Journal of Constructivist Psychology
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713659385

Of Neurons And Knowings: Constructivism, Coherence Psychology, And Their Neurodynamic Substrates

To cite this Article: Toomey, Brian and Ecker, Bruce , 'Of Neurons And Knowings: Constructivism, Coherence Psychology, And Their Neurodynamic Substrates', Journal of Constructivist Psychology, 20:3, 201 - 245
To link to this article: DOI: 10.1080/10720530701347860
URL: http://dx.doi.org/10.1080/10720530701347860

Journal of Constructivist Psychology, 20:201–245, 2007

ISSN: 1072-0537 print / 1521-0650 online
DOI: 10.1080/10720530701347860

Routledge
Taylor & Francis Group

OF NEURONS AND KNOWINGS: CONSTRUCTIVISM, COHERENCE PSYCHOLOGY, AND THEIR NEURODYNAMIC SUBSTRATES

BRIAN TOOMEY
Clinical Psychology Department, University of Memphis, Memphis, Tennessee, USA

BRUCE ECKER
Private Practice in Psychotherapy, Oakland, California, USA

This first of three articles creates a framework for bringing the phenomenology of psychotherapy into fruitful coordination with neuroscientific knowledge. We suggest that constructivism is a conceptual paradigm adequate to this task. An examination of the main features of psychological constructivism and of neural constructivism serves to demonstrate their strong convergence. Attention then turns to a particular implementation of psychological constructivism, the relatively recently developed psychotherapeutic system known as coherence therapy or coherence psychology. We provide an account of the extensive neuroscientific evidence supporting this system's model of clinical symptoms as being produced by coherent, unconscious knowledge structures held in implicit, subcortical memory. Suggestions for research that could test our analysis are the focus of our conclusion.

The field of psychotherapy can benefit considerably, we believe, from incorporating an understanding of the neurodynamic correlates of psychological and behavioral change. Although some individual clinicians are regularly quite effective, there is considerable

Received 3 September 2006; accepted 20 November 2006.

The authors are grateful to Laurel Hulley for influential discussions of this article, and to Timothy Desmond for many useful discussions and clarifications. Niall Geoghegan, Elina Falck, Pat Kunstenaar and Maurits Stakenburg also provided valuable comments. This article also benefited greatly from the critiques provided by its anonymous reviewers, whom we thank sincerely.

Address correspondence to Bruce Ecker, 445 Bellevue Ave., Suite 202, Oakland, CA 94610. E-mail: b.ecker@dobt.com

evidence that, as averaged across practitioners, all tested forms of psychotherapy have the same modest level of effectiveness, a state of affairs widely known as the Dodo bird verdict (see, e.g., Crits-Christoph, 1992; Luborsky et al., 2002; Stiles, Barkham, Twigg, Mellor-Clark, & Cooper, 2006; and Wampold et al., 1997). It also appears that no tested therapeutic modality significantly outperforms a properly designed (structurally equivalent) placebo treatment (see, e.g., Baskin, Tierney, Minami, & Wampold, 2003; Robinson, Berman, & Neimeyer, 1990). Perhaps because these findings span a great deal of time (70 years since Rosenzweig (1936) first discussed observations of equal efficacy of different therapies) and at least 14 different systems of psychotherapy (Ecker, 2006), many researchers and clinicians interpret them to mean that no form of psychotherapy could ever achieve a significantly higher efficacy than the established level. That expectation is not warranted, in our view. Indeed, seeking a breakthrough in efficacy is our chief purpose. A neuroscientific understanding of psychological change should assist the field in evolving psychotherapies that more effectively and reliably alleviate suffering, engender deep change, and foster well-being.

The discovery in the 1990s that new experiences can create new neural wiring throughout adulthood, and that talk and conceptual insights alone largely fail to do so, was the centerpiece of brain science's first wave of impact on psychotherapy. Advances in brain science have since continued at a rapid pace and require ongoing integration by psychotherapists. Detailed knowledge of synaptic plasticity and neuropsychology have now developed to the point where the neurodynamic effects produced by a given psychotherapeutic method can, in many cases, be inferred and even observed with brain imaging. It is becoming feasible, in other words, to begin to delineate the neural mechanisms that are recruited by a given clinical methodology. It also is becoming feasible to attempt a neurodynamic assessment of the type and degree of change that a given psychotherapeutic method can possibly produce.

Achieving a bifocal understanding of psychotherapeutic methods—an understanding of how they operate in both the neural and phenomenological domains—would represent an historic unification of the physiological reductionism that dominates

the natural sciences and the experiential holism of psychotherapy process research. Our aim in this three-article series is to contribute to such a unification. Recently, several authors have attracted much general interest among psychotherapists regarding the implications of brain science for therapy (Cozolino, 2002; Schore, 2003; Siegel, 1999). Initial studies have begun to correlate certain psychotherapeutic processes with localized brain regions (see, e.g., Goldapple et al., 2004). In this and the subsequent articles in this series, we attempt to build on these promising foundations by delineating the neurological substrates of, and the neuroscientific argument for, a specific psychotherapeutic methodology, with particular attention to the specific types of synaptic change that it induces.

The conceptual framework of constructivism provides a particularly natural and compelling paradigm for a synthesis of psychotherapy and neuroscience. We begin there in the next section, with an examination of the remarkable convergence between psychological constructivism, which has a history of centuries, and neural constructivism, which has emerged powerfully in the last two decades. Then our focus turns to coherence therapy, a form of constructivist psychotherapy that may make particularly effective use of the brain's capacity for synaptic change. Of special interest is a recently recognized, potent type of synaptic change capable of nullifying long-term emotional conditioning, believed impossible by neuroscientists for 80 years.

Coherence therapy derives its name from its coherence model of symptom production, an empirically verifiable, nonpathologizing model that covers a wide range of symptoms and guides every phase of the methodology. To our knowledge, the detailed neurological account of this model that we provide represents the first attempt to define a nonpathologizing model of symptom production in neural terms.

However, we write at a moment when there is much empirical evidence regarding the limitations of the currently widespread forms of psychotherapy, but little or no empirical evidence for the emerging psychotherapeutic concepts and methods that we propose and advocate in these three articles. We therefore face a considerable, built-in disadvantage in framing our arguments. We seem to have no choice but to be guilty of imposing a double standard by invoking empirical research to identify the shortcomings

of the old, while invoking less rigorous, observational, theoretical, and anecdotal evidence in support of the new. Nevertheless, we aim to put forward a number of bold propositions in these articles, in the spirit of inviting systematic research and conceptual scrutiny. We will show that the new paradigm we define is now well beyond mere conjecture and has several convergent dimensions of credibility. Lines of research for establishing empirical verification are suggested in the final section of each article.

Psychological and Neural Constructivism

Perhaps most central to the constructivist vision is the contention that we do not passively perceive the world as it actually is, but rather shape and form what we know and experience through active, constructive mental processes (Glasersfeld, 1979, 1988; Guidano, 1995; Kelly, 1955; Mahoney, Miller, and Arciero, 1995; Neimeyer, 1997; Neimeyer & Raskin, 2001; Piaget, 1937, 1985; for a history of constructivist thought see Mahoney, 1988a). Although psychological constructivism is far from a unitary discipline, its main tenets can be summarized as follows:

- Each person unwittingly constructs an experiential world of meaning that he or she inhabits and takes as real and self-evident.
- Any internal representation of self or world is a construct. Every construct serves and operates as a knowing, and all knowings are constructs.
- Knowings are formed in several different media or modes, including perceptual, emotional, kinesthetic, somesthetic, energic, and verbal–conceptual.
- Knowings are actively assembled by the individual, not passively received by the senses or through communication.
- The function of forming knowings is to optimize the person's adaptation in the experiential world, not to accurately discern the true nature of things.
- The great majority of a person's knowings are implicit and not apparent to the conscious personality, because they are unattended and therefore unconscious. These are knowings that one is not aware of knowing but makes use of, nevertheless.

Explicit knowings are those that are recognized consciously; one knows that one knows them.

- The holding, retrieving, and using of knowings (explicit and implicit) is the definition of memory.
- Constructs (knowings) are revisable.

There is a close relationship, bordering on synonymity, between the meanings of the terms knowing, construct, memory,[1] model, schema, and representation, as used in constructivist psychology. These terms differ only in emphasizing different aspects of the same phenomenological entity.

From the constructivist viewpoint, the mind's activity consists, perhaps entirely, of responding to perceptions and experiences by forming, storing, retrieving, implementing, and revising knowings. This is in sharp contrast to mechanistic descriptions of human psychology and behavior.

For example, a woman came for therapy because she had suffered intense panic attacks, complete with intense physiological symptoms, every day or two for years, and had no idea why. In therapy she accessed and experienced knowings that she did not know she held, a potent implicit belief that if her family didn't meet its weekly quota of suffering, the universe would deliver a disaster, such as a car crash as her husband drove home from work. Being tormented regularly by panic met that quota and kept the form of the required suffering under her control. Upon integrating these knowings into day-to-day awareness, she immediately experienced a lasting and radical reduction in both the frequency and the intensity of her fear (Ecker, 2003; Ecker & Hulley, 2000b).

Psychological constructivism's central insistence on the active role of the individual in shaping experiential reality receives extensive corroboration from findings on how the brain functions. As we describe next, the neuroscientific community appears to be converging to a consensus regarding the capabilities of individual neurons and neural networks to actively shape and define what is experienced as reality. The emerging paradigm, which has been referred to as *neural constructivism* (Quartz & Sejnowsky, 1997), aligns well with psychological constructivism.

There is much evidence that individual neurons are themselves constructive agents capable of highly complex, nonlinear

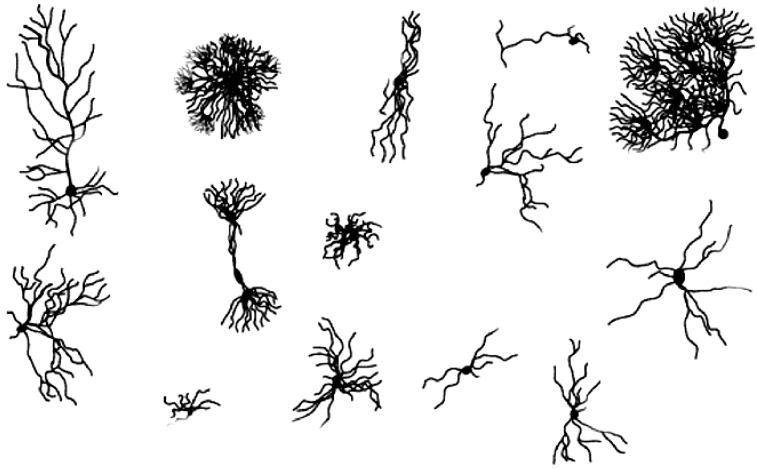

FIGURE 1 Morphology across neuron type.

information processing. For example, Koch and Segev (2000, p. 1171) described how individual "neurons carry out many operations that extract meaningful information from sensory receptor arrays at the organism's periphery and translate these into action, imagery and memory." The human brain contains 10^{11} neurons and 10^{14} synapses. A cubic millimeter of brain contains about 70,000 neurons, each with an axon about a millimeter long and many dendrites typically extending 0.25 millimeter. There are hundreds of types of neurons with widely varying functionality and morphology (see Figure 1). A neuron typically has 1,000 to 10,000 synapses through which it receives information directly from 1,000 other neurons. A single neuron "can perform logical computations at its dendritic branching regions, making it more like an integrated circuit chip than a single switch" (Scott, 2000, p. 72). Furthermore, each neuron is highly adaptive and capable of responding promptly to new conditions with extensive changes in its synaptic configuration.

