Relational Psychophysiology and Mutual Regulation during Dyadic Therapeutic and Developmental Relating

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Abstract. Human experiences of empathy and presence are quintessential in therapeutic as well as intimate relationships. The work on relational psychophysiology has informed psychotherapeutic research by illustrating how early life physiological concordance between mother and infant are critical in mutual dyadic regulation. These processes cross several developmental domains, including biological, affective, social, and self-identity. By examining physiological concordance, this research has propelled our understanding of mutual regulation into the more expansive understanding of dyadically expanded states of consciousness. The core of the therapeutic relationship inherently engenders expanded opportunities and reorganization of the client, as well as the therapist. By incorporating the views of nonlinear dynamic systems theory, this model views the human as an open dynamic system, consisting of interrelated domains of functioning (i.e., physiological, emotional, cognitive/symbolic, and social/behavioral), where each is an agent in mutual regulation and growth. Fine-tuning the mutual regulation model by bringing in relational psychophysiology and dynamic systems theory offers an expanded understanding of intimate human relationships, including early systemic development between mother and infant, as well as therapist-client effectiveness.

Keywords: Person Centered Approach, interpersonal relationship, Relational Psychophysiology, Mutual Regulation Model, Dyadically Expanded States of Consciousness, Face-to-Face Still-Face.

1 Introduction

The purpose of this chapter is to present our work on relational psychophysiology in mother infant research and offer some ways in which this approach might apply to and inform person-centered psychotherapy research and clinical practice. We first briefly review our theories of infant emotional development that emerged from our empirical research. These theories include the mutual regulation model and our theory on dyadically expanded states of consciousness, which integrates a nonlinear dynamic systems framework into the mutual regulation model. We view the human being as an open, nonlinear dynamic system consisting of many interrelated domains of functioning (physiological, emotional, cognitive/symbolic, and social/behavioral). The core of the chapter presents our latest research, which adds physiological measures and assessment of synchrony across these domains to our mother infant work. We also review prominent findings in related research on what has also been called physiological "concordance," "mirroring," or "linkage" in dyadic units across the lifespan. Finally, we discuss similarities and possible applications to person-centered psychotherapy research and practice.

2 Relational Psychophysiology

In the spirit of studying physiological and behavioral states as they relate to dyadic relational processes that enhance self-organization and emotion regulation capacities, we believe that psychophysiological variables during relevant social interactions are key to understanding the development of complexity and coherence for each individual, as well the larger social milieu. Psychophysiology is the study of the physical substrates underlying psychological inner states and can be used to assess cognitive, affective, and behavioral processes (Cacioppo et al. 2000). Examples of commonly studied psychophysiological systems are neural activity, electromyography, electrodermal activity, cardiovascular activity, and stress and reproductive hormonal processes. The earliest work investigating behavioral outcomes on physiological linking likely begins with Levenson and Gottman (1983) who examined marital satisfaction as it related to synchrony across multiple autonomic physiological systems and affect. Similar work since then has explored the interrelatedness between social emotions, including empathy and cooperation, as influenced by the ability of adult pairs to be "in sync," once again across multiple physiological systems (e.g., Ekman et al. 2011). We believe that relational psychophysiology has a critical place in the earliest relational sensitivity and in the nascent development of emotion and self-regulation in both infants and their caregivers.

3 The Mutual Regulation Model

For the past three decades, we have studied mutual regulatory processes between mothers and infants during face-to-face interactions using measures of behavior and affect (see Tronick 2007, for a collection of this work over the past 30 years). We have found that mothers and infants engage in self-directed and other-directed actions during face-to-face interaction in efforts to maintain optimal levels of self and dyadic arousal and engagement. In the mutual regulation model (Gianino and Tronick 1988; Tronick 1989), infants play a major agentic role in regulating the interaction. They invite fitted, regulatory scaffolding, with meanings conveyed through eye contact, facial expressions, and emotive expressions such as crying or laughing. They modulate the intensity of interaction and their internal state, again with meanings conveyed through gaze aversion, self-soothing, and expressions of protest. Caregivers vary in the degree to which they apprehend and learn their infant's messages and thus vary in how much they help (or hinder) the infant's regulation. Caregivers smile when infants smile, wait when infants turn away, and soothe infants when they are distressed. In this way, temporal features of

the interaction reveal contingencies of signaling, synchrony, and attunement, and both caregivers and infants use nonverbal forms of communication that convey meaning.

