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MARRIAGE IS A STRANGE ATTRACTOR:

CHAOS THEORY, A PARADIGM SHIFT FOR COUPLE THERAPY

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Every intimate couple relationship has a unique personality. This personality is evident on the surface through the observable interaction of the partners; it is constructed at the depths from the individual and shared unconscious – a mysterious, unpredictable, and infinitely complex combination of brain interactions, attachment patterns, affective facial, bodily, and sexual signals, and verbal communication. Chaos theory (also called the theory of non-random chaos, complexity theory, or dynamical systems theory) offers an overarching organizing principle for integrating diverse contributions from research on neurological development, attachment patterns, and affective attunement with clinical experience. Chaos theory gives us a new way of thinking about unconscious communication, the development of psychic structure, coupling, and therapeutic action in the analytic treatment of couples.

Chaos theory derives from the mathematical study of the action of complex dynamical systems governed by continuous feedback. These systems iterate (repeat) their operations, each time beginning with a situation that is the sum of all previous experience. Chaos theory applies to the study of diverse unpredictable systems like weather, population dynamics, aesthetics, biological systems like heart rate and brain waves, and most important for our work as couple therapists, it

applies to psychological systems as well. For instance, each of us uses our internal operating systems to proceed through life. At each moment, we are the sum of all our previous experience; and we use our internal systems to guide us through the next developmental stage.

In such complex systems, infinitely small differences in starting points affect the outcome profoundly. The processes of growth and development are iterations of life's operating equations, and they show sensitive dependence on initial conditions. Small and seemingly inconsequential variations in constitution, temperament, and parenting are magnified or minimized under various circumstances, leading to unpredictable results. The couple relationship is a biological system repeatedly adjusting to feedback, both cementing the form of the marital joint personality and introducing slight variations that modify the spouses' personalities in the light of shared experience. Couple relationships, like those of all biological systems, are complex iterated equations with *sensitive dependence on initial conditions* as they apply their daily operating equations to the next set of life challenges. Small differences in the beginning of a day can affect the next weeks or even a life course in unpredictable ways, while something that seems to loom large at one moment may defy prediction and turn out to be relatively inconsequential.

The current interactions of members of a couple and their family histories recorded in each partner's internal object relations affect the patterns of the couple. In chaos theory terms, interactions, affect states, and object relations separately and together exert a tuning force on the individual personality (Quinodoz 1997). They also act as a tuning variable affecting the marital joint personality and the family dynamics, some family members having relatively greater effects than others. For instance, a mother's internal object relations exert a large tuning force on her infant's developing mind, while a child who has left home may exert a relatively weak tuning force on the parental couple she has left behind. A therapist's affective attunement, conscious interventions, and receptivity to unconscious communication exert a tuning force on a couple dynamic.

The complex system of the couple relationship tends to enter periods of relative chaos (experienced as confusion and tension that are disorganizing). The unhealthy system gets stuck there. The healthy system enters chaos temporarily, experiences some turbulence, and

then self-organizes as a more functional interactive system, under the influence of the tuning force of the interacting partners' personalities, or of a more organized interactive system nearby such as the healthy marriage of friends or relatives, or the technique of a thoroughly analysed therapist. When not hampered by histories of trauma or deprivation, a couple's self-organizing potential should lead to more complex and adaptive patterns over time.

At different levels of magnification of a system, patterns repeat, appearing not exactly the same but similar at each magnification. In chaos theory terms, each pattern is a fractal of the other patterns found at different levels of scale. The course of a completed analysis is reflected in the rhythm of any single session (Galatzer-Levy 1995). A couple's sexual relationship, speech patterns, relationship to extended families and children – all are fractals of their internal object relations and of their overall relationship (J. Scharff and D. Scharff 1998). The transference-countertransference dialectic is also a fractal of all these elements of their relationship, a magnification that we experience and study together in therapy. All these elements both organize the system of the couple relationship, and at the same time are actually produced by the dynamic of the system. In chaos theory terms the force that both organizes and is organized by the system is called an attractor. The attractor may be of one of three types: -- fixed, limit cycle, and strange.

A fixed attractor appears to move a system through a predictable pattern toward rest at a single spot, like a gravity-powered pendulum that eventually comes to a stop at a fixed point. A limit-cycle attractor appears to move a system through a fixed pattern continuously, like an electrically powered pendulum that moves back and forth in an arc. A strange attractor appears to move a system through a complex, apparently random pattern, out of which an organized pattern gradually appears -- like a whirlpool that seems to pull water into the whirl, although it is actually the flow of the water that produces the whirl. Similarly, a couple's fights appear to pull their relationship into an aggressive mode, which at the same time is caused by the complex tension of their interacting needs and personalities. None of the movements of the system are exactly the same, but contribute to a discernible overall complex pattern – the "whirl" of disagreement – that characterizes this couple's relationship. A strange attractor may exert an especially strong effect on the couple

system and pull it, like a whirlpool pulls objects outside the whirl into the whirl, into its basin of attraction.

In the complex system of a couple with sensitive dependence on initial conditions, precise prediction of patterns of interaction is not possible. A life course cannot be predicted. Like all self-organizing systems, life is lived by looking forward and proceeding into the unknown, and can only be understood when looking back. At times, life patterns shift under destabilizing conditions, like a whirlpool may be affected by a strong nearby current or a passing object. In the short term, more than one pattern may be evident consistently. For instance, a couple may have one pattern of fierce arguments over disciplining their children and another of co-operation and tenderness in love-making that is not predictable from the intensity of their arguments. Over the long term, general patterns of consistency and adaptive variation can be recognized.

