"At the border between chaos and order": what psychotherapy and neuroscience have in common

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"Understandings that are derived at the border between chaos and order where, according to some, many of the problems of nature lie, may not provide exact solutions but rather those which can allow application and understanding to emerge"

Coveney & Highfield, 1995, p. xiii

"Psychotherapy and psychoanalysis appear to be far closer to forms of intermittent turbulence and uncertainty than to ordered systems ... one of the goals of [...] modelling is to discover the underlying order beneath the surface chaos of the psychotherapeutic interaction"

Langs, 1988, p. 206

We are at a point in history where re-convergence between psychotherapy and the rapidly developing field of neuroscience has immense significance and potential—a potential which is revolutionary in its implications. The neuroscience represented in this book really does reflect a cutting
edge distinct from mainstream science. It offers psychotherapy a great deal more than just fragments of interesting information and alternative models of the mind. It highlights a new way of thinking in science which—I am going to argue—is not just a familiar way of thinking for psychotherapy but actually is fundamental to its inception.

Freud's neurological studies, from 1880 onwards, preceded and informed his development of psychoanalysis. In his day, neurology consisted in the attempt to correlate clinical problems with specific locations in the brain. But he became dissatisfied with the limitations of this "localization" approach, because it did not address the dynamic nature of neurosis (i.e. its clinical difference from the specific effects of brain damage). Freud had both the desire and the imagination to sense a potential integration of neurological, behavioural, mental, and somatic functions, but the scientific tools and conceptual models of his era were not adequate to the task. He never up gave the idea entirely, but turned his attention to the development of psychoanalysis.

In the twentieth century, the two burgeoning fields of psychoanalysis and neuroscience continued to develop in different directions. Dialogue between the two disciplines was hampered by differences in discourse, aims, and modes of research. There was a largely unbridgeable gap between the scientific language of neurons, neurotransmitters, and sensory–motor functions and the psychotherapeutic models of intrapsychic and interpersonal processes. Paul Whittle has called it, "the faultline running down the middle of psychology" with experimental psychology (which has been incorporated into neuroscience) on one side, and psychoanalysis and other forms of psychotherapy, on the other (Whittle, 2000).

But there has been a gradual turning of the tide. Until fairly recently, "the self has been viewed as a metapsychological phenomenon that was not accessible to scientific investigation" (Schore, 1994: p. 490). Now a small but significant group of radical thinkers in neuroscience and related fields have made significant strides towards integrating into its conceptual models aspects of human functioning which are very much closer to psychotherapy’s concern with the self: feelings, the dyadic nature of consciousness (and the unconscious), the construction of meaning (internal working models), and the critical significance of early developmental experience. Psychotherapy, under pressure to produce "scientific" evidence, has much to gain from the impetus and dynamism of contemporary neuroscience. What is most heartening is that affective neuroscience is providing increasing evidence that underlines the need for a relational approach to human suffering, and points away from reductive thinking that has tended to characterize many medical model solutions. (Panksepp, 1998; Schore, 1994; Solms & Kaplan-Solms, 2000; Trevarthen, 2001; Watt, 2001).

Neuroscience's spectacular development, over the last decade in particular, is a result of three main factors:

— A surge in interdisciplinary thinking, including the emergence of many new fields, such as developmental neurochemistry, infant psychiatry, and neuropsychoanalysis, has resulted in the processing, cross-referencing and integration of vast amounts of data. A proliferation of connections between previously separate fields is a result of the crystallization of a few core concepts, such as self-regulation, attachment, and parallel process, which are recognized and studied by many disciplines from different perspectives. Integration is occurring in the context of a clearer recognition of the hierarchy of logical types, in other words different levels of organization, from the micro (atoms, molecules, organisms upward) to the macro (social, cultural, cosmic). Whilst appreciating the distinctions between different "levels of description", integrational theorists are overcoming the obstacles created by perceived hierarchies of discourse, which are about politics and power (Carroll, 2002a).