Much like the therapeutic interaction, however, the ideal interface is not of absolute synchrony and coordination. Rather, it is ‘‘messy.’’ It involves mismatches of affective states, miscoordination of responses, and misapprehensions of relational intentions (Tronick 2007). The actual interaction involves reparation of mismatch and the rejoining of shared relational meaning. In our model, *reparation* is a central mechanism of change and has consequences beyond developing shared meanings. Through reparation, the infant and the caregiver come to implicitly know that the negative experience of mismatch can be transformed into a positive affective match; consequently, the partner can be trusted, and that the infant (and caregiver) is able to act effectively in the world. Out of the reparation of messiness, new implicit ways of being together are co-created and come to be implicitly known (Tronick 2004).

Our research using the Face-to-Face Still-Face (FFSF) paradigm (Tronick et al. 1978) has shown the dramatic affect on the infant when the mother's regulatory input is experimentally halted, that is when she offers no feedback to the infant during an interaction. The typical paradigm consists of three relational segments, each lasting 2 to 3 minutes. In the first episode (mother-infant are face to face), mothers are instructed to play with their infant as they normally do. In the next episode (mother presents still face), mothers are instructed to face their infant but to no longer respond to their infant in any way. The effect on the infant is dramatic (Adamson and Frick 2003; Weinberg and Tronick 1996). Infants quickly detect the change and use a variety of strategies to reengage their mothers (smiling, cooing, or fussing). This solicitation cycle may be repeated many times. However, when the attempts to re-engage the mother fail, infants can withdraw, avert their gaze, and lose postural control and begin to self-comfort. Some, but not many, infants cry. In the third episode (reunion), mothers are asked to resume normal interactions with their infants. Mothers often end up having to exert more effort to soothe their infants, and infants display a mix of positive and negative affective states. Over time, with the regulatory engagement of the mother and the fulfillment of infants' intention to elicit interaction once again, and the dyad resumes its typical messy state.

4 Relational Processes

Our work and that of many other developmental and psychological researchers (e.g., Beebe and Lachmann 2002; Fonagy 2002; Tronick 1998) have had a profound impact on the conceptualization of therapeutic processes. It is not an overstatement to say that the early work on mutual regulation was constitutive and foundational to nearly all forms of relational psychotherapies. For example, Safran and Muran's (2000) relational approach to psychotherapy suggests that the type of reparations in relating identified in mother-infant relationships might reflect parallel processes in adult psychotherapy, such that reparations of the patient-therapist relationship facilitate a restructuring of the patient's relational schemas into more healthy relational patterns of expectation. Rogers (1980) was well aware of the importance of supporting the organic process of dyadic relational restructuring within and outside the therapeutic context. He noted: "it seems that the human organism has been moving toward the more complete development of awareness. It is at this level that new forms are invented, perhaps even new directions for the human species. It is here that the reciprocal relationship between cause and effect is most demonstrably evident. It is here that choices are made, spontaneous forms created" (p. 127). Psychophysiological research has established relational linkage as a critical piece for social emotions in particular. Using measures such as cortisol, alpha-amylase, skin conductance, heart rate, and respiration, several social-related emotions such as empathy, loneliness, and disagreement (e.g., Levenson and Gottman 1983) have been associated with concurrent synchrony and time-lagged synchrony (e.g., Butler 2011). Moreover, linkages have been found primarily during reparative processes between social partners, including romantic partners, as well as whole family systems (e,g., Butler 2011; Saxbe et al. 2011). Interestingly, this work provides evidence that physiological relatedness is not only present during empathetic or positive affective states, but is a critical underlying process during negative interactions and perhaps negative relationship patterning.