In short, "individual neurons ... dwarf the circuit elements available to the electronic circuit designer today" (Koch & Segev, 2000, p. 1176). Thus the constructive, experience-shaping activity of the individual is formidable even at the level of the single neuron.

Neuroscientists Dayan and Abbott (2001) explained that in a process termed "neural encoding," neurons receive an undifferentiated range of inputs from a wide variety of internal and perceptual sources and then adjust their connection properties in order to "construct models that attempt to predict responses to other [subsequent] stimuli" (p. 11). In other words, information in memory is a highly edited rendition of the original stimulus, and is used by the brain for knowing what to expect. The brain is always attempting to recognize what it has learned to anticipate. Recognition involves the retrieval and use of a memory, which is the reconstruction of a coded rendition through a process known as *neural decoding*. (See Dayan and Abbott [2001] for a mathematical description of coding and decoding. A neuron that fires—or "spikes"—transmits a fundamental unit of information, analogous to a single bit [1 or 0] in digital computers.)

Therefore, a perception or personal construct does not capture and represent the raw reality of the thing perceived, but is a personal rendition inevitably produced through extensive, unwitting interpretation. Knowledge structures held by the brain actively construct and interpret the information at all points in this process.

The constructive activity of the brain is particularly apparent in the attuning of individual neurons and groups of neurons to a specific *receptive field*. A receptive field is the set of stimulus qualities to which a neuron, or group of neurons, responds. For visual neurons, this might be a small patch of the entire visual field or a particular shape or color. For auditory neurons, it could be a particular range of sound frequencies. The receptive fields of some individual neurons have been mapped in detail (see, e.g., Kentros Agnihotri, Streater, Hawkins, & Kandel, 2004). A neuron's receptive field is determined by synaptic inputs to that neuron from other, neighboring neurons. The local or "lateral" connections that modify the passage of information between neighboring neurons tend to be inhibitory, actively suppressing the neuron's firing except for certain inputs. Neural responsiveness is, in that way, rendered highly selective. The active shaping of experience and meaning that constructivists identify on the subjective level is strikingly apparent as well on the neural level.

Direct evidence for the ability of single neurons to form models of, and launch responses to, highly specific facets of personal

life was recently reported by Quiroga, Reddy, Kreiman, Koch, and Fried (2005). They observed single neurons that consistently fired in response to the image and even the written name of a particular celebrity, but failed to fire when exposed to hundreds of other images. Other neurons responded reliably and selectively to larger classes, such as angry women or a particular emotion. Moreover, the neural network can modify the receptive field of an individual neuron in response to new experience, such as a shift in the specific pitch to which an auditory neuron responds (Weinberger, Javid, & Lepan, 1993).

The capacities of individual neurons to actively select the perceptions that then appear as reality is magnified greatly by neurons functioning together in tightly integrated networks. Individual neurons link synaptically to form neural networks, which in turn connect and interact with one another through a dynamic web of hierarchical and heterarchical connections. The receptive fields created by such networks of neurons can perceive subtle features or differences with exquisite sensitivity, such as a musician detecting and correcting a middle A-note played at 442 Hz rather than 440 Hz.

The forming of neural receptive fields is undoubtedly recruited in the formation and operation of personal constructs. Personal constructs select for highly specific features of current perceptual experience (such as the presence of a depressed man or criticism from someone in power), then link the detection of that feature to specific knowings (models and expectations in memory) and, in turn, to a strategic, adaptive response (such as being helpful, showing anger, or acquiescing). Moreover, receptive fields, like personal constructs, are simply unresponsive to all perceptual inputs that do not contain the screened-for features. Not everyone screens for the presence of a depressed man. The personal construct psychology of Kelly (1955) incorporates this selectivity in its "range corollary," which states that "a construct is convenient for the anticipation of a finite range of events only."

Hierarchy and Construction in Neural Networks

A neuron, or a neural network, is in a hierarchical, superordinate relationship to another when the first can signal to the second, but not vice versa. This allows the first network to select or

filter the incoming content reaching the second, thus actively forming the context in which the subordinate network operates (Baev, 1998; Rumelheart & McClelland, 1986). Such hierarchies among neural networks are presumably the physiological aspect of the personal construct hierarchies modeled by constructivist authors as "core ordering processes" and "nuclear morphogenic structure" (Hayek, 1952, 1978; Mahoney, 1988a, 1988b, 1991, 1995a, 1995b; Weimer, 1977, 1982a, 1982b, 1987). The next section describes a more detailed phenomenological model of the hierarchical self-organization of personal constructs, which could have implications regarding the structure of the corresponding neural hierarchies.

Neuroscientists Zigmond, Bloom, Landis, Roberts, and Squire (1999, p. 1412) corroborated constructivist metatheory in noting that, "the individual constructs a representation of the causal structure of the world and adjusts this representation through experience." Likewise Adolphs, a social neuroscientist, maintained that we can understand "how we generate knowledge from sensory input" by viewing "the mind as a collection of processes that construct a model of the world" (Adolphs, 2004, p. 121). Neuroscience, Adolphs maintained, shows that an individual's overall model of the world is a composite of his or her models of subdomains of knowing and perceiving, including the cognitive, social, emotional, motor-kinesthetic, auditory, and visual. These domains are processed modularly and then integrated within the brain.

Not only are neural networks constructivist in their organizing and modeling of reality, but the way the brain forms and organizes those neural networks is itself a significantly experience-dependent, constructivistic process. Developmental brain research through the 1990s revealed, for example, that cortical regions that usually subserve vision can be reallocated to touch in blind persons. Quartz and Sejnowski (1997) emphasized that "the developing cerebral cortex is largely free of domain-specific structure. Instead, the representational properties of the cortex are built by the nature of the problem domain confronting it" (p. 537). Cortical formation of specialized subregions devoted to certain domains of experience occurs constructively, in response to experience, to a far greater extent than had been believed previously. The phrase *neural constructivism* denotes this multilevel

plasticity of the brain in actively assembling both its particular models of reality and the neural architecture it uses for doing so (for a review, see Quartz, 1999).

Thus, both the neural and psychological levels of mental functioning are suitably described in constructivist terms. Neuroscientists' conclusions about the active role of the individual in shaping what is perceived and experienced fully concur with the tenets of psychological constructivists.

We turn next to the question of how a constructivist understanding can be operationalized in psychotherapy. The remainder of this first article and the entire second article (Ecker & Toomey, 2007) provide an account of a particular modality of constructivist psychotherapy that, we will propose, makes exceptionally effective use of the brain's capacities for change as currently understood by neuroscience, including the newly discovered type of synapse change that can depotentiate conditioned responses in long-term emotional memory.

Defining Features of Coherence Therapy and Coherence Psychology[2]

This section provides an overview of coherence therapy in phenomenological–experiential terms, with a short, representative case example. The neural view of these concepts and methods begins in the next section and continues in the next article of this series.

Coherence therapy is an elaboration of the view that all activity of the brain–mind–body system consists of the forming, using, and revising of coherent knowings. In particular, a therapy client's presenting symptoms are understood in this framework as an activation and enactment of specific, coherent knowings.

The all-pervasive operation of knowings is formulated in coherence psychology as the principle of *symptom coherence* (Ecker & Hulley, 1996, 2000a, 2000b), which maintains that a client's seemingly irrational, out-of-control presenting symptom is actually a sensible, cogent, orderly expression of the person's existing constructions of self and world, not a "disorder" or pathology.

A concept of coherence is encountered in varying degrees, explicitly or implicitly, in a wide range of writings on psychotherapy, including those of Bandler and Grinder (1979), Bateson

(1951, 1972), Dell (1982), Dodes (2002), Enright (1980), Freud (1916, 1923), Jung (1964), Kegan (2001), Laing (1967), Mahoney (1991), Papp and Imber-Black (1996), Rosenberg (1999), Satir (1972), Schwartz (1995), Sullivan (1948), and Watzlawick, Weakland and Fisch (1974), among others. Coherence is a fundamental concept of constructivist psychology, the home paradigm of coherence therapy. What is unique about coherence therapy is that the principle of coherence is fully explicit and rigorously operationalized, guiding and informing the entire methodology.

The pragmatic definition of symptom coherence was given as follows by Ecker and Hulley (1996, 2000a, 2004):

(a) A person produces a particular symptom because, despite the suffering it entails, the symptom is compellingly *necessary* to have, according to at least one unconscious, nonverbal, emotionally potent construction of reality.
(b) Each symptom-requiring construction is cogent—a sensible, meaningful, well-knit, well-defined schema that was formed adaptively in response to earlier experiences and is still carried and applied in the present.
(c) The person ceases producing the symptom as soon as there no longer exists any construction of reality in which the symptom is necessary, with no other symptom-stopping measures needed.

This seemingly simple model plays out clinically with great versatility and proves relevant for a wide range of symptoms and problems. For example, there are qualitatively different ways in which symptoms can be "necessary." Some symptoms are necessary because they have a crucial function (such as depression that protects against feeling and expressing anger). Other symptoms have no function, yet are necessary in the sense of being an inevitable result, or byproduct, coherently caused either by one of the person's own adaptive, unconscious responses (such as depression that is a byproduct resulting from isolating oneself in order to feel safe) or by an unresolved blow (such as depression resulting from unconscious, ongoing despair over suffering emotional neglect in childhood). Both functional and functionless

symptoms prove, according to the person's own material, to be coherent (for detailed examples, see Ecker & Hulley, 2000b, 2003).

Any given symptom is coherently produced, in other words, by either (1) how the individual strives, without conscious awareness, to carry out strategies for safety or well-being; or (2) how the individual responds to having suffered violations of safety or well-being. This model of symptom production is squarely in accord with the constructivist view of the self as having profound if unrecognized agency in shaping experience and behavior. Coherence therapy is centrally focused on ushering clients into a direct, noninterpretive experience of their agency in generating the symptom.

Symptom coherence was also defined by Ecker and Hulley (2004) as a heuristic principle of mental functioning, as follows: The brain-mind-body system can purposefully produce any of its possible conditions or states, including any kind of clinical symptom, in order to carry out any purpose that it is capable of forming.

This *principle of general coherence* is, of course, quite foreign to the therapy field's prevailing, pathologizing models of symptom production. Underscoring the paradigmatic difference, Ecker and Hulley (2004, p. 3), addressing trainees, comment:

> You won't fully grasp this methodology until you grasp the nimble, active genius of the psyche not only in constructing personal reality, but also in purposefully manifesting any one of its myriad possible states to carry out any of its myriad possible purposes. The client's psyche is always coherent, always in control of producing the symptom—knowing why and when to produce it and when not to produce it.

The therapeutic use of symptom coherence is illustrated in the following case example of coherence therapy reported by Neimeyer and Bridges (2003). Their vignette refers to the client's *antisymptom position*, a phrase used in coherence therapy to denote the client's initial, conscious stance against the symptom, viewing it as something entirely senseless, negative, defective, involuntary, and unwanted; *prosymptom position*, the initially unconscious, nonverbal but well-defined, compelling knowings, themes, and purposes that necessitate having the symptom; and *the*

emotional truth of the symptom, which is synonymous with prosymptom position. The purpose of this case example is to serve as a clear model that we will use repeatedly to delineate the main features of the methodology and the phenomenology that it prompts. Clinically more complex and challenging cases of coherence therapy are available elsewhere (e.g., Ecker, 2003; Ecker & Hulley, 1996, 2000a, 2002a, 2002b; Neimeyer & Raskin, 2001). As all of the case examples show, the methodology of coherence therapy brings about a phenomenological detection and confirmation of symptom coherence in each case.