Dysfunctional couples get stuck doing the same ineffective thing over and over, following the self-same pattern of a limit-cycle attractor. Healthy couples, like healthy biological systems, move in and out of chaos in daily life, following the self-similar patterns of strange attractors – never exactly the same, but patterned enough to be recognizable as part of a dynamic system. Chaotic patterns have an enhanced capacity to adapt to new circumstances and needs. Like the normally non-randomly chaotic rhythm of the healthy heart adapting from sleep to long distance running, healthy families and individuals under challenge respond to turbulence by breaking out of the mold and self-organizing into a new adaptive pattern, while constrained families repeat their limited repertoire of ineffective old habits.

When two individuals form a couple, the patterns of each personality based on their histories behave as strange attractors, each of which interacts with the other and exerts a tuning force on it until the systems combine to form a new overarching strange attractor, namely the pattern of the joint marital personality. When that couple has a child, the strange attractors of the two parents' personalities and of their overall relationship pattern exert tuning forces, which create basins of attraction that interact with the inherent personality patterns of the child, pulling the child's self toward this or that system of organization. All elements of the family – the family group, the couple, and the child – are self-organizing systems that interact with and affect one another. When we compare each parent's strange

attractor pattern, the joint marital personality, the developing personality of the child, and the overall family interaction patterns, we notice that they show fractal similarity to one another.

For instance, a baby is a living embodiment of a couple's interpenetration, and gives life to their partnership. The child arises from, and is a representative of, the sexual and emotional coupling of the parents. In addition, the child is a person in his or her own right, therefore a new object of affection, interest, and hate for the couple. At the same time, the child is also a reminder of the parents' original objects, their own parents, now grandparents, and the internal objects based on early experience with them. The parents respond to aspects of the grandparents that they imagine in the child, and evoke them in the child unconsciously through projective identification. Experience with the child is installed as a complex internal object that is both old and new, and that in turn restructures the parents' selves and their couple relationship. Just as the sea shapes the edge of the land and the land shapes the edge of the sea, parents and child sculpt one another's interaction and personality. This happens every day as they iterate their family equations, each new day offering a new starting point with sensitive dependence on the day's initial conditions, resulting in an infinitely complex interaction of strange attractors and basins of attraction, perturbations, tuning variables, and self-organization at every fractal level.

All this leads to the question of how we can promote change when couples seek help. In a couple, each individual's object relations set -- that is the strange attractor of their internal organization -- acts as a set of tuning variables on the partner. In health, each personality is modified and enriched by its involvement in the couple system. Unhealthy couple dynamics are strong basins of attraction for repeated behaviors, and it is not easy to promote change. Self-same, limit cycle attractor patterns govern the repetition of self-defeating habits that cannot improve until the attractor can be perturbed, moved into chaos, and brought into proximity with self-similar strange attractor patterns. When couple dynamics become disorganized, for instance by the chaos of having an ill partner, falling in love, living in an unfamiliar culture, learning about an affair, losing a child, and so on, they are most open to change.

By introducing perturbations into the operating system of the couple relationship, couple therapists disturb the relatively fixed, maladaptive,

limit-cycle systems in which the couple is stuck. We use the tuning force of our own internal object relations organization honed by training, therapy, and supervision, to create a new basin of attraction, and to join with couples to structure a more flexible strange attractor system with better capacities for adaptation and self-organization.

According to the principle of fractal scaling and sensitive dependence on initial conditions, relatively small changes in therapy can have major effects. Theoretically, the flapping of a butterfly's wings in Brazil can create a hurricane in Texas (the so-called butterfly effect). Similarly, an interpretation of the transference in a single session can produce a thunderstorm's worth of change in the couple's state of mind and way of interacting with the world. Through the butterfly effect, a change in one partner can affect the couple or the whole family. When the couple's overall pattern changes, this exerts a new tuning force on each member of the wider family once again. Such change does not happen every time. It does not need to happen every time. It need happen only periodically to help a person or family make fundamental change.

Patterns of a couple's life appear to attract partners into repetitions of actions, and the couple will often report that they cannot resist the pattern. Or they might report that going to visit a set of in-laws, or dreaming about their family of origin, exposes them to a force they cannot resist. This is to say that the closer they get to the extended family's basin of attraction, the more they get swept up in the family's pattern. But closer inspection shows that their individual repetitive behaviors are the building blocks that join together to create the couple and family dynamics typical of a limit cycle attractor.

In couple relationships, the strands of experience may diverge, realign usefully, or end up in chaos. A couple drinking alcohol together may relax and make love, fall asleep, proceed to drunken fighting, or enter a confused discussion with labile affect that is their interpersonal experience of chaos. In a healthier couple, having a glass of wine together has varied outcomes, organized by strange attractors. It may lead to relative chaos, which provides the impetus to straighten out. If their drinking always leads to the same old fight, the pattern has a deadly self-same quality, organized by a limit-cycle attractor. Besides the alcohol, there are many tuning variables pulling them towards one basin of attraction or another. This variety of response gives the couple a greater capacity for adaptation to changing and

challenging circumstances than the limited repertoire of limit cycle patterns offers.