5 Dyadically Expanded States of Consciousness

5.1 Theoretical Framework

We have recently integrated principles of nonlinear dynamic systems theory (Kiel and Elliot 1996; Lewis 2000; Thelen and Smith 1994) into the mutual regulation model and have coined the term ''dyadically expanded states of consciousness'' to capture our thinking (Tronick 2007). Although we may use the term ''consciousness,'' it is less than ideal because we use it quite differently from neurologists and philosophers and do not believe that all states of consciousness are explicitly realized, but rather much of it is implicit and not in awareness. Nonetheless, we feel that it best captures our belief that the totality of human functioning is involved in the meaning-making processes, from cells to physiological function, from action to awareness. As open dynamic systems, humans move toward more complex and coherent states of self-organization during interaction with their own self and the world of people and things. We refer to this self-organization as a ''state of consciousness.'' This state expresses the entire system of meanings, intentions, and purposes through which one operates and experiences the self in the world. As in all complex systems, there are multilayered, hierarchically organized domains of functioning, and each domain is related to and affects the other. A more coherent state of consciousness occurs when ''all'' domains are organized into greater (but never complete) harmony with other levels. Coherence is a function of organization, complexity, and flexibility in adapting to different environmental conditions. When one partner in a dyadic process is less coherent, the quality of adaptation and development will necessarily also be less coherent for the other partner. For example, not all caregivers are able to completely and effectively engage with their infant; thus the infant's ability to engage in social processes, regulate negative emotions and physiological stress, may be compromised. Much prior work has examined the mutual regulation model in healthy populations, as well as dyads where some level of affective or pathophysiology may be present, such as maternal depression and/or maternal anxiety.

An example of work on mutual regulation comes from Feldman et al. (2009) who investigated the effects of maternal depression on infant social engagement, fear regulation, and cortisol reactivity as compared with maternal anxiety disorders and controls. Primarily, the role of maternal sensitivity in moderating the relations between maternal depression and infant outcomes was investigated. The researchers used an extreme-case design; an initial sample 971 women reported symptoms of anxiety and depression after childbirth, and 215 of those with high and low reports were reevaluated at 6 months. At 9 months, mothers diagnosed with a major depressive disorder (n = 22) and anxiety disorders (n = 19) and matched controls (i.e., no symptoms across the postpartum year; n = 59) were visited at home. Infant social engagement was observed during mother-infant interaction, emotion regulation was micro-coded from a fear paradigm, and mother-infant cortisol values were sampled at baseline, reactivity, and recovery. Mothers' and infants' baseline and reactivity cortisol levels were significantly and positively associated. In addition, the infants of depressed mothers scored the poorest on social engagement and fear regulation at 9 months. Specifically, this group showed the lowest social engagement, less mature regulatory behaviors, greater negative emotionality, and highest cortisol reactivity. The anxious dyads scored less optimally than the controls on maternal sensitivity and infant social engagement. Thus, in this case the concordant physiology was associated with the dysregulated caregiver and subsequent impaired social, regulatory, and physiological reactivity in the infant.

5.2 Dyadically Expanded States of Consciousness in Psychotherapy

We propose that psychotherapy involves a process of increasing the coherence and complexity of the client's self-organization (state of consciousness). Here we use coherence to refer to a state in which all domains of functioning resonate with each other and operate harmoniously with each other, like an orchestra playing on point with individual musical streams merging into a sonata that is greater and more beautiful than the sum of its parts.

