intersubjective origins of self and identity, Gerson (this issue) unwittingly adopts a one-person approach, as if both self and identity are primarily intrapsychic responses to outside stimuli. This is unfortunate, as Gerson’s paper offers up all of the essential ingredients to a fully intersubjective perspective, including the importance of social mirrors and the foundations of embodiment. Gerson even mentions the contemporary trend by which cognition is considered to be an embodied function.

In his account of the proto-self, Gerson cites early Stern (1985) to posit the proto-self as initially merged with the caretaker, only later flowering fully through its differentiation from other. By contrast, he posits the “me” of identity to emerge when the self observes itself in objectified fashion, based on identification and similarities with others. In order to uphold a more embodied perspective, I assert exactly the opposite: that the ontological experience of the self emerges out of identification with the unique perception and perspective that can only be derived from within. By contrast, identity derives out of the differences, distinctions, and contrasting perspectives afforded by viewing the self from the perspective of the other.

This distinction between differentiating self from other versus other from self might seem trivial and only a matter of semantics, but I believe it is of critical importance. By reversing

Gerson's formulation, I place the self before identity, which accords with the developmental order of things. The reverse order assigns primacy to the early developing self, which then serves as the embodied foundation for the later forming identity, which launches intersubjectively from similar embodied bases, initially by observing the other observe the self. Once embodied foundations of identity are no longer necessary, it becomes possible to achieve the more disembodied position of identifying with and adopting the perspective of an other. In fact, at this point when one's sense of body drops away, it even becomes possible to adopt the perspective of another while disavowing one's own subjectivity.

Because proto forms of self and proto forms of identity share similar implicit origins, this establishes a dynamic arc, a kind of tension between these two realms of experience throughout life. Circular causality exists between self and identity, between the I and the "me," between reflexive and reflective experience, between inner and outer distinctions, and between bottom-up (subcortical to cortical) and top-down (cortical to subcortical) informational flows. This is an important way that a nonlinear dynamical model applies. Inner feedback loops between realms of self and realms of identity are recursively enfolded within outer feedback loops between self and other. By overlooking these complex interconnections between self and identity, Gerson misses out on the fundamental mechanism by which identity gets bootstrapped and emerges from the continual stream of subjective self-experiences.

As an aside, Gerson makes a common error in his understanding of neurobiology when he assumes that meaning-making and autobiographical memory are functions of language as linked to the left-brain's capacity for reason, logic, fabrication, explanation, and narrative. While it is true that temporal order, analysis, and causal sequence are left-brain processes, it is also true that autobiographical memory plus meaning-making, that is, the capacity to make sense out of ongoing experience, are all orchestrated by the right and not the left-brain (Marks-Tarlow, 2012; McGilchrist, 2009; Schore, 2012). The capacity to pull what is emotionally salient out of the stream of ongoing perception and to weave meaning into self-narratives draw primarily upon affective and not cognitive processes.

While Gerson upholds the importance of a complexity framework, he appears less successful in actualizing it, primarily by missing the opportunity to explore how self and identity are closely intertwined at first only to become ever more separated over time and with development. By neglecting the implicit, relational origins of both self and identity, Gerson loses the opportunity to address the cyclical causality within his own model plus the intersubjective feedback loops by which higher levels of complexity emerge intrapsychically.

IMPLICATIONS FOR PSYCHOTHERAPY

Because Gerson (this issue) associates identity with language, he asserts that "the exploration and understanding of the other would necessitate objectified identity processes, as with linguistic comparisons, contrasts, or judgments" (p. XX). In my opinion, this account privileges the role of language too much within psychoanalysis. Schore (2011) astutely refers to psychoanalysis as the "communicating" rather than "talking" cure, precisely because he believes that most of what takes place relationally during psychotherapy takes place at implicit levels, underneath language and below the thresholds of conscious awareness. In his recent book, Schore (2012) affirms a paradigm shift taking place in contemporary psychoanalysis away from emphasizing

conscious emotion, to underscoring the role of unconscious affect. Within Schore's regulation theory through nonverbal enactments, unconscious emotion is exchanged and explored by the therapeutic dyad through action. In contemporary psychoanalytic theory, enactments are now considered important potential contexts for therapeutic change, especially when working with highly traumatized individuals (Cassorla, 2008; Ginot, 2007; Maroda, 1998; Stern, 2006).