Carol, a woman in her mid-30 s, initially brought her 11-year-old daughter, Dana, to therapy in a community mental health clinic. After several sessions, Carol asked to be seen individually (by SKB), stating that despite their emotional closeness in other respects, she had always felt cold and distant toward her husband sexually. Her only explanation for this situation was that she just didn't like to have sex very much, although she reported that she truly wanted to enjoy the sexual dimension of her marriage, a conscious view that represented the antisymptom position. As a means of *radical inquiry*—so-called because of its intent to get to the root of the problem—the therapist asked her to complete a sentence stem several times aloud with the first thing that came to her mind: "If I were to like having sex with my husband, I'd feel _____." Carol first stated that she would feel "great" without the symptom, then upon repetition of the stem, "happy," and then after a prolonged silence and with an almost confused look on her face, she voiced the word "embarrassed" hesitantly.

Sensing that she was getting close to the pro-symptom position, the therapist asked her to *stay in that embarrassed state* [italics added] and to complete the sentence, "I feel embarrassed even thinking about enjoying sex with Franklin . . ." Doing so, rather than intellectualizing about her experience, Carol suddenly flashed to a series of memories that ushered in the emotional truth of her sexual difficulties, which had their origin in her parents' openly erotic behavior with one another during her adolescence. In a quiet tone, with her legs crossed and her head in her hands, Carol then recalled a time when she was about 15 years old when her mother walked into the bathroom and found her masturbating. Far from being angry, her mother was so pleased that she not only told Carol's father but also called several friends and told them about this "beautiful good news."

Carol identified her decision to shut out sexual feelings from that very point. Discussing this series of memories and associated feelings, she also realized that enjoying sex with her husband subjectively meant being like her mother, and closer to risking mortifying her own daughter, Dana, in the same way. At the end of the powerful session, the therapist wrote

> the following prosymptom position statement on a card to underscore for Carol the compelling purpose that necessitated her sexual neutrality—"I hate to admit it, but experiencing sexual pleasure with my husband makes me more like my mother. So, even though it is hurting my marriage, I will continue to avoid sexual contact, because it is better to sacrifice pleasure and intimacy than to risk doing to Dana what my mother did to me." Prompted by the therapist, Carol read the card aloud and stated that she didn't like what it said but agreed that it was accurate. The therapist then asked Carol to read it twice a day in the week between sessions, with no other attempt to change her sexual behavior with her husband.
>
> In the next session, Carol reported that the statement began to seem almost silly to her during the week, and although she knew it would take time and practice, finding a new way to understand her sexuality as her own and not her mother's was a freeing experience for her and also for her relationship with her husband. Once held as a conscious rather than unconscious position, the previously prevailing view soon lost much of its power, permitting the client to relinquish it as her governing emotional reality. (Neimeyer & Bridges, 2003, p. 291)

For a large fraction of therapy clients, as for Carol, the presenting symptom proves to be the person's means of carrying out a specific, unconscious purpose. Such symptoms may therefore be characterized as having a function, as noted previously. The process of coherence therapy in such cases reveals that, although having the symptom entails sufferings, *not* having the symptom is expected, unconsciously—in the person's prosymptom position—to entail an even worse suffering, and so having the symptom is emotionally necessary in order to avoid the even-worse suffering. As the prosymptom position becomes conscious, it becomes plainly apparent to the client that she or he purposefully produces the symptom as part of some specific personal strategy for avoiding harm or having well-being or justice. This awakening to fundamental *agency* in relation to the symptom is a key milestone in the methodology.

Carol initially experienced her symptom of distaste for and avoidance of marital sex as something over which she was powerless, a kind of personal deficiency and deformation. Then the underlying, coherent necessity of this symptom emerged unmistakably, including the emotional truth of how, in her life, sexuality had been an intensely repugnant, harmful experience. She then

directly experienced her own clear purpose and potent agency in shunning sexuality in the present.

As Carol's material shows, prosymptom positions typically have longstanding, core themes and emotions in their deeper layers. The making-conscious of a prosymptom position is usually experienced as a major retrieval of personal meaning that makes new sense of important areas of life, revealing order where there had seemed to be a clinical disorder. The realness, decisiveness, and accuracy of Carol's discoveries are built into coherence therapy because the client's encounter with the coherent emotional truth of the symptom is experiential and phenomenological, not just an exercise in cognitive insight. The therapist does not interpret and does not think that cognitive insights can create such experiences. Rather, cognitive insights follow *from* direct experiences of symptom-requiring emotional truth.

As coherence therapy unfolds with some clients and the unconscious production of the symptom is brought to light, the presenting symptom may be found *not* to have a function—that is, not to be the means of carrying out a purpose—but rather, as described earlier, to be a byproduct necessitated by either (1) the client's own adaptive strategies or (2) models of self and world formed in response to sufferings previously incurred.

Whether the symptom is functional or functionless is unknown to the therapist until the underlying, symptom-requiring material has been revealed. The core methodology of coherence therapy is the same in both cases. Within that methodology, the look and feel of the therapist–client interaction in coherence therapy can vary significantly across clients and therapists, and the particular techniques used by the therapist may also vary widely. As a rule, the therapist initially has no information or hypothesis at all as to what the client's prosymptom position is, and does not presume to be able to analyze or infer it on the basis of the presenting symptom or problem. People with quite similar descriptions of symptoms (such as symptoms of depression or anxiety) can and do have entirely different prosymptom positions. The therapist assumes symptom coherence and proceeds to design and create experiences in which the client encounters and recognizes her or his prosymptom, implicit knowings

consciously for the first time. *The therapist learns from the client* what the prosymptom theme and purpose is, not the other way around.

That is the first main stage of the methodology of coherence therapy—the creation of *discovery* experiences. The discovery work locates and zeroes in on the specific prosymptom constructs within the person's vast universe of personal constructs.

For that purpose, the therapist in the preceding example used the technique of sentence completion to carry out a *symptom deprivation* (Ecker & Hulley, 1996, 2000a, 2004), in which being *without* the symptom while revisiting a symptom-evoking situation bumps the client into a resulting dilemma, revealing a specific suffering avoided by having the symptom. When creating discovery experiences, the therapist is free to use any experiential technique that can be applied or adapted for eliciting prosymptom positions into consciousness.

The next stage of the methodology of coherence therapy is the creation of *integration* experiences, which are repeated experiences of the discovered prosymptom knowings, installing them firmly in the person's conscious world. The therapist's acceptance and empathy toward this material plays an important role in guiding the client likewise into a profound acceptance and embracing of it.

In the example, initial experiences of integration were created during the session by having Carol remain subjectively in the newly discovered material while verbalizing it to the therapist, putting into words her new memories of sexual violations and her new awareness of purposefully shutting down her sexuality to protect herself and, later, her daughter. In addition, the creation of between-session integration experiences is mandatory, not optional, in coherence therapy. This was accomplished in the example through the daily reading of an index card, which is coherence therapy's mainstay method of structuring between-session tasks. On Carol's card was written the succinct essence of the prosymptom material needing integration, in first-person, emotionally vivid phrasing rather than as explanatory, intellectual concepts.

The work alternates between discovery and integration until the entire prosymptom position is routinely conscious and fully retrieved from implicit knowing to explicit knowing. The person

then directly experiences, daily, the emotional truth of how, why, and when the symptom is necessary to have. Full integration may require several sessions of focused, persistent work.

Integration sets up the material for the third and final stage—the creation of *transformation* experiences, in which the client's brain–mind–body system changes or dissolves prosymptom constructs, eliminating the need to produce the symptom. In our next article (Ecker & Toomey, 2007) we will examine closely the built-in form of that change process and how coherence therapy's methodology of transformation is tailored to it. In the example, a significant degree of transformation is indicated by the client's report in the next session that the prosymptom themes and purposes that previously felt compellingly real, gravely serious, and urgent have lost that felt realness, are no longer evocable, and now seem "silly." This is a distinct and typical indication that transformation has occurred, provided that the client's verbal and nonverbal qualities congruently indicate a relaxed, undefended, nonavoidant relationship to the material.

Coherence therapy is defined as those three activities—the discovery, integration, and transformation of prosymptom positions, carried out experientially and phenomenologically. Consistent, day-to-day success across many different clients and symptoms of course requires much detailed know-how, a repertoire of suitable techniques, and flexibility of communication style, but the basic methodology is invariant. A successful session is one in which at least one of those three activities makes progress, and it is the therapist's active aim for that to occur in every session.

We characterize coherence therapy's methodology as *phenomenological* because at all stages it relies on and uses the person's inherent capacity for having subjective experiences of knowing—in particular, awareness of the knowings being applied by oneself, through directing attention to those knowings. The term *phenomenological* refers to experiences of direct, immediate knowing, not mediated by conceptualizing, in any domain, but especially in the domain of one's own mental processes. Perhaps paradoxically, deep, therapeutically potent, phenomenological experience, because it is entirely experiential, does not require well-developed verbal–analytical skills or cognitive insights, and so is available to a broad range of therapy client populations.

This coherence-focused methodology is inherently noncounteractive—that is, it never comes across to the client as an attempt to prevent the symptom or to replace the symptom with a preferred state or behavior. Coherence therapy excludes all counteractive methods of therapy because the two strategies—coherence-focused and counteractive—are mutually exclusive, for fundamental reasons that we will explicate at many points throughout this and the following two articles. The third article (Toomey & Ecker, in press) contains our reasons for predicting, on neurological grounds, that the coherence methodology is capable of significantly greater therapeutic effectiveness than counteractive methods can deliver.

In most therapies, therapist and client work together against the symptom, either with methods designed to directly counteract, override, and get rid of the symptom or by developing skills and resources for managing it. This counteractive strategy is an attempt to build up the client's antisymptom position in order to enable the client to prevent and defeat the symptom. Examples of counteractive methods include some of the most widely used methods in the field, such as teaching a relaxation technique to a client who has anxiety attacks; building up hopefulness in a depressed client; teaching communication skills and tools to an adversarial couple; reframing the meaning of the problem situation; having therapy group members describe what they do to keep themselves from isolating; and getting a client with low self-worth to take in clear evidence of worth (loved by friends, recognized as talented and competent at work, etc.).

Note the absence of any symptom-opposing, counteractive steps in the case example of Carol. Counteracting is counterproductive within coherence therapy, because as a rule it maintains and even exacerbates the split-off, unconscious status of prosymptom positions while failing to transform them.

Most people, including therapists, have a powerful *counteractive reflex*. In addition, the prevailing mentality in the field is counteractive, so most psychotherapies are counteractively implemented whether or not they are also counteractive in theory. A client's prosymptom position is the dreaded source of all the trouble, and as it comes clearly into view during the discovery and integration process in coherence therapy, it is crucial for the

therapist to desist entirely from following his or her counteractive reflex against it, and instead guide the client to keep experiencing and embracing it just as it is, session by session.

Coherence therapy's model of change can be summed up in this way (Ecker & Hulley, 2004; Ecker, 2005):

- Change of a symptom is blocked when the person tries to make the change from a position that does not actually have control of the symptom—a position merely against having the symptom, an *anti*symptom position.
- Efficient symptom cessation stems from first having the person experience, inhabit, verbalize and embrace the emotional truth of the position that *does* have control over producing the symptom, his or her symptom-requiring *pro*symptom position.
- People are able to change a position they experience having, but are not able to change an unconscious position that they do not know they have.