We suggest that some patients enter therapy because they experience some type of incoherence. They may complain of having a false self, of living a lie, or of not knowing who they are, what they feel, or what they want (e.g., Masterson 1990). They may lack insight or self-awareness (i.e., coherence of identity and meaning with behavior, affect, and physiology). Alternatively, they

may lack greater control over their behaviors or emotions (coherence of will and action or feeling). Along these lines, the person-centered approach (PCA) views dysfunction of the self as a failure to be in process; incongruence exists between aspects of the self-concept and daily experience. The person remains stuck in misperceptions or inadequate behavior, while being unable to learn and change (Rogers 1961). From an adult attachment perspective (George et al. 1996), these patients may be identified as dismissive in attachment style and display a poverty of content or report a lack of feeling when discussing attachment issues.

Other patients may present with problems in complexity. Complexity, from a nonlinear dynamic systems perspective, refers to both stability in system organization and flexibility to respond and adapt to changing environmental demands (Siegel 1999). It can be viewed as a chaotic state in which changes emerge out of organizational stability. Low-complexity patients are those who, as the saying goes, find themselves stuck in a hole but keep on digging because they only have a shovel. These patients cannot help but repeatedly make meaning of situations in the same dysfunctional ways or react to situations in the same way (i.e., automatic thoughts, from a cognitive perspective). They may be described as rigid, intolerant, angry, or afraid and are likely to be diagnosed with a personality disorder. Other patients may have disorganized complexity, tending toward randomness. They may become incoherent when anxious, vague, flighty, distracted, and fearful. In the literature on adult attachments, these patients may be categorized as preoccupied and display linguistic and semantic incoherence when discussing anxiety-provoking attachment issues. More seriously, they may present as disorganized, which represents the ultimate level of disruption in self-organization and is often associated with the most severe experiences of trauma or loss.

We believe that therapeutic action lies in dyadically expanding the coherence of patients' self-organization. Any domain of function (physiological processes, behaviors, emotions, conscious awareness, reflective awareness, identity, intentions, and social relationships) can be an effective target for intervention because increasing the coherence in one domain will likely impact the entire system, given the relations of the levels/domains and components of the individual as a system. In this paper, we highlight the importance of the emotional domain because we believe that it serves as a foundational building block for coherence and is the ''product'' of domains of function. Thus, it is a critical target for therapeutic intervention and growth. Somewhat like the responsive mother with her child, the therapist must attend to the immediate, moment-to-moment emotional meaning state occurring in the patient, in the therapist, and between patient and therapist. The purpose of this apprehending is to facilitate two overlapping and synergistic processes important in the development of coherence: regulation of affect and awareness of affect. This is not to say that we privilege the emotional domain in therapy, because cognitive therapists have certainly highlighted how alterations in semantic levels of meaning (such as changing cognitive distortions or attributional biases) can have resounding effects on emotions as well. We also acknowledge the interesting work of body psychotherapists (e.g., Ogden et al. 2006), who focus more directly on the nonverbal, sensorimotor domain of function, and believe that this work too can affect self-organization at higher levels.

We also cannot overemphasize the centrality of other people in the development of coherence and complexity. From our clinical experience, one of the greatest sources of malaise in patients is a deep sense of isolation, and many patients report that one of the things that feels best and is most helpful about therapy is the chance to feel heard and understood by another and to have their views on the world validated, their meanings shared. Something magical happens when the patient's most private and shame-inducing vulnerabilities can be shared with the therapist, particularly one who is nonjudgmental, empathic, and accurate in his or her perception (Rogers 1957/1992). The therapist resonates with the patient on an affective, visceral level. Sometimes, on a nonverbal level, vocal rhythms converge (Beebe and Lachmann 2002) and gestures become mirrored (Bernieri and Rosenthal 1991). This alone, however, would be sympathy. The therapist must also accurately convey through language and other forms of communicating meaning that he or she grasps the client's meaning. Empathy requires that the multiple layers of the client's self-organization become resonant with the therapist's and together they co-create a new and greater coherence, a dyadically expanded, harmonically amplified state of consciousness shared between them. This then becomes empathy (Greenberg 1997). We believe that this experience facilitates reconstruction of implicit relational schemas (Tronick 2007) that exist in the body and mind in all organizational levels of the self.