Gerson continues to privilege the role of language, reason, and cognitive processes in final sections of his paper that cover concepts of ownership, agency, unity, and continuity. This tendency leads him in potentially dangerous clinical directions. Gerson presents the case of a graduate student with an advanced degree in business who struggles with tension and anxiety regarding her dissatisfaction in marriage. Gerson suggests that an effective intervention on the part of the therapist would be to counteract the woman's hopeless, helpless feelings in her marriage by underscoring her efficacy and sense of agency in the different sphere of being a graduate student. This intervention makes sense within Gerson's model, since issues of identity can be explored only through linguistic channels, where interventions readily include comparisons. Yet, from the perspective of the developmental model offered here, where representations of self and other are nonverbally instilled, affectively laden and highly interconnected, this intervention appears potentially damaging. To use the woman's agency in one sphere as proof of her potential agency in another sphere could easily be experienced as a shaming by the therapist. This intervention could reinforce an already existing internal split, only widening the gap between the woman's internal interpersonal vulnerability and external personal competence. Should the patient scramble to please the psychotherapist and cover up any underlying vulnerability, this could result in her defensively constructing new layers of a "false self."

In *Clinical Intuition in Psychotherapy* (Marks-Tarlow, 2012), I offer up the case of a patient who lacked a profound sense of agency. The issue became negotiated and enacted at an entirely nonverbal level every time she entered my office. We developed a joint ritual where she was free to rearrange my furniture anew every clinical hour, as a symbol of her agency. Due to the baby's origins in helpless, dependency, even in adulthood identity derives strong roots through the power to effect action in others. This clinical example underscores how the lack of agency is affectively charged and not cognitively driven, beginning during preverbal phases with helplessness to affect a response in others (see Knox, 2010). Viewing Gerson's graduate student from this perspective, only by dealing with this woman in a fully embodied, relational manner, by providing a corrective emotional experience by which the patient can perceive her own power to move the therapist and feel moved in return, can this pair arrive at the deepest subcortical, implicit levels in which identity, alongside the self, is forged anew and therapeutically shifted.

COLLECTIVE IDENTITY AND SELF-SIMILAR DYNAMICS

As Gerson (this issue) notes, my 1999 paper "The Self as a Dynamical System" posited identity as best understood as a multiscaled process-structure with embedded levels of self-similar, fractal structure. Guided by the perspective of nonlinear dynamics, perhaps my main contribution to the field of psychoanalysis involves understanding how fractal patterns constitute the heart of identity (Marks-Tarlow, 2008, 2010). Fractal geometry is a newly discovered form of mathematics that models natural complexity. This includes external patterns, such as exist in mountains, clouds, rivers, and roots, as well as patterns internal to our physiology such the spacing of our pours,

the wrinkles on our faces, the folds of our brains, or branches of our capillaries. I suggest that fractals describe not only the geometry of nature, as Mandelbrot (1982) famously proposed, but also the geometry of human nature. The essence of a fractal is self-similarity, which means that the pattern of the whole repeats itself recursively on various temporal or spatial scales in the pattern of the parts. While a complete exposition of fractals goes beyond the scope of this paper, we can understand Freud's concept of repetition compulsion in fractal terms as rigidly repeated iterations of self-similar structure. We can also reinterpret the revered psychoanalytic tradition of starting with tiny fragments of dreams in order to arrive at the whole of the psyche as a fractal process. Finally, the old psychoanalytic adage that the whole of the session is contained in a patient's first utterance or that the whole of the psychoanalysis is contained in the first session bespeaks of self-similar and self-referential dynamics, which are especially useful for complexly intertwined boundaries.

Perhaps, in self-referential fashion, self-similar dynamics apply to the identity of our field as a whole. Perhaps we have all been caught in an enactment at a collective level. The hermeneutic claim that the level of complexity attained by psychoanalytic immersion in the moment can never be touched by science resembles the enactment between patients and therapists who are too caught up in what they are doing at unconscious levels to be able to step outside the dynamics and observe them consciously. The perspective of interpersonal neurobiology along with the real-time imaging of neuroscience provide methods to resolve enactment at the collective level of our field. The more we can make invisible intersubjective streams visible, the more this technology will help us to step outside our offices. While the hermeneutic circle provides a sacred container filled with wonder and poetry, its inviolate status has kept us in a closed vacuum isolated from the rest of the scientific world. The flexibility of a complexity model plus shiny new imaging tools of neuroscience afford us new tools to begin self-reflecting on intersubjective space at higher levels of complexity. From this vantage point, perhaps we can observe the analytic third from the emergent perspective of interpersonal neurobiology as the analytic fourth.