As noted previously, in the course of coherence therapy properly carried out, a phenomenological demonstration and verification of symptom coherence occurs naturally with each client, as in the example above. Symptom coherence is not an interpretation imposed on the client or the client's material. It is manifestly evident from and in the client's own material, understood in its own terms. In other words, with each client symptom coherence receives empirical support in the symptom-requiring content of the psychological material revealed and in the symptom cessation that results from transforming that specific material, with nothing else done to bring about symptom cessation.

Neuroscience and the Existence of Unconscious, Symptom-Requiring Constructs

Ecker and Hulley (1996) introduced the phrase *prosymptom position* to denote a module of linked, unconscious, symptom-requiring constructs (knowings) functioning as an active, autonomous "part" or subpersonality. A prosymptom position is an encapsulated set of implicit knowings which, like all implicit

knowings, operates entirely without conscious thought or recall, yet consists of knowing *what* to respond to and *how* to respond to it—a *procedural* knowing (as distinct from the *declarative* character of conscious, *explicit* knowings).

Carol's prosymptom position in the case example above consisted of a set of hierarchically linked, nonverbal constructs—implicit knowings that could be verbalized as follows after being rendered explicit and experienced consciously:

- Mom's sexuality is how sexuality is, so to enjoy and allow my own sexuality would make me be like her—openly showing sexual behaviors to the family; wanting to watch my own children being sexual; eager to socially reveal my children's sex lives, mortifying them; and being blind to their need for sexual privacy. (An unconscious model of reality, or fourth-order, ontological construction.)
- I've got to avoid enjoying sex and having pleasurable sexual feelings, so that I'm not a sexual mortifier like Mom, ever, and also so that I cannot be exposed and mortified sexually ever again by Mom or by sex-loving people like Mom. (An unconscious, global purpose and a broad strategy for carrying out that purpose, or third-order, teleological construction.)
- Sexuality is (or could be) coming into play here in this situation with Franklin, so now is when I must not let myself enjoy that with him, so that I don't become like Mom and violate our daughter's sexual privacy, mortifying her, like Mom did to me. (An unconscious frame applied to the concrete situation, or second-order, situational construction.)
- Internally, the suppressing of sexual feelings; behaviorally, an unresponsive, distant, chilly demeanor toward Franklin's sexual overtures. (The symptom—a concrete, consciously noticed manifestation, or first-order, implementational construction.)

A prosymptom position consists of knowings that one does not know one knows—emotionally urgent, living knowledge of a specific type of problematic situation or existential dilemma, how that situation or dilemma works, and how it is necessary to behave, feel, and/or think in this situation for safety, well-being, or justice. It is that manifested response, that particular way of responding to the dilemma that produces the presenting symptom. Within

this nonverbal yet well-defined model of self-in-situation, the presenting symptom is coherently necessary to have.

A prosymptom position unfailingly and fully activates when any current perceptions match some part of the situation it models (marital sexuality in our example). An activated prosymptom position powerfully implements its preestablished response completely outside the awareness of the conscious personality. For example, Carol would begin feeling cold and aloof toward marital sex with no awareness of her own underlying, passionate purpose for positioning herself in such a feeling.

Phenomenologically, an unconscious prosymptom position functions as a sealed capsule of constructs, insulated from the influence of all other knowings held by the person—an unchanging, timeless tableau of a particular subjective reality. In most cases a therapy client's module of prosymptom constructs was formed in childhood, yet it persists in its original form across decades, unaltered by the later formation of contrary knowings that are more mature and nuanced.

A therapy client who begins to consciously, subjectively experience a prosymptom position usually feels it to be a distinct "part" of him- or herself. It is this part that produces, and has control over producing, the presenting symptom or problem. The integration of this capsule of constructs into the conscious personality deinsulates it, allowing direct contact with contrary knowings. Then a transformation of the prosymptom constructs is readily possible. This transformation results in symptom cessation as well as resolution of the emotionally distressed theme and existential dilemma that the symptom was part of solving.

The component constructs of prosymptom positions are unlimited with respect to their possible content, yet are always found to exist in an invariant hierarchy of four types of constructs (Ecker & Hulley, 1996, 2000b). The list above of Carol's verbalized constructs shows the form of this universal hierarchy: A model of an aspect of reality (ontological or fourth-order construction) is most superordinate and gives rise to a broad purpose and strategy (teleological or third-order construction), which in turn gives rise to the meaning attributed or frame applied to the concrete situation (situational or second-order construction), from which in turn arises the presenting symptom (implementational or manifested, first-order construction).

All of the distinctive features of prosymptom positions just described find corroboration in the knowledge garnered by neuropsychological and neurodynamic research.

First and most fundamental is the matter of the very existence of unconscious mental functioning and unconscious knowings.

The Finally Undeniable Unconscious

Throughout the twentieth century, the concepts of both consciousness and the psychological unconscious were criticized, disdained, and rejected from quite influential quarters within academic psychology as being inferential, untestable, unscientific and conceptually unnecessary (for a review, see Güzeldere, 1995). In 1958, an authoritative dictionary of psychology stated, "nearly all meanings [of 'unconscious'] are closely linked to debatable theories. Any user of the term therefore risks suggesting agreement with theories he may deplore" (English & English, 1958). The powerful behaviorist movement sought aggressively and successfully to expunge all notions of consciousness and unconsciousness from academic psychology, insisting that only observable, external sensory stimuli and motor responses ought to be included in any explanation of behavior. Güzeldere (1995, p. 41) commented, "Behaviourism . . . for over half a century . . . managed to remove the words 'consciousness' and 'introspection' from the face of the Anglo-American world." Only recently has the subject of consciousness reemerged in serious scientific discussion and study. As a result of this academic banishment, the "unconscious" became the property of the psychoanalytic and psychodynamic schools, which did not focus on controlled, empirical research.

The tide has turned, however. A massive and ever-growing body of empirical research has now rendered arguments against investigating consciousness and the unconscious obsolete and, indeed, regrettable. The existence of what we call the coherent unconscious—complex mental processes, astute knowledge, and purposeful responses fully outside of awareness—is no longer seriously disputed within the cognitive and affective neurosciences.

The principal neurological reason that people are capable of not consciously knowing much of what they implicitly know is now widely recognized: The brain forms, holds, and applies knowings

(constructs) in a number of different brain systems operating concurrently, in parallel, many of which are not directly connected to the systems involved in conscious awareness (Rumelhart & McClelland, 1986). There are, in other words, several different memory systems of different types in the brain (Milner, Squire, & Kandel, 1998).[3]

The major subdivisions of the brain consist of three anatomical systems: the cerebral cortex, which encases the limbic system (also termed the medial temporal lobe), underneath which is the brain stem (MacLean, 1990). All three systems use implicit knowing and memory—the learning, storage, retrieval, and performance of knowings completely outside of conscious awareness. Conscious knowing, in which the knower or "I" is explicitly cognizant of having specific knowings, is a function of the neocortex, the cortex's outer layer.[4] Verbal knowing is a function of only one module within the neocortex in the left cerebral hemisphere. (This verbalizing capacity operates in conjunction with other brain regions that process nonverbal and contextual aspects of words as well as related procedural knowledge. As reviewed by Schore [2005], the right hemisphere is dominant for the meaning of vocal inflection and the processing of emotional words, the detection of one's first name, humor, laughter, social discourse, metaphor, and the generation and modification of mental models that fit a text.)

The limbic system, or mammalian brain, creates and stores the living knowledge formed in emotionally intense experiences, including the associated constructs (models, schemas, and response strategies; MacLean, 1990; Panksepp, 1998). The direct, felt sense of what is emotionally real and meaningful is based principally in the limbic system, according to current knowledge. Increased activation of the limbic system is observed in response to a wide range of emotionally significant stimuli—words (Canli et al., 2004), pictures (Malhi et al., 2004), and facial expressions (Adolphs, 2002).

In the limbic system, the amygdala controls the encoding of a wide range of negatively valenced, emotionally compelling knowings into long-term, implicit memory (for reviews of the functions of the amygdala, see LeDoux, 2002; Phelps & LeDoux, 2005). In addition to its well-established, central role in fear conditioning, aversive responses, and aggression, the amygdala

also has been shown to be critically involved in the processing of sadness (Adolphs & Tranel, 2004) and social judgment, such as the approachability and trustworthiness of others (Adolphs, Tranel, & Damasio, 1998; Stone, Cosmides, Tooby, Kroll, & Knight, 2002). The amygdala is centrally involved in the brain's incessant monitoring of perceptual input for any salient resemblance to stored knowings and schemas having a negative emotional component, and it activates and launches any schemas that are pertinent matches. The amygdala responds to perceptions of recognized emotional stimuli very rapidly, before conscious awareness (Whalen et al., 1998).

In light of extensive current knowledge of the amygdala from animal and human studies, it is reasonable to surmise that unconscious, prosymptom positions that are aversive, such as Carol's, are primarily amygdalar formations because they were created in response to intense, fearful experiences and involve urgent, unconscious tactics and strategies for protecting self or others. We therefore sometimes refer to aversive prosymptom positions as "amygdalar" knowledge structures in this series of three articles. However, not all prosymptom positions are fearfully aversive. In some types of depression, for example, the unconscious constructs responsible for the dysphoric mood are not fear-related, but rather pertain to the construed permanent hopelessness of meeting crucial needs or conditions for well-being. Brain scans of depressed therapy clients before, during, and after treatment by cognitive–behavioral therapy and by pharmaceuticals do not implicate the amygdala and show no changes in amygdalar activation when depression is alleviated (Goldapple et al., 2004). Rather, a complex interaction of a number of other limbic and cortical regions is indicated. Rapid brain imaging during coherence therapy could help identify the locations in the brain that store and activate a wide range of unconscious constructs that generate clinical symptoms, because the methodology of coherence therapy involves the selective retrieval and activation of these constructs with a high level of phenomenological accuracy and specificity, as needed for correlating brain images with subjective experience.

The third brain system is the brain stem or reptilian brain, which handles primal, approach/avoidance responses to danger, pain, and pleasure, and forms and harbors its own types of

related knowings. The brain stem also has a powerful influence on memory formation by virtue of being a principal relay station through which the influence of adrenal stress hormones reaches the direct controllers of memory encoding, the limbic system's amygdala and hippocampus (McGaugh & Roozendaal, 2002). Up to a point, enhanced levels of stress hormones greatly intensify memory formation, whereas ultra-high levels have the reverse effect and block the encoding of explicit, narratively coherent memory. The brain stem is a key component in the hormonal regulation of memory production. Habitual physical behaviors also are controlled by the brain stem.

Social psychologists Bargh and Chartrand (1999, p. 462) flatly state that "most of a person's everyday life is determined not by their conscious intentions and deliberate choices but by mental processes that are put into motion by features of the environment and that operate outside of conscious awareness and guidance," a conclusion echoed by prominent affective neuroscientist Jaak Panksepp, who asserted that "much of behavioral control is elaborated by unconscious brain processes" (1998, p. 9).

LeDoux (1996) stressed that the capacity for conscious affect is a recent evolutionary accomplishment compared to the capacity for implicit hedonic processing. LeDoux (1994, p. 292) stated, "[I]t is probably best to assume that information processing in the brain is carried out unconsciously unless it can be proven that it is actually conscious. To me, unconscious processing is the rule and conscious processing is what needs to be proven."