Importantly, these processes are pertinent beyond therapeutic relationships or intimate dyadic interaction, to the development of social emotions and behaviors in the broader societal context.

Decades of research have shown that infants' response to the still-face predicts indices of emotional and behavioral health later in development, such as infant attachment classification at 1 year (Braungart-Rieker et al. 2001; Cohn et al. 1991; Kiser et al. 1986) and behavior problems in early childhood (Bates et al. 1985; Moore et al. 2001). We have also documented the impact of maternal illnesses, particularly depression and anxiety, on infant interaction behaviors, leading to more infant hostility, withdrawal, and negative affect that have ramifications on other adult-infant interactions (Tronick 2007) and adult relational style.

Thus, the processes of physiological synchrony can be viewed as having broader social functions, including the enhancement of social cohesion in a cohort. One recent study that reflects this cultural level of meaning making via physiological and affective synchrony comes from Konvalinka et al. (2011). The research team assessed whether heart rate synchrony would occur during a collective ritual: Spanish fire-walking. This study was conducted in a rural Spanish village of 600 inhabitants and occurred during their annual fire-walking ritual. Performed at midnight at the height of summer solstice, the ritual takes place in an amphitheater, built for this exact purpose. Crowds of up to 3,000 come to watch the spectacle. The researchers chose this particular ritual because it is highly physiologically arousing, but does not involve overt behaviors to be synchronized. Thus the investigators could assess physiological synchrony merely by observing social others' who did not need to synchronized body movements, that is, the spectators who were not walking through the coals.

Specifically, they compared synchronized heart rate reactivity between fire-walkers and significant others to unknown spectators. A total of 28 participants walked 7 meters over the glowing red coals with surface temperatures of 677 °C. Continuous heart rate data were recorded from three groups of participants: (a) 12 firewalkers, (b) 9 spectators who were either relatives or friends of at least one firewalker, and (c) 17 spectators, not related to any of the locals, who were visiting the village for the ritual. The results demonstrated strong synchronous relationships between the heart rate activity of active firewalkers with their related onlookers, but not with the heart rate of the unrelated spectators. Interestingly, all of the firewalkers' heart rates had a distinctive "signature," with a high peak distributed around the walk itself. This same physiological pattern was found with related spectators, whose heart rates also synchronously peaked for the walk of their relatives and friends. Though the mechanism is unknown a crucial factor seems to be the nature of the relationship between the walker and the spectator; perhaps something in their mutual knowledge of how emotions are expressed and are not seen by unknown others. This study is one of many that demonstrates that synchrony and relational psychophysiology has a social function in the larger societal context, that is the enhancement of community cohesion and as the authors suggest, "collective effervescence" (Durkheim 1912/1995). Furthermore, shared physiology and subsequent mutual regulation are critical mechanisms underlying social emotions (e.g., empathy, rapport or cooperation) at group levels (e.g., Maughan and Gleason 2008; Miles et al. 2009).

6 Physiological Indices and Relational Psychophysiology

The most widely studied psychophysiological signals for social processes are cardiovascular, particularly respiratory sinus arrhythmia (RSA) as an index of parasympathetic tone and emotion regulation (Porges 2003), and salivary cortisol to index social stress reactivity via the hypothalamic-pituitary-adrenal axis system (e.g., Stansbury and Gunnar 1994). Vagal tone or RSA in particular have been well documented as indices of emotion regulation capacities and social competence (Porges 2003). RSA is an indirect measure of parasympathetic influence on heart rate variability (Brownley et al. 2000). The parasympathetic system is generally considered to modulate arousal and activate positive states of rest and digestion. RSA is reflected in heart rate fluctuations that naturally occur with respiration (i.e., increases in heart rate during inspiration and decreases during expiration). RSA can be calculated through spectral analysis of cardiac frequencies and is equivalent to the power density of the high-frequency band typically associated with respiration (Brownley et al. 2000; Task Force of the European Society of Cardiology and The North American Society of Pacing and Electrophysiology 1996). RSA has been shown to be positively related to emotional and behavioral regulation and attentional control (Porges 2003) and is thought to index the ''efficiency of central-peripheral neural feedback mechanisms'' that control those processes (Thayer and Lane 2000, p. 204). Dysregulated

RSA has also been associated with preterm birth status and greater cost to behavioral self-regulation and attentional control (Lester et al. 1996).