Writing before we had knowledge of chaos theory, Klein (1946) described the effect of early experience on individual organization in terms of the paranoid-schizoid and depressive positions created by the force of the life and death instincts; Fairbairn (1952) described introjection, splitting, and repression in relation to the mother leading to endopsychic structure; and Sutherland (1980) developed his ideas of the healthy autonomous self as a self-organizing system tending towards greater complexity. If the infant has had a reliable contact with the mother, and the attractor of destructiveness, attributed by Klein to the death instinct, is not too strong, the pattern of splitting into good and bad seen in the paranoid-schizoid position (described by Klein) undergoes self-organization into the flexible and complex organization of the depressive position. The initial introjection of a whole unsatisfying object reorganizes as a dynamic system of internal objects and parts of self in continual dynamic flux (described by Fairbairn). We now know that these stages of emotional and mental development are accompanied by neurological changes. Pruning of the initial oversupply of neurons enriches the patterns of neural connection and capacity for response. As the infant brain matures, higher centers (like the orbito-frontal cortex) review and modify signals from lower, more reactive centers (like the amygdala). Development generally leads away from limited possibilities in infancy towards ever larger degrees of freedom in the maturation of the self. Entering chaos and self-organizing makes possible the liveliness and creativity that characterizes the emergence of an autonomous self (described by Sutherland), and, we add, an autonomous couple.

Arlow and Brenner (1990) described the re-organizing impact of the therapist on the mental organization of individuals: "What the analyst communicates to the analysand serves to destabilize the equilibrium of forces in conflict within the patient's mind. This leads analysands to a growing awareness and understanding of the nature of their conflicts" (p. 680). Their description applies equally to the interactional organization of an intimate pair. Pulled away from the organization of the tightly organized limit cycle attractor, the couple relationship system enters the edge of chaos from which it reorganizes, influenced by proximity to the strange attractors of the therapeutic relationship and the basin of attraction of the therapeutic process. The process of

entering chaos brings a feeling of stress and confusion to the couple – and to their therapist.

Couple therapy example: Sessions 1 and 2

Lucien and Rachel, are now in their forties and have been married for 10 years. Both had been married previously to partners who betrayed and abandoned them, leaving them fearful of intimacy. They are slim, attractive, and in good shape but they have no sex life. They have no children, a decision reached by mutual agreement and without later regret. They stay in touch with their families in an occasional way. They experience Lucien's mother as a domineering woman and his father as a retiring man, emasculated by her and by Lucien's grandfather. They find Rachel's mother to be a warm and friendly person, but her father is temperamental and not tuned in to Rachel's wavelength. Rachel initiates sexual interaction but Lucien has no desire. His energy goes into fending off Rachel, delaying the moments when intimacy might occur, and in general avoiding sex. Rachel tends to pressure Lucien, despite the fact that this tends to drive him away. Lucien blames her for pressuring him, but he invokes it by his avoidance. If Lucien were to have sex wholeheartedly, he fears that Rachel would take control of him.

Prior individual and couple therapy having been ineffective in releasing Lucien's sexual desire, the couple sought therapy with Dr. David Scharff. In marital and sex therapy with him, Lucien slowly became able to tolerate sex, find the idea exciting, and progress to pleasurable intercourse, but the couple still encountered a barrier in the approach phase of every exercise or encounter. Lucien repeatedly insisted that Rachel shouldn't pressure him by scheduling times for sex. He wanted sex to occur spontaneously, but he did not allow it to happen, and thus fueled her need to pressure him for a schedule. Despite improvement, their sexual interaction remained a totally predictable, repetitively frustrating pattern, governed by limit cycle attractors.

In the first session of three that we will report, the therapist (DES) worked on a dream that Lucien had. He said, "It was a dream of a man with salt and pepper hair, holding a dead baby in his lap. The man wasn't dressed as a physician, but he had eviscerated the baby, and was asking me to understand and accept that. I was horrified at

the idea of what this man must have done. He wanted me to understand, but it wasn't my child, and I didn't have any feeling for it. I was just an observer."

Lucien associated to a business partner who might want to scuttle a new business venture that he refers to as "his baby," and to his aunt's late fourth husband, a gambler who wasted her money. Rachel thought that the baby might be Lucien's self. I thought that the dead baby with no parents was the couple's sexual life for which I (a gray-haired physician who, however, does not wear a white coat) was responsible. Lucien said I was nothing like the physician in the dream. When he added that it was a hollow baby, I commented that he might be watching the sex therapy project die. He said that he was trying not to, and Rachel objected that she had again been unable to persuade him to do a sex exercise.

Lucien's thoughts about the aunt's husband led to his feelings about his aunt. He said, "My aunt has come to be known as the 'black widow' because all her husbands have died. She tells my mother, who is quite overweight, that you can't be too thin or too rich. She is the horror show at our family Christmas. She dresses to kill and uses her money to lure men. She's not fit for society."

I said, "A lethal, predatory woman. Your association to your 'black widow aunt' tells me you feel at risk in this sex therapy project. The dead baby in the physician's lap represents the horror of what you might be doing right now, while acting as though you had no part in it. You cut yourself off from that feeling and put it into Rachel, and then get mad at her when she expresses the anxiety and longing for a lively sexual life on behalf of you as a couple. You then feel as if she is luring you into her web, and you stay away from her and from your own desire. It is your own desire that is the spider's web you fear."

Lucien said, "I recognize that I cut myself off. I enjoy the absence of pressure. Each week, I try to buy as much time before sex as possible [by not specifying when to do the exercises] because if we put down a marker [like a gambler], the clock starts ticking, and I get anxious. I want sex to be something that is just normal, not special, and I don't know how to get to normalcy."