Empirical findings on mental contents and processes that operate fully outside of awareness are summarized in several recent volumes (de Gelder, de Haan, & Heywood, 2001; Hassin, Uleman, & Bargh, 2004; Uleman & Bargh, 1989). A selected sample follows.

- The subliminal presentation of facial expressions has been shown to unconsciously activate the subcortical limbic circuits of the amygdala (Whalen et al., 1998), demonstrating that the limbic system recognizes and responds to emotionally laden cues without conscious awareness.
- Subjects unable to read Chinese expressed an increased aesthetic preference for Chinese ideographs shown consciously (for a half-second) when they were preceded by the

unconscious (10 milliseconds) presentation of smiling as compared to angry faces (Zajonc, 1980). Winkielman, Berridge, and Wilbarger (2005) showed that a similar subliminal presentation of happy or sad faces was able to significantly affect the subsequent consumption of a beverage. These studies show that affective assessment and response occurs prior to, independently of, and much more rapidly than conscious cognition, and that precognitive affective appraisals (which figure prominently in prosymptom positions) have demonstrable effects on perception, feelings and behavior.

- Male subjects presented subliminally with the visual words, "Beating dad is OK," show better performance on a competitive dart-throwing task than subjects presented with subliminal control stimuli such as "Being a doctor is OK" (Palumbo & Gillman, 1984; Silverman, Ross, Adler & Lustig, 1978).
- In a phenomenon known as *blindsight*, patients with damage to the visual cortex have absolutely no subjective experience of vision, yet are able to "guess" the position of objects and the emotion on faces with an accuracy significantly greater than chance, indicating the operation of distinct, subcortical, unconscious perceptual channels (de Gelder, de Vroomen, & Pourtois, 2001).
- Reber (1967) showed participants letter strings generated from a complex artificial grammar structure that followed well-defined but hidden rules much too complex to decipher consciously. The rules defined, for instance, the string XVTHJ as grammatical and XJHPHV as nongrammatical. Without being given any information concerning the underlying syntax, participants were able, with practice, to identify which strings followed the grammar more frequently than by random chance.

Taken together, these and many other findings empirically demonstrate the operation of unconscious capacities to perceive, read written language, appraise emotional and social significance, generate and remember complex knowings, recognize complex patterns, learn kinesthetic skills, and affect overt behavior. This has led to an explosion of clinically relevant programs of research on the cognitive (Kihlstrom, 1987), adaptive (Wilson, 2002), procedural (Squire, 1994), automatic (Logan, Taylor, & Etherton, 1999), affective (Winkielman, Berridge, & Wilbarger, 2005), and

social (Bargh, 2005) aspects of the unconscious. Within the scientific community, the existence of unconscious mental functioning is no longer a matter of discussion. The debate has progressed to investigating its scope and properties and its relationship to conscious awareness.

The Neuroscience of Prosymptom Positions

Granted that the existence of complex, unconscious knowing and processing is no longer in question, what, then, does neuroscience have to say about the particular unconscious formations and processes detected and described as prosymptom positions by Ecker and Hulley?

The existence in the brain of autonomous, unconscious modules of knowing-and-responding was firmly established in the 1980s by cognitive neuroscientist Michael Gazzaniga (1985) in his split-brain research, which first discovered differences between the brain's right and left hemispheres. The subjects in Gazzaniga's experiments were patients whose corpus callosum, the main connection between right and left cerebral hemispheres, had been severed as treatment for severe epilepsy. This disconnection allowed the different functions of the two hemispheres to be made apparent in Gazzaniga's studies, including the autonomous operation of specific, unconscious/implicit knowings. Gazzaniga sums up much of his work in this way:

> Interpreting our behaviors would be a trivial matter if all behaviors we engaged in were the product of verbal conscious action. In that case, the source of the behavior is known before the action occurs. If all our actions consisted of only these kinds of events, there would be nothing to explain . . . . *[T]he normal person does not possess a unitary conscious mechanism in which the conscious system is privy to the sources of all his or her actions* . . . [T]he normal brain is organized into modules and . . . *most of these modules are capable of actions, moods, and responses. All except one work in nonverbal ways* such that their modes of expression are solely through overt behaviors or more covert actions. (Gazzaniga, 1985, p.74; italics ours.)

The many nonverbal, unconscious modules to which Gazzaniga refers "can compute, remember, feel emotion, and act" (1985, p. 86)—exactly the phenomenology of unconscious, prosymptom positions. Gazzaniga emphasized: "Brain modularity

is not just a psychological concept . . . . Through [experimental] studies . . . it becomes clear that modularity has a real anatomical basis" (1985, p. 128).

Neuroimaging researchers have more recently documented that the performance of specific psychological tasks involves highly localized regions of the brain, further corroborating Gazzaniga's findings (Dougherty, Rausch, & Rosenbaum, 2004; Posner & Raichle, 1994). It is now widely recognized among neuroscientists and evolutionary biologists that *parallel distributed processing*—the organization of the brain into a large number of unconscious modules or networks operating in parallel—is necessary to carry out the enormous quantity of information processing required for living and surviving (Rumelhart & McClelland, 1986). The brain's conscious attentional capacity is utterly inadequate for this computational task, as was noted over a century ago by James (1890). At any given moment while awake, a person carries out numerous tasks simultaneously—such as object recognition, physical balance, homeostatic regulation, coordination of all five senses, and natural language production—each of which entails a computational capacity far greater than most computers can handle. Yet individual neurons are estimated to process information nearly a billion times slower than do present-day computers. Parallel distributed processing is what allows the brain to function with such richness and complexity, despite its relative slowness of signal processing. It is clear that unconscious processing is not primarily a matter of repression or deficit, but an absolute necessity with adaptive evolutionary value.

The study of patients with localized brain damage also provided extensive, compelling evidence not only that brain modules operate autonomously and in parallel, but also that each brain module consists of and operationalizes an extremely specific, well-defined knowledge. Patients with localized brain damage lose the damaged module's highly specific abilities while retaining normal functioning in other areas. Examples include the inability to remember verbs (averbia) and the inability to differentiate between written words that are categorically similar, such as apricot and peach or parrot and raven ("deep" or "semantic" dyslexia; Denes, Cipolotti, & Zorzi, 1999). This is strong evidence that specific locations in the brain can correspond to highly specific, well-defined knowings.

The same degree of specificity and well-definedness of knowledge and function is found to characterize prosymptom positions, as illustrated in our example of Carol. The specificity of the nonverbal, unconscious constructs forming prosymptom positions, at all four levels of their construct hierarchy, is readily and routinely apparent in the normal course of coherence therapy (Ecker & Hulley, 1996, 2000b). The training of coherence therapists emphasizes the necessity of creating experiences and verbalizations in which the finer details of the constructs are rendered fully explicit. The unconscious emotional themes and purposes of a lifetime are not only available to be directly experienced in well-defined detail, but also are readily amenable to being expressed in words that capture them richly and accurately according to the person experiencing them. The inherent specificity of the implicit constructs is especially apparent in the frequent observation during therapy that even a subtle misattunement of the verbalization from the felt meaning is immediately sensed by, and disturbing to, the person—just as the true fit of a suitable wording, once found, is immediately recognized and satisfying. To verbalize adequately a previously unconscious construction is to put visible, well-tailored clothing on an invisible man or woman; it makes apparent a form that was already present and most definite.

In contrast, the view held by most depth-oriented clinicians is that unconscious, nonverbal material is inherently blurry and indistinct. The constructivist psychology literature in particular contains many assertions that tacit, higher-order, emotionally laden constructs and "abstract ordering rules" are inherently fuzzy and not susceptible to clear, decisive knowing (Guidano 1995; Mahoney, 1991; Weimer, 1982b). However, to regard "nonverbal" and "tacit" as necessarily meaning "blurry" proves to be something of a rationalist, neocortex-centric bias, as if definiteness of knowing is the property only of the verbal–conceptual faculty.

Proof to the contrary comes also from neurologist Oliver Sachs (2005, p. 47), who reported a case of aphasia (loss of capacity for understanding words, spoken or written, due to localized brain damage) experienced by Jacques Lordat, an eminent early-nineteenth-century French physiologist, following a stroke. Upon recovery, Lordat wrote an account of his experience that makes the specificity of nonverbal knowing strikingly clear:

> Within twenty-four hours all but a few words eluded my grasp. Those that did remain proved to be nearly useless, for I could no longer recall the way in which they had to be coordinated for the communication of ideas. . . . I was no longer able to grasp the ideas of others, for the very amnesia that prevented me from speaking made me incapable of understanding the sounds I heard quickly enough to grasp their meaning . . . . Inwardly, I felt the same as ever. This mental isolation I mention, my sadness, my impediment and the appearance of stupidity which it gave rise to, led many to believe that my intellectual capacities were weakened . . . . [But] I used to discuss within myself my life work and the studies I loved. Thinking caused me no difficulty whatever . . . . My memory for facts, principles, dogmas, abstract ideas, was the same as when I enjoyed good health . . . . I had to realize that the inner workings of the mind could dispense with words.

In the realm of personal constructs, it is not because of any intrinsic blurriness that knowings and meanings are unconscious and tacit, but because of being unattended. It is because specificity and definiteness are built into the material and are part of the native process phenomenology that coherence therapy can be as accurate and effective as the many published case examples illustrate (Ecker, 2003, 2005; Ecker & Hulley, 1996, 2000a, 2002b; Martignetti & Jordan, 2001; Neimeyer, 2000; Neimeyer & Bridges, 2003; Neimeyer & Raskin, 2001; Thomson & Jordan, 2002). Because they believe that unconscious emotional meaning is inherently blurry and elusive, therapists often do not work to elicit the actual specificity of felt meaning and instead impose interpretations or generalizations. The therapeutic use of metaphor, which can help bring about a potent, direct encounter with well-defined meaning, can also serve to maintain a distance from edgy material. For example, a man in therapy might say, "Around my father, I guess I was always walking on eggshells." His therapy benefits greatly if he is prompted to attend to the concrete specifics of experience hinted at by his metaphor, soon verbalized as, "I was always scared and tense around him because he might beat me again at any moment over the smallest thing, and I could never tell what would trigger that."

The case example of Carol and our description of her four-level hierarchy of constructs illustrate the rich detail of unconscious personal constructs and their accurate retrieval. Such accurate, empirical mapping of constructs confirms the constructivist principle that an individual's tacit, nonlinguistic,

abstract ordering rules (higher-order constructs) shape and dictate conscious, overt thoughts, feelings, and behaviors without appearing in them (Guidano, 1995; Mahoney, 1988b). However, this "primacy of the abstract" (Hayek, 1978) by no means denotes lack of specificity in higher-order constructs. Carol's symptoms of suppressed sexuality were caused in the present not by the memory of what she suffered as a girl per se, but by the specific constructs she formed in response to that suffering and still used—the abstract, high-order modeling and the attributions of meaning as well as the more concrete, anticipatory, self-protective tactics that she added to the memory of the suffering.

The coactivation of the several component constructs of a prosymptom position exemplifies the "content addressable" character of neural networks. The following four, well-established features of how memory operates in the brain corroborate the coherence psychology model (Baev, 1997; Eichenbaum, 2004; Rumelhart & McClelland, 1986):

1. *Schema formation.* A memory is stored modularly and comprises a model of a specific aspect of the world and how it is expected to operate, such as if X happens, then Y happens; meanings or values attributed to percepts; and so on. Only if current perceptions match these templates or schemas can meaning be attributed to them and responses launched, consciously or unconsciously.
2. *Modularity of response.* Whole schemas are activated when current percepts match or approximate any one component.
3. *Abstraction.* Schemas consist most centrally of the essentialized form or abstracted nature of what is perceived, not the minute details. This allows them to be recallable by similar, but not identical, novel situations, and is achieved through the operation of inhibitory synapses and receptive field formation.
4. *Hierarchy.* Knowings (constructs) are held in memory in an architecture of layers of information, along a spectrum from the most essentialized, general and abstract features to the most detailed. Information flows through this hierarchy in both directions, but the abstract side governs in that it determines the meaning of an experience and the type of response enacted, tailored to account for the details to a greater or lesser extent.