In our study on mother and infant behaviors and their own and each other's physiologies, we assessed mother-infant synchrony with RSA because of its widely accepted use as an index of emotion regulation, attention, and social emotions. We also included a measure skin conductance (SC), a measure of sympathetic activity that is much more temporally sensitive.

We found that physiological concordance in fluctuations of sympathetic activity between mothers and infants was related to different social engagement states depending on the contextual demands of the interaction. When mothers are asked to sit still and simply watch their infants without responding, greater SC concordance occurred more when infants spent the most time protesting, fussing, or showing other forms of negative engagement. However, when mothers are asked to resume interaction and make every effort to soothe and attend to their infants, their own parasympathetic systems appear to be come more active in relation to how much their infant fusses and protests during the reunion, as if they are calming themselves in order to calm their infants. Furthermore, greater SC concordance between mothers and infants is no longer related to infant distress, as in the SF context, but instead becomes related to greater synchrony in mother-infant engagement behaviors, our marker of maternal sensitivity (Beeghly and Tronick 2011). The results of our study support the concept that physiology can be used to measure the relational processes that may facilitate the development of emotion regulation capacities and enhance the coherence of what we refer to as dyadically expanded states of consciousness (DiCorcia Sravish and Tronick 2012).

These results pair nicely with Marci et al.'s (2007) result. At first, we were disappointed that SC concordance was not related to mother-infant synchrony during the normal face-to-face (FF) episode. However, we realized that psychotherapy is also not a normal FF interaction but is more like the reunion (RE) episode, in which one participant (the mother or therapist) is actively focusing on and perhaps even soothing the other (infant or patient). Thus, one might conclude that physiological concordance is most likely to occur when one person is actively attending to another. This conclusion would also be consistent with Marci et al.'s finding that concordance is related to therapist empathy and positive, affirming behaviors. It is also consistent with McCraty et al.'s (2001) proposal that focal unconditional positive regard toward a target person causes entrainment between the target person's cardiac activity and the subject's cortical activity, as measured by electroencephalogram. At the same time, simply interpreting what goes on in mother-infant or therapeutic interactions in a unidirectional fashion is not adequate, because it is not only the mother or the therapist who are responsible for the emergence of synchrony. These processes are bidirectional and require mutual engagement. As the infant is an agent, the patient in therapy must also engage with the therapist in the processes of dissolution and resolution, and ultimately greater coherence and complexity.

7 From the PCA and to the Still-Face Paradigm

The interpersonal dynamics that facilitate relational psychophysiology for the mother and infant and for the therapist and client are couched in Roger's PCA. Rogers is recognized for conducting some of the earliest known experientially based research that examined the "common factors" or "therapeutic factors" in the therapist-client dyad that mediate successful psychotherapy outcomes (Bohart 2005). Specifically, Rogers (1957/1992) found empirical support for the importance that the client be treated with empathy, unconditional positive regard, and genuineness as a unique individual. Psychotherapy research has continued to consistently demonstrate that it is the therapeutic relationship itself and not the therapeutic technique (e.g., manualized treatment plan) that has the most significant and most positive outcome for therapy (Beutler et al. 1986; Hubble et al. 1999; Lambert and Barley 2001). Underscoring these findings, considerable evidence now suggests that the quality of therapeutic alliance and client variables, such as psychological mindedness, account for the bulk of variance in treatment outcome as opposed to therapeutic technique (Messer and Wampold 2002). Additionally, psychotherapy studies examining physiological concordance between the therapist and client have identified its relationship in both client-perceived empathy of the therapist and therapist-client social emotional process during psychotherapy (Marci et al. 2007). Therapeutic alliance and client variables are explicit manifestations of the PCA, including presence/genuineness, empathy, and unconditional positive regard.