Rachel said, "I think normalcy for you is not having sex, and we'd still be stuck with that."

The various elements of the dream and the couple's associations in the session (transference manifestations, family history, fantasies about women) reflect many facets of individual and couple organization. Each element is a fractal of the other, showing pattern similarity on different orders of scale.

Shifting my focus from the transference to the fractal of Lucien's self and his object relations, I then commented that I now saw the gray-haired man as Lucien himself in the future, still unable to protect the baby (both himself as an infant and the sexual life with Rachel about which he was avoidant) and vulnerable to death at the hands of the black widow, which he sees in her but which is active in him, entrapping and killing off his desire.

Lucien and Rachel have no children and no pleasure in sexuality. Lucien's dream shows that their procreativity and capacity for pleasure is being pulled into a basin of attraction dominated by limit cycle attractors governed by death anxiety and murderousness, in turn attributed to the destructive seductiveness of the sexual woman, from which both of them turn away to avoid the impact of their own desire.

At their session the next week, Lucien reported that he had had another dream. This time I was more clearly in it, and it was set in my waiting room at the end of a session. Lucien said, "In the dream, Rachel left your office ahead of me. As I left, I reached what I thought was your front door until I realized that it was a beautiful, tall, gilded French armoire. When I opened it, I couldn't see anything inside. Next to it, a 14-year-old girl was admiring an iron sculpture of herself. You and your wife entered the vestibule. I admired the furniture, and your wife accepted the compliment. Then she showed me a spot on the lower right-hand corner of the armoire where the gilt had been rubbed off, and she repaired it with some gilt from the other side. It was like a magic armoire. You entered, reminded me that Rachel was waiting for me, and I scurried off."

He continued, "You and your wife, you're keepers of the flame, healers. Gilt is like guilty. I might be guilty about my new business venture hurting my partner."

I said "That's quite an idealized image of my wife and me. What she does is put gold over the bare spot."

He said, "Right, healed by copy and paste, healed by a new reservoir of golden objects."

I said, "The dream also shows us a young woman admiring her lifeless statue. Who could that be? Then you focus on my wife quietly patching things up. Both are different images of women than your mother or your wife."

He said, ignoring my reference to the image of the young woman, "I think of you and your wife as keepers of the image – restorative figures, completely different than my mother, who is a destructive force of nature. She captured too much of me."

I said, "So you developed armor for your amour, and covered it in guilt."

He said, "The gilt is a protective adornment."

The dream presents the couple as split in time and space, as Rachel goes ahead and Lucien gets lost in contemplating the magic armoire. Lucien's dominant image of a black widow in a deadly couple (a limited cycle attractor) has given way to the pull of new female objects (strange attractors), in the form of the young girl looking at her own statue and the therapist's wife who deals with his guilty conscience by "a cut and paste operation" that gilds it over. These new strange attractors draw Lucien and the couple away from the limited attractor functioning most often seen in their sessions. Their pattern loosens in relation to the appearance of new objects in foreground of the dreams -- the young girl in a self-examining, possibly admiring pose, the magically reparative woman, and the idealized generative therapist couple – and in the context of the therapy, new strange attractors in the form of the therapeutic relationship and the therapist's technique. New images of women as objects and as parts of Lucien's own identity lead the internal organization of a more complex internal couple with restorative potential.

In the meeting of the unconscious organizations of Lucien and the therapist both in his dreams and in the couple's analysis of them, the therapist's inner world acts as a tuning variable that causes a perturbation in Lucien's inner world, bringing to the surface latent, previously suppressed organizations that bring new possibilities for reworking the couple relationship. This is an example of a strange attractor in formation. In these two sessions, Lucien's part of the

pattern is most apparent. We will show its fractal similarity to Rachel's, as the couple works on her dream in the third session, to which we will return after the next section on concepts regarding neurological development and complex attachment.

Integrating neuroscience, attachment, and affect regulation in couple therapy under the rubric of chaos theory.

There is now ample evidence from brain imaging and developmental research that the infant's brain grows best when the infant is nurtured in a warm, reciprocally responsive relationship with a well-attuned mother or devoted caregivers (Schore 1994). The importance of the holding relationship in infancy, in marriage, and in therapy has been known for years. What is new is that its importance can be documented by research. From infancy until about age 3, the right orbital frontal cortex (the part of the brain over the right eye) grows most rapidly. The dominant part of the brain for the first 3 years, the right orbital frontal cortex integrates and oversees the functioning of other parts of the brain (the amygdala, thalamus, and limbic system) that process input from the mother's face, eyes, voice, and touch. The right brain is built for the task of processing interaction with the mother quickly and repeatedly, reading affective cues, and generating single words like Mamma, Dadda, Yes, and No to express emotion and connection to important relationships. In addition to expressing emotion, the right frontal lobe specializes in receiving and reading the complex emotions of others. The left brain enables the development of linear and logical thinking, and fluid verbal communication. It is not until age 3 that growth of the left frontal cortex catches up. Then the toddler moves from using single words to constructing sentences. As the infant grows to adulthood, the right brain remains the executive center for processing emotional information. The left frontal lobe continues to specialize in expressing thoughts through language (Schore 2003a, 2003b).

The baby's brain grows in the culture medium of the mother's brain in a cycle of exchange organized by attractor patterns that move naturally from limit cycle to strange attractor patterns as the infant matures (Schore 2003a, 2003b). In partnership, mother and infant read each other's minds at levels far below conscious awareness and far more quickly than two adults can understand one another's words.