Viewed in the context of these four properties, prosymptom positions are seen as being fundamentally no different than all of the brain's other reality-modeling schemas. Prosymptom positions are the unconscious schemas generating consciously unwanted experiences and behaviors that people cannot stop, prompting them to seek help from psychotherapists.

The response of the conscious personality to symptom production is a matter worthy of consideration in itself. The single verbal module, in the left hemisphere's neocortex, is the source of our conscious, conceptual reasoning and sense making. Because, as Gazzaniga found, the verbal–conscious module is not privy to the coherent, implicit knowings (such as prosymptom positions) that determine so many of our responses, it invokes notions and narratives available from neocortical explicit memory to explain them. Some of Gazzaniga's split-brain experiments studied exactly this phenomenology. He described an experiment (2005, p. 149) in which the word *walk* was presented only to the right side of a split-brain patient's brain, by being shown only to the left eye, so that the conscious, verbal module in the left hemisphere was unaware of it. In response the patient "got up and started walking. When he was asked why he did this, the left brain [where language is primarily processed and where the word walk was not presented] quickly created a reason for the action: 'I wanted to go get a Coke.'"

In a variation of this experiment, the response unconsciously induced was an emotional state rather than a physical action. Gazzaniga reported (p. 224) that here too the verbal module stepped in "to construct a theory as to why there is a felt state since the brain systems triggering the emotional state do not have direct neural access to cortical [conscious] processes."

Gazzaniga also studied stroke patients with damage to the right parietal cortex that made it impossible for them to recognize their paralyzed left arm as their own arm. Normally the verbal sense-making module in the left brain would account for inability to move the limb as paralysis, but in this case precisely the area of the brain that would signal this has been damaged. As a result, the left brain simply invented explanations to account for the fact that there was an immobile limb attached to the body. When asked about the arm and why they could not move it, patients replied, "It's not mine" or, "I just don't feel like moving it" (Gazzaniga,

2005, p. 149). If Carol, in our case example, had explained her coldness toward marital sex by saying, for example, that it meant there was something genetically wrong with her, it would have been the same kind of arbitrary sense making.

An observation of the same phenomenology from the early history of clinical neuropsychology is provided by Vallar (1999, p. 336). In 1911, the Swiss psychiatrist Claparede was treating an alcoholic with Korsakoff's syndrome, the inability to generate new explicit memories. Claparede had to reintroduce himself upon entering the room, even if he had been gone only several minutes. Upon entering one morning he concealed a pin and pricked the patient's hand as he shook it. He then left the room and returned several minutes later. The patient reported no memory of who he was but refused to shake his hand and felt uncomfortable. When asked, she was initially unable to report why she felt uncomfortable and replied, "Isn't one allowed to withdraw one's hand?" Upon closer questioning as to her motives she replied, "Perhaps there is a pin hidden in your hand." When Claparede then asked, "What can make you suspect that I would like to prick you?" she replied, "It is an idea which came into my head, sometimes pins are hidden in hands." This anecdote shows not only the autonomous operation of unconscious, implicit knowings relative to conscious knowings, but also that implicit memory is not autobiographical or episodic and does not refer to the past, but only to how the world is expected to behave in the present: Hands sometimes hide pins.

These observations illustrate the arbitrariness of the conscious, verbal module in creating a sensible narrative that accounts for the manifestations of autonomous, implicit/unconscious knowings. This is precisely the phenomenology of symptom coherence: An unconscious module (prosymptom position) cogently generates a visible response (the presenting symptom or problem) to which the conscious module attributes its own familiar meanings and assessments (antisymptom position) with no inkling of the true source and reason for the production of the symptom. A person's antisymptom position is produced by the brain's single verbal module, which, Gazzaniga (1985, p. 80) determined, "is committed to the task of interpreting our overt behaviors as well as the more covert emotional responses produced by these separate mental modules of our brain. It

constructs theories of why these behaviors occurred and does so because of that brain system's need to maintain a sense of consistency for all of our behaviors."

It is the brain's parallel distributed processing that allows the *simultaneous* existence and activity of a conscious, antisymptom position and an unconscious, prosymptom position, two schemas that make sense of the same perceptions and experiences in very different ways.

In addition, for the same symptom any number of prosymptom positions can also exist and operate simultaneously. Each prosymptom position construes a different meaning that necessitates producing the same symptom in response to the same situation. For example, in response to a particular situation, sharp anger can be necessary to feel and manifest for several different, unconscious purposes: in order to avoid feeling powerless (which is the purpose in one prosymptom position); to protest forcefully a perceived injustice (which is a different prosymptom position operating simultaneously); or to create a favorable social image (yet another prosymptom position). At the same time, the person's antisymptom position could construe the same anger as meaning "I am crude, frightening, and unacceptable," with corresponding feelings of shame.

Prosymptom positions often contain knowings and purposes that patently contradict consciously held knowings and purposes. The brain's capacity for forming and holding incompatible models of the same area of reality is well established. It is documented extensively in animal studies of extinction learning. In such studies, the animal learns a conditioned response when, for example, a neutral tone is repeatedly followed by a second, unpleasantly sharp sound. The animal's brain forms a memory and expectation of the second, aversive sound upon hearing the first. This training is then followed by the learned extinction of the response: The first tone is presented repeatedly without the second sound occurring, creating a memory (knowing) of the first tone as neutral and not being followed by anything. These two knowings, which are logically incompatible, have been shown to be held in anatomically separate, coexistent memories—a knowing that the first tone is followed by a second, aversive sound, and the knowing that it is followed by nothing. The extinction learning can *override* the aversive conditioned response formed previously, but it does

not erase the conditioned response memory; the animal's brain stores the two opposite, separate knowings and remains capable of retrieving either one (Bouton, 2004). This capacity for harboring diverse models of the same entity is basic to the design of the brain.

To our knowledge, in the constructivist psychology literature there is little if any explicit consideration of such simultaneous, parallel attributions of entirely different, even contradictory meanings. As we noted earlier and will examine in detail in the next article in this series (Ecker & Toomey, 2007), coherence therapy identifies the *simultaneous* experience of two incompatible knowings as being the critical condition for bringing about a nullifying transformation (as distinct from extinction) of one of them. Kelly (1955) allowed for incompatible constructs to exist in succession, but his model never addressed simultaneity.

As also noted earlier, coherence therapy phenomenologically reveals a well-defined, hierarchical relationship among a prosymptom position's component constructs. The actuality of the operation of this hierarchy of constructs is particularly apparent when a therapy client becomes conscious, experientially, of the most superordinate (fourth-order) construct and then transforms or dissolves it, so that it no longer has any felt realness as a model of reality. It is immediately found that the subordinate third-, second-, and first-order constructs, including the presenting symptom, completely cease to arise, as they should if their very existence rests upon and derives from the subjective realness of the fourth-order construct. This hierarchical functioning of constructs has an obvious neural correlate in the hierarchical neural networks described earlier. However, to our knowledge, the invariant four tiers in the construct hierarchy identified by Ecker and Hulley (1996, 2000b) has not yet become apparent in brain studies. This may be an area where the clinical phenomenology could guide the neuropsychological research.

Conclusion

We have argued that neuropsychological evidence aligns strongly with coherence therapy's constructivist conceptual foundations and its model of symptom causation by coherent, adaptively intended, prosymptom positions—modules of multimodal

personal constructs unconsciously held in implicit memory. The specific characteristics of prosymptom positions observed phenomenologically—unconsciousness, coherence, modularity, autonomy, agency—also have solid neuropsychological support.

Translated into neuropsychological terms, symptom coherence means that if a symptom is produced, there exists a neural network generating the symptom as a response that is cogent, adaptive, and necessary according to the constructs encoded in that network. Symptoms that have been dispelled by coherence therapy include depression, anxiety, panic, agoraphobia, low self-worth, attachment problems, sequelae of childhood abuse, sexual problems, food/eating/weight problems, rage, attention deficit, disorganization, complicated bereavement, fidgeting, codependency, underachievement, procrastination, and a wide range of interpersonal, couple and family problems.

Coherence therapy and psychology were developed on the basis of systematic, sustained clinical experimentation and observation in a spirit of scientific inquiry (Ecker had previously done experimental physics research for well over a decade), but they have not yet been the subjects of controlled research. We have striven not to ignore any evidence contrary to the coherence model, and we welcome critique and correspondence concerning perceived theoretical weaknesses or vulnerabilities. Several areas addressed in this article require controlled research for confirmation:

1. *Verification of symptom coherence and of the effects of coherence therapy methodology.* If the symptom coherence model of symptom production is correct, then (1) experiential evocation of a prosymptom position should manifest in the brain as the activation of localized subcortical regions observable through fMRI brain imaging; (2) symptom cessation should occur if and only if this local neural activation can no longer be evoked; and (3) the transition from activation to nonactivation should occur in precise synchrony with the subject's report that the prosymptom theme and purpose has lost the subjective, emotional realness it formerly had. Such studies on subjects undergoing coherence therapy would presumably require only

minor modification of brain imaging procedures already in use for studying cognitive regulation strategies.

2. *Identification of the implicit memory systems storing the pro-symptom positions driving symptom production.* The locations in the brain of the implicit memory circuits that store prosymptom positions could occur through fMRI images of subjects undergoing coherence therapy in the discovery and integration stages. As noted, it is likely that fear-based, aversive prosymptom positions are stored in the (basolateral) amygdala. It is less obvious, based on current knowledge, where the brain stores nonfear-based prosymptom positions, such as those that maintain depression in many cases and those in which the central theme and purpose is a determined seeking of personal justice or a striving for the satisfaction of an unmet, fundamental need (an example of which is the often-encountered prosymptom position typically verbalized as, "I want the experience of being taken care of that I didn't have and *should* have had!")
3. *The clinical efficacy of coherence therapy.* The clinical utility of the symptom coherence model and of coherence therapy's methodology based on that model requires confirmation through suitably designed controlled trials. A design for such a trial is proposed at the conclusion of our next article in this series (Ecker & Toomey, 2007).
4. *The internal structure of symptom-requiring implicit memory.* The phenomenological finding that prosymptom positions always have a distinct, hierarchical, four-level structure is an important feature of coherence psychology and plays an active role in the pragmatics of coherence therapy. Neurological confirmation of this structure would both firm up the coherence framework and illuminate the architecture of the neural networks harboring prosymptom positions. One strategy focuses on images of brain activation at moments when different subsets of the four construct levels are activated and being experienced subjectively.

Pending such studies, we invite clinicians to experiment with the coherence-focused approach in their own therapeutic work. First-hand experiences of observing a client become conscious of previously unrecognized purpose and agency maintaining a symptom, and of witnessing a decades-old, life-organizing prosymptom

position dissolve through juxtaposition with other living knowledge, are invaluable adjuncts to any theoretical or empirical adjudication of the coherence paradigm.

The broad neuropsychological support for the existence of prosymptom positions and for their causal role in symptom production, as described in this article, sets the stage for the next article in this series, which provides a closer examination of the methodology of coherence therapy and of the mechanisms of synaptic plasticity that it recruits.