— Advanced technology, such as MR (magnetic resonance scanning) and PET (positron emission topography), for monitoring activity in various regions of the brain, techniques for tracking biochemical changes in the body, use of video to study the choreography of mother–infant interactions, and computers which can handle complex data, all contribute to a dynamic microscopic and more complete picture of human internal life. The micro level is absolutely critical in distinguishing subtle processes which have hitherto been disregarded or denied as scientifically unproveable.

— A shift has taken place in the overarching models of science, as far reaching as the changes following Einstein's theory of
relativity. Field, chaos and complexity theories have superseded mechanistic models which compared the brain to a computer. The implications for psychotherapy of this paradigm shift will be the main theme of the chapter.

A scientific revolution

To understand what it is that has enabled neuroscience to begin to get to grips with the subtle, multilayered, and often convoluted process of human relating, it is necessary to appreciate the revolution that has taken place in science over the last century. This new scientific paradigm, stemming from general systems theory, has arisen from the attempt to describe the behaviour of non-linear dynamic systems. These systems manifest characteristics such as chaos, complexity (or in some cases catastrophe), and self-organization by which names the theory is also known.

In Table 1, I have contrasted the basic terms, principles, and characteristics of classical and new science (non-linear dynamic systems theory). This over-simplifies a historical process which is itself complex and chaotic, but gives an overview of the critical change in framework for thinking about non-linear processes.

Classical science explains closed systems which behave in ways that are predictable, stable, and knowable, for example, the physical behaviour of mechanical objects, such as clocks. New science was born from the attempt to understand dynamic, complex, open systems, such as the ecosystem, the weather system, and the behaviour of living creatures. In these systems, change is a matter of complex interconnected events, where there can be an extraordinary sensitivity to timing and minute changes in the environment, mediated through ubiquitous networks of feedback loops.

Psychotherapy has long wrestled with the implications of biology and its associations with determinism. The new biology—within the framework of self-organization theory—emphasizes interaction and contingency as major principles of formation, and therefore is more aligned with the emphasis on historical and relational principles of psychotherapy. In addition, new developments in science have enabled a more profound recognition of the structure–function relationship: structure is the record of previous history and determines capacities, but not content. The characteristics of the human mind arise from and are grounded in the structure of the brain and the body in interaction with the environment (Damasio, 1994, 1999; Johnson, 1987; Panksepp, 1998; Schore, 1994; Totton, 1998).

The formulation of principles which describe dynamic non-linear processes has led to tremendous advances in fields such as neuroscience. The brain itself is now conceived of as dynamic and non-linear, a complex hierarchy of systems and sub-systems. Interest is increasingly focused on neurochemistry in the dynamic equation of psychological functions. This implicates the totality of bodily processes interacting with brain structures to produce a radical "new anatomy", where all psychological functions, even specific ego functions, are conceived of as emergent properties of a complex "brain–mind–body" (Carroll, 2001; Schore, 2000: p. 40).

The prototype and initial bridging concept between biology and psychology was self-regulation, modelled on physiological homeostasis and incorporating the behavioural concept of adaptation. Feedback is the essential mechanism of self-regulation that allows
living organisms to maintain themselves in a state of dynamic balance. Mother and baby can be conceived of as homeostatic regulators of each others’ emotional states. The baby's behaviour is feedback—a communication to the mother. Her attuned response acts as benign feedback, helping to maintain equilibrium in the infant. The theory of self-regulation has been taken up by infant research and recent psychoanalytic theorists, where it has been strongly identified with the concept of affect regulation (Fonagy, 2001). Integrating across a variety of disciplines, Allan Schore demonstrates how the infant acquires regulatory capacities as a set of representations of interactions between itself and the caregivers. These representations correlate with structural changes in the brain enabling increasing self-regulation (Schore, 1994).

Whilst self-regulation remains a core model of developmental process, it has been extended by the evolution of self-organization theory which adds to it the elements of form and complexity. Prigogine, a pioneer of chaos theory, differentiated between systems that were "in equilibrium", "near equilibrium" and "far from equilibrium". Self-regulation theory emphasizes how the organism maintains equilibrium. Prigogine (1984) showed that systems far from equilibrium give birth to new structures—they can develop in a non-linear way. Chaos emerges when the trajectory of a system reaches a threshold of change (bifurcation point) far from equilibrium. At this moment of instability, the system may break down and follow an earlier pattern imprinted in its structure (repetition). Or as a result of its exquisite sensitivity to any fluctuation in the environment, it may break through to a new pattern of higher order and complexity.