The frontal lobes retain a capacity for change and growth throughout life. Just as you can still learn new facts or a new language in adulthood (even while losing neurons with aging), you can learn new emotional patterns throughout life, mediated by neuronal patterns and neurochemical change in the brain.

At birth, the baby's brain is already rich in neurons but not in the rich connective networks that experience builds. Attachment research has shown how secure and insecure attachment affect development in infancy and in later life (Ainsworth et al. 1978, Fonagy 2001). Object relations therapists have long noticed that interpersonal neglect and trauma interfere with the development of the mind. Neuroscience now shows that it does so by inhibiting the growth of connectedness between neurons and sub-units of the brain. Brain scan studies show that severe trauma also leads to neuropsychological disconnection between sub-units that normally function in an integrated way. In subjects who do not feel, or who dissociate, brain scans show a poverty of activity in areas of the right thalamic-limbic area and their connection to the right orbitofrontal cortex. In subjects who show post-traumatic stress disorder, brain scans of those who suffer from fearful flash backs show increased activity in the right amygdala, which is responsible for the initial appraisal of interpersonal situations, and is also the brain area where fear responses begin. Brains of those who suffered severe neglect and trauma show more rigid, limit cycle patterns of brain function, less overall right brain growth, accentuation of fear centers, and less neural network interconnectivity (Cozolino 2003, Siegel 1998, Schore 2003a, 2003b).

The right orbitofrontal cortex also houses implicit and procedural memory, and connections between bodily and social experience. It processes reciprocal emotional interactions with others through projective and introjective communications in a continuous unconscious communication (Schore 2003a, 2003b). This happens between parent and child, and between therapist and couple in couple therapy. The process is mutual, consisting of rapid interactions of mutual emotional exchange, right brain-to-right brain, almost entirely below the levels of conscious awareness. The right brain is therefore described as the seat of the unconscious (Schore 2003a, 2003b).

We have noted that all intimate partners are in a state of unconscious communication through the use of introjective and projective mechanisms (J. Scharff 1992, D. Scharff and J. Scharff 1991). In

chaos theory terms, each individual intrapsychic organization exerts a tuning force on the other. New brain studies give us a way of formulating the neurological underpinning of this tuning force. Studies of the motor cortex of monkeys reveal the presence of mirror neurons, which are activated when one monkey watches another monkey make movements (Cozolino 2003, Modell 2003). We now propose that there are similar mirror neurons in the parts of the human brain that record facial expressions and tone of voice, giving a neurological basis for the mental mechanisms of projective and introjective identification that convey emotional experience among intimate partners. The face is rich in neuromuscular construction to give rise to various emotional expressions, some of them universal (like smiling or showing disgust) and others more nuanced in specific circumstances (Tomkins 1995). Rich facial expression is accompanied by a richness of vocal inflection. The capacity to express and read emotion is proportional to the level of activity of the right brain. We propose that neural mirroring is the mechanism through which each person affects the other's state of mind and actual brain organization in a virtually simultaneous mutual process of communication at the affective, physiological, and neurological levels. In couple interaction over time, each partner's mind structures and restructures the other through continuous non-random chaotic interaction.

Alan Schore (2003a, 2003b) has postulated that the right brain-to-right brain communication of mothers and infants operates according to principles of chaos theory, the mother's mind acting as a tuning variable to organize the baby's mind in the image of her own strange attractors – that is her internal object relations set. He believes that this is the neurological basis of the mental mechanism for unconscious communication -- projective identification. Now that we know about mirror neurons, we have the support of findings from neuroscience for the idea that couples are biologically constructed so that each partner takes in the experiences, moods, and reactions of the other. Being informed about one another inside their own minds, the partners create a relationship that becomes a larger system made up of the iterated continuous interactions of the two of them. Each partner's attractor patterns become powerful tuning forces inside the mind of the other, influencing the emotional experience and mental structure of one another. When a wife perceives her husband's emotions accurately, she experiences a resonant psychological state in herself, possibly through the action of mirror neurons like those in the motor

parts of the brain. Whether she perceives intense pleasure or discord, the perturbations are equally profound, and capable of stimulating reorganization.

The principal evolutionary importance of the mother-infant attachment relationship is to provide the platform from which to teach the infant to regulate affects and states of mind, thereby establishing both an autonomous self and a self-in-relation to others. Affect is regulated at first by the mother. At the beginning the mother marks the newborn's expressions by mirroring them almost exactly, and the infant therefore feels understood emotionally. This is called contingent marking, which is an important component of establishing an early secure attachment (Fonagy P. et al 2003). Perhaps such close interpersonal mirroring helps to prime the early maturation of mirror neurons, but it stands to reason that these neurons are involved in the infant's inbuilt understanding of the mother's relationship, and in the instinctive capacity of parent and infant to mirror each other while automatically understanding each other.

Later, at about three months of age, something happens that dramatically changes the quality of such interactions. Infants now prefer a gap between their own expressions and those of their mother. They now want their mother's reaction to be nearly the same, but clearly not the same. This is called non-contingent marking (Fonagy et al 2003). The mother makes an expression similar enough to convey that she has received the message but different enough to modify the original affect, for instance by tuning its volume up or down. Thus she not only marks the affect but begins to regulate it. She may mark a slight difference and vary the degrees of difference, or randomly lengthen or shorten the interval before she responds each time, teasing the infant until a game develops between them. She can mark her infant's distress, and then modify it through modulating her own response. In this way, over time, the baby develops a growing sense of self-in-relation. These emotional components and early memories are housed in the right cortex, while the verbal aspects that are acquired later are housed predominantly on the left. Over time, integration and cross-fertilization of the two ways of thinking across the right and left brains are required for optimal growth. In the move from the limit cycle attractor of contingent marking, a self-same pattern suited to the preferences and potential of the immature mind, to the self-similar strange attractor of non-contingent marking, we can see the form of the mother and infant interaction moving toward

unpredictable patterns with more capacity for liveliness, surprise, and adaptation to the unexpected twists and turns of relational fortune.