Notes

1. In this article, as in neuroscience, the meaning of *memory* is the formation, storage and retrieval of knowings of all kinds, such as knowing how to tell a story suspensefully or knowing to stop talking when the boss enters the room. This differs from the vernacular meaning of *memory*, which is the explicit recall of a past personal experience (*episodic* memory) or of facts, such as $2 + 2 = 4$ (*semantic* memory).
2. The original moniker, used from 1993 through 2005, was "depth-oriented brief therapy," or DOBT. The change to "coherence therapy" or "coherence psychology" was intended to reflect the central principle of the approach.
3. The major distinctions between types of memory are explicit (declarative) memory versus implicit (procedural) memory, each of which can have two forms, long-term and short-term. These four types of memory differ anatomically, synaptically, and molecularly. There are further subtypes within them. Explicit memory, which consists of factual knowings of the world (semantic memory) and of one's personal past (episodic memory), is recollected in consciousness and undergoes long-term encoding by the hippocampus, a structure in the limbic system. Implicit memory stores motor and language skills, tasks, habits, and emotion-driven behavioral responses. Its expression is through performance and does not involve consciousness awareness. Its long-term encoding is carried out through the amygdala, cerebellum, or basal ganglia.
4. The neocortex is 1 to 4 mm thick (0.04 to 0.16 inch). It has about 30 billion neurons interconnected through 30 trillion synapses, which are either excitatory or inhibitory. The

architecture of the neocortex consists of six layers, each consisting of a different type of neuron. Transversely the neocortex is subdivided into several hundred million six-layer columns, each of which processes information hierarchically, with lateral interconnections between columns. Storing, retrieving, and revising memory—models of reality at various levels of detail and abstraction—is the chief neocortical activity.

References

Adolphs, R. (2002). Neural systems for recognizing emotion. *Current Opinion in Neurobiology*, *12*, 169–177.

Adolphs, R. (2004). Emotion, social cognition, and the human brain. In J. T. Cacioppo & G. G. Berntson (Eds.), *Essays in social neuroscience* (pp. 121–133). Cambridge, MA: MIT Press.

Adolphs, R., & Tranel, D. (2004). Impaired judgments of sadness but not happiness following bilateral amygdala damage. *Journal of Cognitive Neuroscience*, *16*, 453–462.

Adolphs, R., Tranel, D., & Damasio, A. R. (1998). The human amygdala in social judgment. *Nature*, *393*, 470–474.

Baev, K. (1997). *Biological neural networks*. Berlin: Birkauser.

Bandler, R., & Grinder, J. (1979). *Frogs into princes: Neuro linguistic programming*.. Moab, UT: Real People Press.

Bargh, J. A. (2005). Bypassing the will: Towards demystifying the nonconscious control of social behavior. In R. Hassin, J. S. Uleman, & J. A. Bargh (Eds.), *The new unconscious* (pp. 37–58). New York: Oxford University Press.

Bargh, J. A., & Chartrand, T. L. (1999). The unbearable automaticity of being. *American Psychologist*, *54*, 462–479.

Baskin, T. W., Tierney, S. C., Minami, T., & Wampold, B. E. (2003). Establishing specificity in psychotherapy: A meta-analysis of structural equivalence of placebo controls. *Journal of Consulting and Clinical Psycholology*, *71*, 973–979.

Bateson, G. (1951). Information and codification: A philosophical approach. In J. Ruesch & G. Bateson (Eds.), *Communication: The social matrix of psychiatry* (pp. 168–211). New York: Norton.

Bateson, G. (1972). *Steps to an ecology of mind*. New York: Ballantine.

Bouton, M. E. (2004). Context and behavioral processes in extinction. *Learning and Memory*, *11*, 485–494.

Canli, T., Sivers, H., Thomason, M., Whitfield-Gabrieli, S., Gabrieli, J., & Gotlib, I. (2004, December 3). Brain activation to emotional words in depressed vs. healthy subjects. *Neuroreport*, *15*, 2585–2588.

Cozolino, L. (2002). *The Neuroscience of psychotherapy: Building and rebuilding the human brain*. New York and London: Norton.

Crits-Christoph, P. (1992). The efficacy of brief dynamic psychotherapy: A meta-analysis. *American Journal of Psychiatry*, *149*, 151–158.

Dayan, P., & Abbott, L. (2001). *Theoretical neuroscience: Computational and mathematical modeling of neural systems.* Cambridge: MIT Press.

Denes, F., Cipolotti, L., & Zorzi, M. (1999). Acquired dyslexias and dysgraphias. In G. Denes & L. Pizzamiglio (Eds.), *Handbook of clinical and experimental neuropsychology* (pp. 289–317). London: Psychology Press.

de Gelder, B., de Haan, E., & Heywood, C. (2001). *Out of mind: Varieties of unconscious process.* Oxford, UK: Oxford University Press.

de Gelder, B., de Vroomen, J., & Pourtois, G. R. C. (2001). Covert affective cognition and affective blindsight. In B. L. M. F. de Gelder, E. de Haan, & C. Heywood (Eds.), *Out of Mind* (pp. 205–221). Oxford, UK: Oxford University Press.

Dell, P. (1982). Beyond homeostasis: Toward a concept of coherence. *Family Process, 21*, 21–41.

Dodes, L. (2002). *The heart of addiction.* New York: Harper Collins.

Dougherty, D. D., Rauch, S. L., & Rosenbaum, J. F. (2004). *Essentials of neuroimaging for clinical practice.* Washington, DC: American Psychiatric Association.

Ecker, B. (2003). The hidden logic of anxiety: Look for the emotional truth behind the symptom. *Psychotherapy Networker, 27*, 38–43, 58.

Ecker, B. (2005). Utilizing the brain's hidden rules for change. *Psychotherapy Networker Symposium.* Washington, DC. [Audio CD, item #715–506]. Available from www.playbacknow. com.

Ecker, B. (2006). *The effectiveness of psychotherapy: Constructivism to the rescue!* Keynote address presented at the 12th Biennial Conference of the Constructivist Psychology Network, San Marcos, California

Ecker, B., & Hulley, L. (1996). *Depth oriented brief therapy: How to be brief when you were trained to be deep, and vice versa.* San Francisco, CA: Jossey-Bass.

Ecker, B., Hulley, L. (2000a). Depth-oriented brief therapy: Accelerated accessing of the coherent unconscious. In J. Carlson & L. Sperry (Eds.), *Brief therapy with individuals and couples* (pp. 161–190). Phoenix, AZ: Zeig, Tucker & Theisen.

Ecker, B., Hulley, L. 2000b). The order in clinical "disorder": Symptom coherence in depth oriented brief therapy. In R. A. Neimeyer & J. Raskin (Eds.), *Constructions of disorder* (pp. 63–89). Washington, DC: American Psychological Association.

Ecker, B., & Hulley, L. (2002a). Deep from the start: Profound change in brief therapy. *Psychotherapy Networker, 26* (1), 46–51, 64. Available at www.findarticles.com/p/articles/mi_qa4016/is_200201/ai_n9033893.

Ecker, B., & Hulley, L. (2002b). DOBT toolkit for in-depth effectiveness: Methods and concepts of depth-oriented brief therapy. *New Therapist, 20*, 24–29.

Ecker, B., & Hulley, L. (2004). *Depth-oriented brief therapy practice manual and training guide.* Oakland, CA: Pacific Seminars. Available at www.dobt.com/manual.htm.

Ecker, B., & Toomey, B. (2007, in press). Depotentiation of symptom-producing implicit memory in coherence therapy. *Journal of Constructivist Psychology.*

Eichenbaum, H. (2004). An information processing framework for memory representation by the hippocampus: The cognitive neuroscience of knowing one's self. In M. S. Gazzaniga (Ed.), *The Cognitive Neurosciences III* (pp. 1077–1089). Cambridge: MIT Press.

English, H. B., & English, H. C. (1958). *A comprehensive dictionary of psychological and psychoanalytical terms: A guide to usage.* New York: McKay Publishing.

Enright, J. B. (1980). Change versus enlightenment. In S. Boorstein (Ed.), *Transpersonal psychology* (pp. 217–231). Palo Alto, CA: Science & Behavior Books.

Freud, S. (1916/1966). The sense of symptoms (Lecture 17 in *Introductory lectures on psychoanalysis,* James Strachey, Ed. & Trans.). New York and London: W. W. Norton.

Freud, S. (1923/1962). *The ego and the id.* (*The standard edition of the complete psychological works of Sigmund Freud,* James Strachey, Ed. & Trans.) New York and London: W. W. Norton.

Gazzaniga, M. S. (1985). *The social brain: Discovering the networks of the mind.* New York: Basic Books.

Gazzaniga, M. S. (1992). Brain modules and belief formation. In F. S. Kessel, P. M. Cole, & D. L. Johnson (Eds.), *Self and consciousness: Multiple perspectives* (pp. 88–102). Hillsdale, NJ: Lawrence Erlbaum. (Ed.)...

Gazzaniga, M. S. (2005). *The ethical brain.* New York: Dana Press.

Glasersfeld, E. (1979). Radical constructivism and Piaget's concept of knowledge. In F. B. Murray (Ed.), *The impact of Piagetian theory on education, philosophy, psychiatry, and psychology* (pp. 109–122). Baltimore, MD: University Park Press.

Glasersfeld, E. von. (1988). The reluctance to change a way of thinking. *Irish Journal of Psychology, 9,* 83–90.

Goldapple, K., Segal, Z., Garson, C., Lau, M., Bieling, P., Kennedy, S., & Mayberg, H. (2004). Modulation of cortical-limbic pathways in major depression: Treatment-specific effects of cognitive behavior therapy. *Archives of General Psychiatry, 61,* 34–41.

Guidano, V. F. (1995). A constructivist outline of human knowing processes. In M. J. Mahoney (Ed.), *Cognitive and constructive psychotherapies* (pp. 89–102). New York: Springer.

Güzeldere, G. (1995). Consciousness: What it is, how to study it, what to learn from its history. *Journal of Consciousness Studies, 2,* 30–51.

Hassin, R., Uleman, J. S., & Bargh, J. A. (2004). *The new unconscious.* New York: Oxford University Press.

Hayek, F. A. (1952). *The sensory order.* Chicago, IL: University of Chicago Press..

Hayek, F. A. (1978). *New studies in philosophy, politics, economics, and the history of ideas.* Chicago, IL: University of Chicago Press.

James, W. (1950/1890). *The principles of psychology.* New York: Dover.

Jung, C. G. (1964). *Man and his symbols.* Garden City, NY: Doubleday.

Kegan, R., & Lahey, L. L. (2001, November). The real reason people won't change. *Harvard Business Review,* 85–92.

Kelly, G. A. (1955). *The psychology of personal constructs* (Vols. 1 & 2). New York: Norton.

Kentros, C. G., Agnihotri, N. T., Streater, S., Hawkins, R. D., & Kandel, E. R. (2004). Increased attention to spatial context increases both place field stability and spatial memory. *Neuron, 42*, 283–295.

Kihlstrom, J. F. (1987). The cognitive unconscious. *Science, 237*, 1445–1452.

Koch, C., & Segev, I. (2000). The role of single neurons in information processing. *Nature Neuroscience* (Suppl. 3), 1171–1177. Retrieved March 3, 2006, from http://www.nature.com/neuro/journal/v3/n11 s/pdf/nn1100_1171.pdf

Laing, R. D. (1967). *The politics of experience.* New York: Pantheon.