The trajectory of self-organization is influenced by attractors, which, in terms of a human process, can mean a memory, a thought, or feeling—an attractor is like a groove which gets carved as experience gets repeated. Periodic attractors are those which recur and are characteristic of a stable system. Strange attractors emerge when a system is far from equilibrium and they can lead to dramatic shifts and reorganizations of structure. The difference between self-regulation and self-organization is that in the former the process is one of adaptation, translation, and change in surface structure. In contrast, self-organization manifests deep structural changes, where new forms emerge spontaneously. Self-organizing systems evolve hierarchically, they move from one level of development to another. Each new level builds on the previous one and is increasingly complex and differentiated. This helps elaborate a model of human development which includes both gradual progress and quantum change. Allan Schore, for example, has convincingly shown how the infant’s experience in the attachment relationship is internalized as structural changes in the brain, in the form of increasing complexity, connectivity, and differentiation between parts. This directly correlates with the precise character of each individual infant's psychological story, with huge implications for their future emotional and physical well-being (Schore, 1994).

Self-organizing systems develop by coupling with other systems through ongoing feedback. Recurrent interactions trigger mutual structural changes. Neuroscientists Maturana and Varela coined the term "structural coupling" to describe the general principle of living systems interacting with their environment (Maturana & Varela, 1980). Structural coupling graphically describes human relationships, where people have ongoing reciprocal impact on each other. What is more, they insist, a structural couple is a learning system. Through experience we generate internal working models which we then enact, though with varying degrees of awareness. As Capra explains in The Web of Life:

At a certain level of complexity a living organism couples structurally not only to its environment but also to itself, and thus brings forth not only an external but also an inner world. In human beings the bringing forth of an inner world is linked intimately to language, thought and consciousness. [1996, p. 270]

Self-organization is the critical property of living systems because it makes them both flexible and responsive to change, including sudden change, and robust and stable, able to maintain self-referral and coherence. The brain is self-organizing, with the evolutionary older parts tending to have more "fixed programmes", and the later-developing mammalian system being associated with the capacity for a wide range of feelings linked to survival and social functioning. It is now suggested that the plasticity of the neocortex, especially the orbito-frontal area, is influenced by the quality of structural coupling in the attachment relationship. Self-and-other representations become increasingly differentiated and
integrated over specific developmental stages. In this way a hierarchical organization of sub-systems allows for emergent complex emotions, thoughts and actions (Schore, 1994, p. 491). Whilst such concentrated change cannot occur in the adult brain—because the sensitive "windows" of development have passed and with it the young brain's neural plasticity—the adult brain continues to evolve according to the principles of self-organization (Schore, 1994, p. 468).

Allan Schore points out that the term self-organization is a misnomer in two ways (Schore, 1997, p. 607). Self-organization describes a fundamentally dyadic process, not a self-centred one; and it refers to a continual flux of dis-organization and re-organization. With this minor caveat, self-organization theory provides a framework for thinking about multiple levels, the effect of relationships, non-linear change, the role of history, repetition, communication, sensitivity, and subtlety; in other words, the very phenomena that interest psychotherapists.

*Psychotherapy —at home with chaos and complexity*

Psychotherapy has always sought to work with the non-linear, apparently irrational, uniqueness of each individual or group. Its key thinkers have been gifted in seeing through the veil of madness to a deeper pattern, which takes account of the context and dynamic from which it emerged. Freud said of the unconscious: "we call it a chaos ..." (1933), and he described it as a dynamic system. Many of the regulatory principles outlined in Freud's "Project" (1950[1895]) have been found to be quite compatible with modern systems theory (Pribam & Gill, 1976). However, Freud lacked the conceptual models of our contemporary scientific paradigm, and so was forced to develop psychoanalysis as a separate discipline.