Couples exhibit a right-brain to right-brain communication similar to and derived from the parent-infant experience. The neurological processes of the right brain sweep for affect approximately every 30 milliseconds, ten times faster than the left brain's sweep of verbal information every 300 milliseconds. These sweeps are too fast for conscious processing, but they are going on all the time in couples. Healthy couples use their relationship to regulate affect, to support healthy individuated selves, and to enjoy the vitality of intimacy through multi-channel communication – verbally, affectively, sexually, as parents, lovers, or friends. Their patterns of interaction, both on the large scale and moment-to-moment, have mainly a reassuring self-similarity in which patterns of reliable, accurate attunement are combined with non-contingent marking to be reassuring but challenging. Without these small but crucial variations, the narrow, self-same responses of limit cycle attractors give a lifeless, boring affective tone to the couple's life.

Secure partners whose relationship is organized by strange attractors enjoy reciprocity and flexibility in role differentiation, equality, and respect. Insecure partners take up rigid roles, defensive positions, and interact by limited attractors such as patterns of domination and submission. Traumatized partners have the most limited patterns, governed by fear and reactivity (J. Scharff and D. Scharff 1994).

Trauma and deprivation most limit maturation at every level, narrowing the brain and mind's repertoire of responses to those most basic for survival, and depriving an individual and couple of the quality of vitality that depends on freer ranging interactions. The right amygdala is the seat of the first alarm response to new experience, when fear and avoidance of danger may be the safest option. In insecure attachments, and most especially in disorganized or traumatized attachments, this amygdala-driven reaction is not overridden by the higher brain organization, and then the right orbito-frontal cortex is not able to appraise the situation in a nuanced way. The development of the right orbitofrontal cortex is nurtured during the first 18 months by a positively toned relationship with the parents, supplanting the more limit cycle reaction of the amygdala with the complexity of the frontal cortex. Trauma and deprivation limit all this,

and leave the developing child with a propensity to insecure attachments and limited patterns of response. Like Lucien and Rachel, mutually persistently fearful couples are haunted by ingrained, amygdala-driven limit cycle responses (Schoore 2003a, 2003b).

Couples come together in an infinite variety of combinations reflecting the complexity of two brains and two minds in interaction. Multiple influences in childhood affect their adult attachment and the nature of their relationship (Morrison et al 1997a, 1997b). In the process of forming their relationship, each couple forms a *complex attachment* in which partners depend on and support each other (Clulow 2001, 2006 in press, Fisher and Crandall 1997, 2001). However, the factors that determine their interactive range and their joint couple personality are too complex to compute or to predict precisely – but in many of the couples who come for therapy, the range of factors has narrowed disastrously. A husband's amygdala-driven reactivity acts as a tuning force bending his wife's anxious, insecure attachment into a submissive, clinging helplessness instead of marking and then playing together to regulate fear and pleasure. When partners mark each other's needs repeatedly only in a contingent way, and do not embrace adaptive chaotic elements, they limit their interactive potential.

Couple therapy example: Session 3

At the next session, Rachel described a dream of her own. She said, "I only remember the end, and I awakened screaming. We were in Paris, my favorite place in the world, looking for a selection of good cheeses, and we got separated by crowds. When I saw Lucien again he was on an old street, carrying a thin, young French woman who was feeding Lucien his favorite cheese. I started yelling at him that he'd been lying and that some other woman did make a difference."

Rachel said that the dream relieved her guilt about the sexual relationship going wrong. It showed her Lucien's attachment to another woman, carrying her and receiving nurturance from her the way she would like him to carry their sexual life and its repair and to receive nurture from her in sex. Lucien asked whether the French woman could be his mother who was thin before his birth.

Both dreamers referred to guilt, and to a thin young woman. Lucien had ignored the image of the thin, young, self-absorbed woman in his

dream, and now Rachel was picking it up, feeling anguish at being excluded by Lucien's pleasure in being fed by the young woman. Rachel's dream was marking Lucien's concern but doing so contingently, with an infusion of her own alarm. The limit cycle attractors of their paired amygdala-driven fears magnify the dread of their relationship.

I talked about the overlap in the two dreams. In Rachel's dream, Lucien is searching for something, and he finds it with a thin woman in his arms, feeding him. In Lucien's dream, a thin woman was self-involved. He was opening the door looking for something, not seeing anything, and closing it again. Then, another woman connected to me marks the guilt/guilt on the armoire/armor in a contingent way and down regulates it by magic repair, the way that a mother's kiss can make it better. What did this mean for them as a couple?

Lucien said, "She fixed it so easily. I wanted to look inside, but it was blank."

Rachel said, "I see you caught up in the emptiness of your relationship to your mother and the damage it does to us."

Lucien's mother is quite overweight, but Rachel is thin. Rachel had seen a thin woman in his arms. Yet when Rachel asks for sexual intimacy, Lucien sees her as the intrusive, enveloping mother that he must fend off. Lucien is afraid of searching for her in case he finds nothing inside. Rachel is sad that she can not compete with Lucien's fantasy of a nurturing mother and cannot dispel the image of one who will overpower him.