REFERENCES

- Badenoch, B. (2008). *Being a brain-wise therapist: A practical guide to interpersonal neurobiology*. New York, NY: Norton. 400
- Beebe, B. (2005). Mother-infant research informs mother-infant treatment. *Clinical Social Work Journal*, 38, 17–36.
- Bromberg, P. (2006). *Awakening the dreamer: Clinical journeys*. Mahwah, NJ: The Analytic Press.
- Buzsáki, G. (2006). *Rhythms of the brain*. New York, NY: Oxford University Press.
- Cassorla, R. (2008). The analyst's implicit alpha function, trauma and enactment in the analyst's borderline patients. *International Journal of Psychoanalysis*, 89, 161–180. 405
- Cozolino, L. (2005). *The neuroscience of human relationships: Attachment and the developing social brain*. New York, NY: Norton.
- Craig, A. (2009). How do you feel – now? The anterior insula and human awareness. *Nature Reviews/Neuroscience*, 10, 59–70.
- Damasio, A. (1995). *Descartes' error: Emotion, reason, and the human brain*. New York, NY: Penguin Books. 410
- Damasio, A. (1996). The somatic marker hypothesis and the possible functions of the prefrontal cortex, *Philosophical Transactions of the Royal Society of London*, 351, 1413–1420.
- Damasio, A. (2010). *Self comes to mind: Constructing the conscious brain*. New York, NY: Pantheon Books.
- Fogel, A. (2009). *The psychophysiology of self-awareness: Rediscovering the lost art of body sense*. New York: Norton.
- Frederickson, B. (2013). *Love 2.0: How our supreme emotion affects everything we feel, think, do, and become*. New York, NY: Hudson Street Press. 415

- Freud, S. (1895). Project for a scientific psychology. In J. Strachey (Ed. & Trans.), *The standard edition of the complete psychological works of Sigmund Freud* (Vol. 1, pp. 295–397). London, UK: Hogarth Press.
- Ginot, E. (2007). Intersubjectivity and neuroscience: Understanding enactments and their therapeutic significance within emerging paradigms. *Psychoanalytic Psychology*, 26, 290–309. 420
- Knox, J. (2010). *Self-agency in psychotherapy: Attachment, autonomy, and intimacy*. New York, NY: Norton.
- Libet, B., & Kosslyn, S. (2004). *Mind time: Temporal perspectives in consciousness*. Cambridge, MA: Harvard University Press.
- Mahler, S., Pine, M., & Bergman, A. (1973). *The psychological birth of the human infant*. New York, NY: Basic Books.
- Mandelbrot, B. (1982). *The fractal geometry of nature*. New York, NY: Freeman. 425
- Marks-Tarlow, T. (1999). The self as a dynamical system. *Nonlinear Dynamics, Psychology, and Life Sciences*, 3, 311–345.
- Marks-Tarlow, T. (2008). *Psyche's veil: Psychotherapy, fractals and complexity*. London, UK: Routledge.
- Marks-Tarlow, T. (2010). The fractal self at play. *American Journal of Play*, 3, 31–62.
- Marks-Tarlow, T. (2011). Merging and emerging: A nonlinear portrait of intersubjectivity during psychotherapy. *Psychoanalytic Dialogues*, 21, 110–127. 430
- Marks-Tarlow, T. (2012). *Clinical intuition in psychotherapy: The neurobiology of embodied response*. New York, NY: Norton.
- Maroda, K. (1998). Enactment: When the patient's and analyst's pasts converge. *Psychoanalytic Psychology*, 15, 517–535.
- McGilchrist, I. (2009). *The master and his emissary: The divided brain and the making of the Western world*. New Haven, CT: Yale University Press. 435
- Panksepp, J. (1998). *Affective neuroscience: The foundations of human and animal emotions*. New York, NY: Oxford University Press.
- Schore, A. (1994). *Affect regulation and the origins of the self*. Hillsdale, NJ: Erlbaum.
- Schore, A. (2003a). *Affect dysregulation and disorders of the self*. New York, NY: Norton. 440
- Schore, A. (2003b). *Affect dysregulation and the repair of the self*. New York, NY: Norton.
- Schore, A. (2011). The right brain implicit self lies at the core of psychoanalytic psychotherapy. *Psychoanalytic Dialogues*, 21, 75–100.
- Schore, A. (2012). *The science of the art of psychotherapy*. New York, NY: Norton.
- Siegel, D. (1999). *The developing mind: How relationship and the brain interact to shape who we are*. New York, NY: Guilford. 445
- Stern, D. (1985). *The interpersonal world of the infant*. New York, NY: Basic Books.
- Stern, D. (2004). *The present moment in psychotherapy and everyday life*. New York, NY: Norton.
- Stern, D.B. (2006). Opening what has been closed, relaxing what has been clenched: Dissociation and enactment over time in committed relationships. *Psychoanalytic Dialogues*, 16, 747–761. 450
- Stevens, G., Silbert, L., & Hasson, U. (2010). Speaker-listener neural coupling underlies successful communication. *Proceedings of the National Academy of Science USA*, 107, 14425–14430.
- Thelen, E. (2005). Dynamic systems theory and the complexity of change. *Psychoanalytic Dialogues*, 15, 255–283.
- Trevarthan, C. (2001). Infant intersubjectivity: Research, theory, and clinical applications. *Journal of Child Psychology and Psychiatry*, 42, 3–48. 455
- Varela, F., & Shear, J. (Eds.). (1999). *The view from within: First person approaches to the study of consciousness*. Thorverton, UK: Imprint Academic.

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