Freud struggled to integrate functional, topographical, systemic, dynamic, and economic points of view. Arguably, self-organization theory could provide the framework for such an integration. Certainly Freud was struck by the principle of the reciprocal bodily and psychological process of trying to maintain equilibrium, and the paradoxical behaviours and spontaneous (unconscious) forms—symptoms, dreams, jokes—that resulted from juggling internal conflicts. He identified the shifts between "bound" and "mobile" states on many levels (word presentation, ego organization, affect, energy). He used terms such as "fixation", "excitation", and "lability" to describe what Allan Schore, using the language of non-linear dynamic systems theory, is correlating in neurological detail with attractors and state transitions (Schore, 1997). Today Christopher Bollas is further developing this idea of constant flux or disorganization—reorganization (what he calls condensation and dissemination) as the work of the unconscious and psychotherapy (Bollas, 1997).

Interestingly Reich and Jung were able to find an explicit place for self-regulation, both in their distinctive metapsychological positions and, more significantly, in the actual process of the therapeutic work. Reich anticipated contemporary neuroscience in his emphasis on the autonomic nervous system, now recognized as a core structure involved in emotional self-regulation: "the development of character is a progressive unfolding, splitting and antithesis of vegetative (i.e. autonomic) functions" (Reich, 1973, p. 302). He maintained that physiological systems, such as the muscular system, had a correlating psychological function, based on their structural—or as he put it functional—identity. In his development of vegetotherapy (i.e. a therapy which directly addresses the autonomic nervous system), Reich worked with the breathing pattern to release chronic contraction in the tissue, which arrests pulsation, the fundamental rhythm of self-regulation (Reich, 1972, 1973). Meanwhile, Jung had a powerful perception of the patient's spontaneous productions—symptoms, imagery, dreams—not simply as diagnostic, but as potentially healing in and of themselves. The Self is seen as having deeply rooted, innate self-regulating capacities which can be effectively utilized in psychotherapy (Conger, 1988; Jung, 1921; Samuels, 1989).

Self-regulation, as a broad term, remains a key concept in subsequent therapeutic traditions—particularly the humanistic—where it includes a variety of therapeutic activities. The elaboration of an impulse indirectly through a specific medium, such as art, or directly with the therapist allows for its recognition and assimilation. In other therapies (NLP, family therapy, Gestalt, T.A) systems and field theory have been used explicitly to model dynamic processes.

Meanwhile, the thinking of Klein, Winnicott, and Bion was characterized by the attempt to find a language to describe intensity.
Working typically with a more disturbed client group, they anticipated the relevance of catastrophe, chaos, and paradox in non-linear dynamic systems theory by perceiving such change processes of human experience in these very terms! In psychoanalysis, the therapist is conceived as having a more active role in the regulation (containment) of the patient through holding and interpretation (Grinberg, 1977).

Despite the wide variations in theory and technique which characterize the field of psychotherapy today, therapy in general seems to offer a particular opportunity for intensifying the ordinary self-organizing process of life. Its formal structure sets limits of one kind, in order that other limits—such as the constraints of "normal" social discourse—can be suspended. Secondly, it radically increases feedback to the system (the client) in a multiplicity of ways. Self-regulation is supported through the provision of a stable, empathic, boundaried space. This acts as a container for meaningful crises and transitions to more complex and differentiated states.

Psychotherapy pays close attention to the trajectory of the client's thinking and feeling. As the therapist perceives a crisis or fluctuation in the trajectory (both backward and forward), he/she makes a therapeutic decision—perhaps to actively support the emergence of a new state, or perhaps just to continue to wait and see what unfolds. Or the therapist may perturb a familiar trajectory either inadvertently or deliberately through an intervention. Psychotherapy inevitably evokes pain and fear in the client because it amplifies the conflict between established structures which are breaking down and an emergent process which is unfamiliar.

The aspects of the feedback process in psychotherapy could be broken down in various ways and into various categories. In the next section I am going to focus on three fundamentally interrelated facets of this process, which I am calling "representing", "feeling", and "relating". In terms of self-organization theory, representing refers to the pattern of organization, feeling is the state, and relating the structural couple.