Now I said to Rachel, "You have an image of a woman who has captured Lucien by feeding him his favorite food in your favorite place – that is, your sexual life – and frequently, you're furious at his mother."

Rachel agreed, "Yes, I feel she is a rival for his affection even now."

I said, "Lucien carries inside a black widow mother who seduces his attention from you. But this is your dream. Who is the woman inside you who seduces the man you yearn for and keeps him from you?"

Rachel said, "I love my mother. She's great. She keeps herself in great shape. We're good friends. My father was the difficult one for

me. He wasn't as bad as Lucien's mother, and he really loved me, but he was temperamental and difficult, and arrived at some terrible misunderstandings of me. My mother put up with him, and she got the best of him. She kind of seduced him into a relationship that was much more loving than ever I could manage with him."

I said, "So although your father cared for you, there is a part of him you could never have, but your mother could. This is the thin, seductive mother that you see inside Lucien winning him over. His attachment to his black widow overlaps with your thin, attractive mother. And inside his overweight mother hides a thin attractive 14-year-old who could be self involved or who could seduce him with food. Both your mothers seduced men: Rachel, your mother seduced your father and left you out; Lucien, your mother seduced you into her web and left your father to die emotionally, and that also leaves you feeling left."

Rachel's dream shows up the area of overlap in painful internal objects, which are psychic strange attractors. Both have organizations that trigger overlapping, amygdalae-driven fear responses. They have mirror neuron responses that reinforce fear and rejection in each other. The result is the development and reinforcement of a limit cycle attractor in each of them individually and in their interactions that colors their joint marital personality.

In this session, Rachel follows Lucien in sharing a dream. The dreams are close together, resonate with the same theme, and move the work forward. The swirl of the attractor patterns in therapy both brings the image of a couple closer and shows that the block to Rachel and Lucien establishing a sexual couple is their longing for a feeding couple and fear of emptiness. The strange attractor of the therapist's mind exerts a destabilizing tuning force that continues to bring previously hidden patterns to the surface, and then works to increase the range of motion in a new interactional strange attractor.

A therapist's main influence comes through unconscious communication – right brain to right brain. The strange attractor of the therapist's endopsychic system exerts a tuning force on the couple relationship. The complex co-regulation of affect between couple and therapist leads to new self-regulation and self growth. The life-long plasticity of the right orbitofrontal cortex enables it to change and grow connections that promote emotional maturation – to achieve an

earned security over a period of time. The couple therapist's verbal understanding helps the left frontal cortex to develop a capacity for self-reflection in each individual, and therefore in the couple, which reinforces right brain reflective function. The couple can learn to expand the use of mirroring from simply appraising danger from the other to the complex function of actually understanding the other's interior experience.

Attachment theory, neuroscience, understanding of the limitations imposed by trauma and deprivation, all change the way we listen to couples, and how we interpret the transference. We listen for inconsistencies and breaks in the flow of the couple's narrative. We notice whether their memories are described in words, conveyed in images, recreated in the transference, or experienced in the countertransference. After speech is acquired, and when sensitive parents have put their children's experiences into simple words, verbal memories are laid down in the explicit memory system of the left brain. When early experience cannot be put into words and detoxified by the parents or by the child who cannot yet speak, then memories are stored as images in the implicit memory system of the right brain. Only an in-depth therapy -- based on unconscious resonance, reflection, and iteration of experience captured in the mirror neurons - - can give voice to early damage.

Couple therapy functions as a secure base (Bowlby 1969, 1980) from which couples can embark on exploration of trauma and loss and reach toward growth (Bowlby 1973, 1980). In reactive couples, we see automatic, brain-driven responses rather than the more flexible mentalizing of matured minds (Cozolino 2003, Fonagy et al 2003). We notice the mentalising capacity of the partners, and the moment-to-moment patterns of reaction, holding-and-containment, or failure of understanding. Like a secure parent caring for a child, the couple therapist mentalises, senses, imagines, and understands the couple's experience. All of these functions form the tuning force we bring to couple therapy. We hope – but cannot predict for sure – that our tuning force will introduce perturbations in the most limited of the couple's attractor patterns, throwing them into destabilized, chaotic and confused states, and that from this edge of non-random chaos, new, more flexible strange attractor patterns will take over and bring a capacity for vitality to the newly autonomous self-organizing couple relationship.

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Abstract

Chaos theory, the theory of dynamical systems, offers a new paradigm for understanding the dynamics of psychological, mental, and affective processes in couples and the development, maintenance, and therapy of couple relationships.

The couple relationship forms when two individual psychodynamic systems combine in unpredictable ways to develop a system that is essentially chaotic and inherently self-organizing. Couple therapy informed by chaos theory moves troubled couples out of their limit cycle functioning and encourages the development of new strange attractor patterns that confer enhanced flexibility of response in the couple system, bringing couples new adaptability and confidence to meet developmental challenges.

In ill health, the couple system is governed by limit cycle attractors, which means that emotional and interactional patterns repeat with a self-sameness that undermines confidence in each other and leads to a sense of deadness and futility rather than vitality. In health, the couple is governed by strange attractors that create self-similar patterns that are not precisely self-same, which means that a healthy couple's dynamic internal object relations organize, and are organized by, patterns with overall consistency enlivened by small, unpredictable variations. These variations allow flexible adaptation to new

challenges, development, and growth as a couple, while the repeating, consistent aspects of the pattern contribute to confidence in the ongoing life of the couple.