LeDoux, J. E. (1994). Emotional processing but not emotions can occur unconsciously. In R. J. Davidson & P. Eckman (Eds.), *The nature of emotion: Fundamental questions.* New York: Oxford University Press.

LeDoux, J. E. (1996). *The emotional brain.* New York: Simon & Schuster.

LeDoux, J. E. (2002). *The synaptic self.*. New York: Viking.

Logan, G. D., Taylor, S. E., & Etherton, J. L. (1999). Attention and automaticity: Toward a theoretical integration. *Psychological Research, 62*, 165–181.

Luborsky, L., Rosenthal, R., Diguer, L., Andrusyna, T. P., Berman, J. S., Levitt, J. T., Seligman, D. A., & Krause, E. D. (2002). The Dodo bird verdict is alive and well—Mostly. *Clinical Psychology: Science and Practice, 9*, 2–12.

MacLean, P. D. (1990). *The triune brain in evolution: Role of paleocerebral functions.*. New York: Plenum Press.

Mahoney, M. J. (1988a). Constructivist metatheory: I Basic features and historical foundations. *International Journal of Personal Construct Psychology, 1*, 1–35.

Mahoney, M. J. (1988b). Constructivist metatheory: II. Implications for psychotherapy. *International Journal of Personal Construct Psychology, 1*, 299–315.

Mahoney, M. J. (1991). *Human change processes: The scientific foundations of psychotherapy.* New York: Basic Books.

Mahoney, M. J. (1995a). Theoretical developments in the cognitive and constructive psychotherapies. In M. J. Mahoney (Ed.), *Cognitive and constructive psychotherapies* (pp. 3–19). New York: Springer.

Mahoney, M. J. (1995b). Continuing evolution of the cognitive sciences and psychotherapies. In R. A. Neimeyer & M. J. Mahoney (Eds.), *Constructivism in psychotherapy* (pp. 39–65). Washington, DC: American Psychological Association.

Mahoney, M. J., Miller, H. M., & Arciero, G. (1995). Constructive metatheory and the nature of mental representations. In M. J. Mahoney (Ed.), *Cognitive and constructive psychotherapies* (pp. 103–120). New York: Springer.

Malhi, G. S., Lagopoulos, J., Ward, P. B., Kumari, V., Mitchell, P. B., Parker, G. B., Ivanovski, P., & Sachdev, B. (2004). Cognitive generation of affect in bipolar depression: An fMRI study. *European Journal of Neuroscience, 19*, 742–754.

Martignetti, C. A., & Jordan, M. (2001). The use of DOBT in pastoral psychotherapy. *American Journal of Pastoral Counseling, 4*, 37–51.

McGaugh, J. L., & Roozendaal, B. (2002). Role of adrenal stress hormones in forming lasting memories in the brain. *Current Opinion in Neurobiology, 12*, 205–210.

Milner, B., Squire, L. R., & Kandel, E. R. (1998). Cognitive neuroscience and the study of memory. *Neuron, 20*, 445–468.

Neimeyer, R. A. (1997). Problems and prospects in constructivist psychotherapy. *Journal of Constructivist Psychology, 10,* 51–74.

Neimeyer, R. A. (2000). Narrative disruptions in the construction of the self. In R. A. Neimeyer & J. D. Raskin (Eds.), *Constructions of disorder* (pp. 207–242). Washington, DC: American Psychological Association.

Neimeyer, R. A., Bridges, S. K. (2003). Postmodern approaches to psychotherapy. In A. S. Gurman & S. B. Messer (Eds.), *Essential psychotherapies,* 2 nd ed. (pp. 272–316). New York: Guilford.

Neimeyer, R. A., & Raskin, J. D. (2001). Varieties of constructivism in psychotherapy. In K. Dobson (Ed.), *Handbook of cognitive behavioral psychotherapies*, 2 nd ed. (pp. 393–430). New York: Guilford.

Palumbo, R., & Gillman, I. (1984). Effects of subliminal activation of Oedipal fantasies on competitive performance. *Journal of Nervous and Mental Disease*, *172*, 737–741.

Panksepp, J. (1998). *Affective neuroscience: The foundations of human and animal emotions*. Oxford, UK: Oxford University Press.

Papp, P., & Imber-Black, E. (1996). Family themes: Transmission and transformation. *Family Process, 35,* 5–20.

Phelps, E. A., & LeDoux, J. E. (2005). Contributions of the amygdala to emotion processing: From animal models to human behavior. *Neuron*, *48*, 175–187.

Piaget, J. (1937). *The construction of reality in the child.* New York: Ballantine.

Piaget, J. (1985). *The equilibration of cognitive structures: The central problem of intellectual development*. Chicago, IL: University of Chicago Press.

Posner, M. I., & Raichle, M. E. (1994*). Images of mind.* New York: Scientific American Library.

Quartz, S. R. (1999). The constructivist brain. *Trends in Cognitive Science*, *3*, 48–57.

Quartz, S. R., & Sejnowsky, T. J. (1997). A neural basis of cognitive development: A constructivist manifesto. *Behavioral Brain Sciences, 20*, 537–556.

Quiroga, R. Q., Reddy, L., Kreiman, G., Koch, C., & Fried, I. (2005). Invariant visual representation by single neurons in the human brain. *Nature*, *435*, 1102–1107.

Reber, A. S. (1967). Implicit learning of artificial grammars. *Journal of Verbal Learning and Verbal Behavior, 6*, 855–863.

Robinson, L. A., Berman, J. S., & Neimeyer, R. A. (1990). Psychotherapy for the treatment of depression: A comprehensive review of controlled outcome research. *Psychological Bulletin*, *108*, 30–49.

Rosenberg, M. B. (1999). *Nonviolent communication: A language of compassion*. Encinitas, CA: Puddledancer Press.

Rosenzweig, S. (1936). Some implicit common factors in diverse methods of psychotherapy. *American Journal of Orthopsychiatry, 6*, 412–415.

Rumelhart, D. E., & McClelland, J. L. (1986). *Parallel distributed processing: Explorations in the microstructure of cognition* (2 vols.). Cambridge, MA: MIT Press.

Sachs, O. (2005, October 31). Recalled to life. *The New Yorker,* 46–53.

Satir, V. (1972). *Peoplemaking.* Palo Alto, CA: Science & Behavior Books.

Schore, A. (2003). *Affect dysregulation and disorders of the self*. New York: W. W. Norton.

Schore, A. (2005). A neuropsychoanalytic commentary on "Body rhythms and the unconscious: Toward an expanding of clinical attention." Retrieved March 13, 2006, from www.psybc.com/pdfs/library/Neuropsa_BodyRythymsUcs_Schore.pdf

Schwartz, R. (1995). *Internal family systems therapy*. New York: Guilford.

Scott, A. (2000). How smart is a neuron? A review of Christof Koch's "Biophysics of computation." *Journal of Consciousness Studies, 7*. Retrieved March 3, 2006, from www.imprint. co.uk/Koch.pdf

Siegel, D. (1999). *The developing mind: Toward a neurobiology of interpersonal experience*. New York: Guilford.

Silverman, L. H., Ross, D. L., Adler, J. M., & Lustig, D. A. (1978). Simple research paradigm for demonstrating subliminal psychodynamic activation: Effects of Oedipal stimuli on dart-throwing accuracy in college males. *Journal of Abnormal Psychology, 87*, 341–357.

Squire, L. R. (1994). Declarative and nondeclarative memory: Multiple brain systems supporting learning and memory. In D. L. Schacter & E. Tulving (Eds.), *Memory systems* (pp. 203–231). London: MIT Press.

Stiles, W. B., Barkham, M., Twigg, E., Mellor-Clark, J., & Cooper, M. (2006). Effectiveness of cognitive-behavioural, person-centred and psychodynamic therapies as practiced in UK National Health Service settings. *Psychological Medicine, 36*, 555–566.

Stone, V. E., Cosmides, L., Tooby, J., Kroll, N., & Knight, R. T. (2002). Selective impairment of reasoning about social exchange in a patient with bilateral limbic system damage. *Proceedings of the National Academy of Sciences, 99*,11531–11536.

Sullivan, H. S. (1948). The meaning of anxiety in psychiatry and in life. *American Journal of Psychiatry, 11*, 1–13.

Thomson, J. E., & Jordan, M. R. (2002). Depth oriented brief therapy: An ideal technique as hospice lengths-of-stay continue to shorten. *Journal of Pastoral Care & Counseling, 56*, 221–225.

Toomey, B., & Ecker, B. (in press). Competing visions of the implications of neuroscience for psychotherapy. *Journal of Constructivist Psychology*.

Uleman J. S. Bargh J. A. (Eds.) (1989). *Unintended thought*. New York: Guilford.

Vallar, G. (1999). Neuropsychological disorders of memory. In G. Denes & L. Pizzamiglio (Eds.), *Handbook of clinical and experimental neuropsychology* (pp. 321–368). Hove, UK: Psychology Press.

Wampold, B. E., Mondin, G. W., Moody, M., Stich, F., Benson, K., & Ahn, H. (1997). A meta-analysis of outcome studies comparing bona fide psychotherapies: Empirically, "All must have prizes." *Psychological Bulletin, 122,* 203–215.

Watzlawick, P., Weakland, J., & Fisch, R. (1974). *Change: Principles of problem formation and problem resolution*. New York: W. W. Norton.

Weimer, W. B. (1977). A conceptual framework for cognitive psychology: Motor theories of the mind. In R. Shaw & J. Bransford (Eds.), *Perceiving, acting, and knowing: Toward an ecological psychology* (pp. 267–311). Hillsdale, NJ: Lawrence Erlbaum.

Weimer, W. B. (1982a). Hayek's approach to the problems of complex phenomena: An introduction to the theoretical psychology of *The Sensory Order*. In W. B. Weimar & D. S. Palermo (Eds.), *Cognition and the symbolic processes*, Vol. 2 (pp. 241–285). Hillsdale, NJ: Lawrence Erlbaum.

Weimer, W. B. (1982b). Ambiguity and the future of psychology: Meditations Liebniziennes. In W. B. Weimar & D. S. Palermo (Eds.), *Cognition and the symbolic processes,* Vol. 2 (pp. 331–360). Hillsdale, NJ: Lawrence Erlbaum.

Weimer, W. B. (1987). Spontaneously ordered complex phenomena and the unity of the moral sciences. In G. Radnitzky (Ed.), *Centripetal forces in the sciences* (pp. 257–296). New York: Paragon House.

Weinberger, N. M., Javid, R., & Lepan, B. (1993). Long-term retention of learning induced receptive field plasticity in the auditory cortex. *Proceedings of the National Academy of Science, 90,* 2394–2398.

Whalen, P. J., Rauch, S. L., Etcoff, N. L., Mcinerney, S. C., Lee, M. B., & Jenike, M. A. (1998). Masked presentations of emotional facial expressions modulate amygdala activity without explicit knowledge. *Journal of Neuroscience, 18,* 411–418.

Wilson, T. D. (2002). *Strangers to ourselves: Discovering the adaptive unconscious.* Cambridge, MA: Belknap/Harvard.

Winkielman, P., Berridge, K. C., & Wilbarger, J. (2005). Unconscious affective reactions to masked happy versus angry faces influence consumption behavior and judgments of value. *Personality and Social Psychology Bulletin, 31,* 121–135.

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist, 35,* 151–175.

Zigmond, M. J., Bloom, F. E., Landis, S. C., Roberts, J. L., & Squire, L. R. (1999). *Fundamental neuroscience.* London: Academic Press.