_Psychotherapy as a self-organizing process_4

Since its inception, psychotherapy has used the telling of a story as a means for the client to present and represent him/herself. The modes of this representation in psychotherapy have proliferated, as have controversies about the nature of representation itself. Whilst neuroscientists would agree that representation is intrinsically overdetermined and complex, they are as much in dispute over the scope of the term representation as psychotherapists. In general though, representation is recognized as an activation or reactivation of a neural pattern. Neuroscientists commonly use the metaphor of an on-line function (reminding us of Freud's meaning "re-presentation").

Damasio and Schore, both from quite different perspectives, are arguing that representations are based on patterns of relationships, the object plus its effect on the subject (Damasio, 1994; Schore, 1994). Of equal significance is the substitution of the idea of "mental" content for a more holistic embodied concept for all representation. Damasio suggests that the neural patterns from which representations derive are essentially _images_ in multiple sensory modalities of texture, _movement and intensity_ (1999, p. 318). His work supports the emphasis on innate imagery, increasingly recognized in psychotherapy as underpinned by bodily processes (Samuels, 1989; Landale, 2002). All the major theoreticians in neuroscience are moving—in their different ways—towards recognizing psychological process as fundamentally embodied (Carroll, 2002a). This is part of the cultural and scientific paradigm shift and is reflected in the growing interest in the role of the body in psychotherapy. Body psychotherapy, for example, includes the explicit use of the feedback from the body to the brain to enhance and clarify object relations (Carroll, 2002b).

Naturally, representation of the client to him or herself happens in numerous ways. Psychotherapies vary most obviously in the way in which they implicitly and explicitly manage this feedback process: verbal interpretations, questions, and reflections; eye contact, non-verbal attunement, movement, and qualities of presence; techniques such as visualization, bodywork, hypnosis, and other structured interventions, such as maintaining _boundaries_. All these interventions are, to one degree or another, interpretative within a framework. Every therapist _imparts_ a set of principles and concepts which, whatever their intrinsic _value_, reframes the client's _experience_, and therefore re-presents it.

Representation is complex, conflicted, and multi-levelled: conscious and unconscious, triggered self-reflexively and directly and
indirectly in relation to the therapist. And it is holistic: affecting many systems of the brain and the body, producing images, sensations, fantasies, feelings, and thoughts. The nature of the brain makes this inevitable—for representation of the self is distributed through many systems of the brain, from the brainstem to the cortex. Rather than a central coordinating area for processing in the brain, neuroscientists suggest that massive parallel neural connections between brain regions (known as "re-entry") happens via reciprocal electrical signalling, such that different regions mutually influence each other. In The Mind-Brain Relationship, Pally explains that:

Synchronisation of activity made possible by re-entry enables rapid shifts in activity in large populations of neuronal groups. Re-entry functions to select the particular neural pathway that underlies the perceptual behaviour and experience [...] by linking widely distributed areas into complicated patterns [...] This is why consciousness takes time. Stimuli, memory or emotion must persist for sufficient duration to enable re-entry to produce the synchronisation of firing necessary to integrate widely distributed neural networks. [2000, pp. 163–164]

The nature of the process which precipitates integration between parts of the brain is very complex and still relatively uncharted. Still, a few basic integrative patterns have been of particular interest: left-brain to right-brain connections; vertical integration of brain systems, from cortex to brainstem; and functional circuits governing specific emotions, behaviours, and psychological functions. Insights into brain functioning confirm how psychotherapy can have a beneficial effect just from the cumulative consequence of making connections, representing and re-associating significant information. The use of metaphor, for example, is a highly integrative form of representation because it activates many brain regions simultaneously.