Therapy functions as a tuning variable that introduces perturbations that destabilize the maladaptive patterns of a couple whose system is governed by a repetitious limit cycle attractor, and pulls the couple towards strange attractor patterns of function that are livelier and more adaptive. Vignettes of three sessions with three dreams from ongoing marital and sex therapy with a couple illustrate the authors' proposition that chaos theory, enriched by the application of findings from neuroscience, attachment research, and affect regulation, exerts a tuning variable on our paradigms for doing couple therapy, and opens new points of access for conceptualizing and treating couple relationships.

El Matrimonio como un Atractor Extraño: Teoría del Caos, un cambio de Paradigma para la Terapia de Pareja

David E. Scharff, M.D. y Jill Savege Scharff, M.D

La Teoría del Caos, teoría de sistemas dinámicos, ofrece un nuevo paradigma para la comprensión de procesos psicológicos, mentales y afectivos en las parejas y en el desarrollo, mantenimiento y terapia de las relaciones de pareja.

La relación de pareja se forma cuando dos sistemas psicodinámicos individuales se combinan de maneras impredecibles, desarrollan un sistema que es esencialmente caótico y auto-organizador. La Terapia de Pareja, que incluye la información que brinda la Teoría del Caos, moviliza parejas perturbadas hacia afuera del ciclo de funcionamiento limitado y fomenta el desarrollo de nuevos patrones de atractores extraños que confieren y realzan una flexibilidad de las respuestas en el sistema de pareja, que le dan a la pareja una nueva adaptabilidad y confianza para que puedan enfrentar los desafíos del desarrollo.

En las parejas enfermas el sistema es gobernado por un ciclo de atractores limitados, lo que significa que los patrones emocionales de interacción se repiten con una auto igualdad y lo lleva a una sensación de inercia y futilidad en vez de vitalidad. En relaciones sanas la pareja es gobernada por atractores extraños que crean patrones auto-similares que no son exactamente auto-iguales, lo que significa que en la dinámica de la pareja sana las relaciones objetales internas organizan y son organizadas por patrones de una consistencia completa animada por pequeñas variaciones impredecibles. Estas variaciones permiten una adaptación flexible a nuevos desafíos, desarrollo y crecimiento como pareja, mientras que los aspectos consistentes y repetitivos de los patrones contribuyen a mejorar la confianza en la vida de la pareja.

La Terapia funciona como una variable que afina e introduce perturbadores que desestabilizan los patrones de la pareja cuyo sistema es gobernado por un repetitivo ciclo limitado de atractores y empuja a la pareja hacia el funcionamiento de patrones de atractores extraños que son más vivos y más adaptativos. Se presentará viñetas

de tres sesiones con tres sueños de la Terapia Marital y Sexual de una Pareja que ilustra la propuesta de los autores en que la Teoría del Caos, enriquecida por la aplicación de descubrimientos de la Neurociencia, investigaciones de apego y regulación afectiva, ejerce como una variable que afina nuestros paradigmas en el trabajo de Terapia de Pareja y da apertura a nuevos puntos de acceso para la conceptualización y el tratamiento de relaciones de pareja.

Marriage come un etrange attracteur:la theorie du chaos come changement pour la therapie du couple.

David et jill Scharff

La théorie du chaos, la théorie des systèmes dynamiques, offre un nouveau paradigme pour la compréhension des dynamiques des processus psychologiques, mentales, et affective en cas des relations entre les membres d'un couple, le développement d'une relation de couple, et la thérapie des connexions des couples. La parenté de couple s'établit quand deux systèmes psychodynamiques individuels fusionnent à la manière imprévisible pour créer un système à l'essence chaotique mais capable d'arranger elle-même. La thérapie des couples informée par la théorie de chaos peut changer la fonction limitée et encourager le développement des nouveaux modèles des attracteurs étranges qui confèrent une réponse plus flexible au système du couple. Ce développement donne aux couples un nouvel niveau d'adaptabilité et de la confiance pour surmonter les défis de la vie.

En cas de la santé malade, le système du couple est gouverné par les attracteurs limités. Ça veut dire que les modèles de l'expression des émotions et des interactions se répètent sans modification. Cette similarité juste sape la confiance. Puis un sens feutré et futile suit en place de la vitalité. En cas de la santé, le couple est gouverné par des attracteurs étranges qui créent des processus qui ne sont pas précisément à fond. Ça veut dire que le rapport des objets internes du couple sain arrange, et sont arrangés par, des modèles fidèles, animés par des petites variations imprévisibles. Ces variations laissent à la couple l'adaptation aux nouvelles interpellations, développement, et grandissement. Au même temps, les aspects répétitifs du processus contribuent à la confiance du couple. La thérapie marche comme un variable qui s'accorde. Cette variable introduit des perturbations qui déstabilisent des processus manqués d'un couple dont le système est gouverné par un attracteur limité et répétitif, et tire le couple vers des processus des attracteurs étranges qui leur donnent des fonctions plus vivants et plus souples. Des vignettes de trois séances avec des rêves produites en train de la thérapie maritale et sexuelle éclairent la proposition des auteurs que la théorie de chaos, enrichie par l'application des découvertes des neurosciences, de l'attachement, et de la régulation de l'affect pose un variable qui pousse nos paradigmes pour travailler en thérapie avec des couples, et ouvre nouveaux points d'accès pour la compréhension et traitement des parentés de couple.

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