The complementary styles of the right and left cortex, popularized in the 1960s by Gazzaniga and Sperry, have been increasingly differentiated with significant resulting implications for psychotherapy (Pally, 2000, pp. 105–136). The left and right brains are lateralized for special functions, although in the healthy brain the two work synergistically. The right brain is associated with emotional processing and attachment; contextual, spatial, and global thinking; socio-emotional and non-verbal information; and integration of information from the body. The left brain identifies detail, sequential information, causal relationships, logic, and language. The left brain plays an important role in verbalizing and therefore optimally interpreting and articulating feelings. When it is not integrated with right-brain functions, it operates more like a confabulator, generating plausible explanations that are not based on deeper emotional connections (see Turnbull in this volume). Therapeutic work can support increasing representation across the two cortices through the use of arts, music, movement and bodywork (which nourish the right brain), and by attention to the client-therapist relationship (Robbins et al., 1986).

Equally, however, increased understanding of the complexity of brain organization confronts us with the stubborn hard-wiredness of deep psychological-neurological structures. Despite the relative plasticity of the cortex, which allows for the tremendous intellectual and creative scope of the human mind, its deeper interconnections with older parts of the brain limits its ultimate range of function. Neurodevelopment follows the principles of self-organization in that higher structures mirror and recapitulate the organization of lower systems. In other words, a "basic fault" will manifest higher up the system. In addition, whilst the cortex is designed to process novelty, it is in the lower brain structures that behaviours not subject to conscious control are maintained and consolidated. In studies, it has been shown that as long as the individual tries to control his behaviour or makes a conscious mental exertion, the alpha wave, which reflects spontaneous reorganization of brain activity, is not achieved (Robbins et al., 1986, p. 117).

The challenge of facilitating structural change is compounded by the sheer multiplicity of neurological systems organizing behaviour. This means that attention and energy are easily displaced into the circuits with which therapist and client are most comfortable. Freud identified this process of displacement of instinctual energy over a century ago. In a landmark work, Affective Neuroscience, Jaak Panksepp (1998) has delineated seven emotional operating systems, distinguished by specific neural circuits and integrated cognition/affect/behaviour patterns, that come close to what we might call "instincts". Panksepp regards these not as drives but as regulatory
mechanisms emerging from the intrinsic potentials of the nervous system. Neurobiologically, the systems identified are: the seeking system (governing curiosity, searching and meaning-making); the rage system (aroused by frustration); the fear system (fight/flight/freeze); the panic system (separation distress); the lust system (sexual behaviour); the care system (maternal behaviour); and the play system.

Whilst some of these categories are predictable, others radically reformulate our established categories of affect with surprising implications. Panksepp suggests that the function of the play system—which he links with play in the sense of "rough and tumble" activity—is to integrate a wide variety of somatic and other information, in a complementary role with dreaming (1998, pp. 280-299). Meanwhile, the seeking system is linked with the pleasure of discovery, and is implicated in the neurochemistry of dreaming. Investigation of this neurobiological system, connected with foraging behaviour, can help us understand why we are driven to search for meaning in psychotherapy (and elsewhere) and why its elaboration is so intrinsically satisfying, quite apart from the benefits to be gained from insight. Dysregulation of this system leads to an excess of meaning-making—manic activity which is ungrounded and unstable (1998, pp. 144-163).

Yet what strikes me about these neurologically identifiable systems is that they correlate quite highly with the orientation and emphases of various therapeutic traditions: those which have given pre-eminent place to attachment, such as attachment-based psychoanalytic psychotherapy (separation distress system); the Freudians with their emphasis on sexuality (lust system); the Kleinians who work particularly around themes of frustration and envy (rage system); the Jungian emphasis on active imagination and dream analysis (the seeking system); body psychotherapy which is premised on somatic integration (the play system); and finally therapies which specialize in working with trauma (fear system). Obviously no psychotherapy is limited to one system and these links between neurological system and school are somewhat stereotypical. But I hope the point is still valid: that the development of psychotherapies may be influenced by the particular system that their founders tended to self-organize around. The positive side of this is that self-organization in one system does affect neighbouring systems, so that there will be a knock-on effect from work done on any aspect.

Naturally it is also the case that these distinct circuits are complexly interrelated and reciprocally linked. Nor should these neurological structures be mistaken for the manifest themes in psychotherapy. They constitute deep organizational patterns which have ramifications on many structural levels of the brain. The best hypothesis about the key to structural reorganization fits with current psychotherapy thinking: that it is not in identifying the content, but in creating the therapeutic context for activating cortical, limbic, and brainstem simultaneously—a neurological firing on all cylinders. Douglas Watt, commenting on the phenomenon of repetition compulsion, suggests that both "cortical and subcortical systems need to be 'on-line' and (re-)activated in order for them to be modified by new contingencies" (Watt, 2001, p. 8).

How—as it were—can the therapist maximize this "on-lineness" so that critical reorganization can take place? Recall that what nourishes self-organization is feedback which, I suggest, in a cultivated and often highly sophisticated way is the essence of psychotherapy. Indeed, psychotherapy is a specialized form of mutual feedback, a double loop which focuses around the client's self-organization, whilst nested within the organization of the psychotherapy relationship (and beyond that the supervision). It depends on the reflective use of relating, paying particular attention to subtle changes and nuances that hint at hidden dynamics. When a behaviour, phrase or gesture—or all three together—are noted, even if not verbalized, awareness is amplified. Empathy in the therapist, and the client's attachment to the therapist, and curiosity in them both, will increase the potential for resonance. The structure of therapy itself reinforces the propensity to heightened engagement stimulated by high levels of attunement. In contemporary psychotherapy, there is now a marked emphasis on the psychotherapeutic relationship itself as the critical factor organizing change. The therapist-client couple has been variously theorized and utilized, including via the attachment model and the erotic couple of the Jungian coniunctio (Samuels, 1989). This correlates with the concept of structural coupling, a phrase which evokes the prototypical human pairings of mother-infant and adult lovers.

The Process Oriented Psychologist, Mindell, suggests that the varieties of psychotherapy are "spontaneous creations which arise..."
by amplifying events in given channels of the client therapist interaction” (Mindell, 1989, p. 8). The implication is that not only are different schools of psychotherapy self-organizing, but so is each therapist in his or her experience of the countertransference. With each new client the therapist allows the emergence of a self-organizing structure between themselves and the client (Ogden’s "analytic third"). The recognition of countertransference as an ordering principle is thoroughly congruent with chaos theory (Field, 1996). Countertransference is characterized by an extreme sensitivity to relational cues; its meaning has to be derived from the context. Its manifestations are inherently non-linear and unpredictable and we tend to notice them first either in a very subtle and novel detail of our own process or through finding our own internal trajectory knocked dramatically askew.

Transference reflects a relatively closed feedback loop, because it constitutes the repetition of a past pattern, rather than an open loop in the present. The therapist aims to feedback the information in this unconscious behaviour in the face of the tricky fact that transference is precisely what blocks the client from receiving feedback. It is interesting to note that in dynamic systems theory two contrasting kinds of feedback are recognized: amplifying or (+ve) feedback which expands and intensifies patterns; and dampening or (–ve) feedback, which has the opposite effect. In the psychotherapy relationship, both participants are subject to their own self-regulating defences (internal feedback). When a certain threshold of arousal occurs, he/she will unconsciously inhibit further arousal (–ve feedback). This is in tension with the curiosity to explore and amplify feelings which may lead to a pleasurable, or uncomfortable, increase in self-awareness (+ve feedback).

This has numerous ramifications, which may be perceived by the therapist in terms of the client’s language (narrative content, imagery), behaviour (looking away, making faces), and other body phenomena (breathing, tone of voice), and in the countertransference. The therapist’s intervention may help amplify subtle transactions which are then experienced in their intensity as pain, excitement, fear etc. (increasing positive feedback). Or they may provoke further defensive contractions in the client, who is attempting to limit the catastrophe and chaos of experiencing intensity. The tension between these forms of feedback are at the crux of psychotherapy. With an imbalance of negative feedback, the individual/system becomes static and closed. Too much positive feedback dysregulates in the other direction—there is chronic instability.

At the risk of over-generalizing, we could say that the humanistic tradition has been characterized by its emphasis on positive feedback, “letting it happen”, expression etc. Its raison d’etre was the encouraging of growth. By contrast, some psychoanalytic psychotherapies have focused on naming and interpreting defences, in order to modify the effect of negative feedback. In practice, all therapies probably use a mixture of both. We work with the dynamic tension between safety and not being too safe, between conscious insight and disinhibition, between structuring and disrupting.

The paradox of therapy is that when the client can bear what is unbearable to think and feel, their experience changes—the self reorganizes. The critical factor here is spontaneity which is equivalent to chaos, in the sense that scientists are using the term. Chaos, in this context, represents “a lifting of constraints on information processing” (Schore, 1997, p. 614). The client—and sometimes the therapist—inevitably fear chaos in the worst sense of the word, as a meaningless loss of control. Yet an outburst of feeling may prove an important turning point allowing for a deeper holding or tolerance of destructiveness, or an insight into the creative force of what has been repressed.

Spontaneity is the hallmark of reorganization. It is a term more frequently used in humanistic practice and conveys its fundamental optimism about human nature and the trajectory towards self-actualization. It has also been associated with the emphasis on discovering internal freedom to act. In psychoanalysis, free association is the focal vehicle for a spontaneous process. The emphasis here is on freedom to think through getting at the roots of unconscious restraints on thought.

It is widely agreed now that the client needs to experience feelings in the relationship with the therapist. This makes sense because, as Doug Watt has argued, "emotion binds together virtually every type of information that the brain can encode [...] running from top to bottom of the neuro-axis" (1998, p. 19). Intensity of feeling, transitions between feelings, and the identifying of unfamiliar
feelings, all feed self-organization. The therapist plays a critical role in influencing—via subtle cues and interpretations which reflect both strategic focusing and unconscious avoidance in the therapist—both the specific feeling and the intensity that the client is encouraged to experience.

These are bodily relational processes. The ability of the client to occupy and differentiate a multiplicity of psychological "positions" (in the broadest sense) depends on their capacity to shift between different psychobiological states associated with different affects. Schore argues that pathology is directly equivalent to inefficient state regulation originating in early failures of the attachment relationship. He notes that chaos arises at the point of phase transition, in other words at the critical point when new feelings are emerging (1997). At this point, the client is extremely sensitive to "perturbation", a disturbance in the form of interruption or non-attunement. As therapists know, timing is crucial and "minute perturbations can change the whole trajectory" (Schore, 1997, p. 602).

At the current moment both neuroscience and psychotherapy would probably agree that change is not linear but rather a continual process of organization, disorganization, and reorganization. Despite the need of the therapist to maintain the therapeutic position, many argue now that at critical moments neither therapist nor client may be "in control" and that the therapist's access to a meta-level—a containing overview—will be disrupted before it is recovered (Soth, 2000, no. 18, p. 10). Psychotherapy, in other words, joins neuroscience in researching "at the border between chaos and order" (Coveney & Highfield, 1995, p. xiii).

Notes

1. The importance of Freud's 1895 essay Project for a Scientific Psychology (1950) was noted by neuropsychologist Pribam and Gill (1976), and has been commented on by Wilden (1972), Solms & Kaplan-Solms (2000), and Totton (1998).

2. Non-linear dynamic systems theory is the over-arching term, whilst chaos, complexity and self-organization form overlapping branches of theory. Field and information theory are also part of the new scientific paradigm. I have tried to minimize use of technical terms and lengthy explanations of concepts in order not to obscure the emphasis on basic principles. As a non-scientist, I followed the descriptions outlined in Coveney and Highfield (1995), Capra (1996), Sardar and Abrams (1998), and for the broadest overview Wilber (1995).


4. Various writers have made links between chaos theory and psychotherapy, including Field (1996), Scharff and Scharff (1998), and Robbins et al. (1986). Allan Schore's paper on non-linear processes in early development (1997), as well as his discussion of research in psychotherapy using a chaos model (1994, pp. 469-472), was an important influence. I am also grateful to Michael Soth, Nick Totton, and Kathrin Stauffer for their inspiration and help in developing this chapter.

References