The PCA is interpersonal in nature and guides the therapeutic process. Congruence is the therapeutic vehicle for a supportive and collaborative dyadic process that emphasizes a deep appreciation of the client's experiential world, while having the therapist be open to his/her experience. Being congruent also asks that the therapist be genuine about the inner experience that the dyadic interaction evokes (Bugental 1987; Rogers 1957/1992). The concept of empathy, as Rogers described it, echoes the assumption of congruence but also requires more from the therapist. Empathy asks that the therapist understand the client's thinking, feeling, and perception of his/her behavior. The empathic approach includes attending to the client's non-verbal and verbal communication. Rogers explains unconditional positive regard as the basic attitude of distinguishing between the client's dysfunctional behavior and who the client is, in addition to respecting, accepting, and responding to the client "as a full human person" (Holdstock and Rogers 1977, p. 140). The complexity of verbal and nonverbal cues from the therapist to the client are critical in understanding the patients' perceptions of feeling respect, empathy, and genuineness from (Tepper and Haase 1978).

PCA is implicit in a mother's interaction towards her infant. It would behoove us to illustrate how Roger's notion of congruence/genuineness, unconditional positive regard, and empathy, provides a theoretical framework for how mother-infant relational psychophysiological dyadic interactions are facilitated. In our research, we see how mothers attempt to maintain their presence during each episode of the FFSF paradigm. For example, during the play episode, the mother will demonstrate unconditional positive regard toward her infant. She will attempt to engage her infant in a play activity, while tolerating her otherwise irritable infant. The still-face episode exacerbates the distress for the infant, while the mother presents a poker face and refrains from interacting with her infant. During the reunion episode, the mother will empathize over her infant's distress, and she will attempt to console her infant. Similar to the therapist-client dyadic interaction from one therapeutic moment to the next, there is a synchronizing or pacing between the mother and infant dyad in each FFSF episode. Moreover, the PCA is similarly "messy" for the therapist or mother to attain or maintain connection, while it may be conceptually straightforward. Congruence, for example, does not always characterize inner harmony for the therapist or mother; the inner sense of physiological harmony comes and goes. Both therapist and mother must initially self-regulate and to strive for congruency with the client and infant, respectively. Active behavioral and physiological subsystems within the dyads are supported through the therapist and mother's efforts at congruence, empathy, and unconditional positive regard. The interpersonal nature of the PCA maintains the momentum of the dyadic relational psychophysiology, which is necessary to engender meaning making for each interacting individual.

Much of the work of therapy is focused on the quality of the relationship or what the analysis see as transference and counter-transference. Somewhat neglected are the numerous different levels of meaning and how those levels affect both the therapist and the patient. The multilevel nature of communication is spoken to clearly by the data on the synchrony (or not) of skin conductance and heart rate in infants and mothers, the synchrony of heart rate in firewalkers and intimate onlookers, and the heart rate and empathy data of the therapist and the patient. The firewalker findings are particularly telling in relation to multilevel process involved in working on the relationship because the synchrony was enhanced by the level of relationship between the individuals. While the information that drives the psychophysiological synchrony is still unknown, the linkage only occurred between individuals who are in relationship. Similarly, what happens over time in successful therapy is that the two individuals come to know each other in a multileveled way. New understanding of the processes engaged in authenticity, presence and positive regard can be illuminated. Unfortunately, these processes – relational psychophysiological processes – may also underlie the failures of therapies when unknown to either patient or therapist, physiological reactivity may belie and betray their lack of presence, authenticity and positive regard.

8 Person-Centered Therapy considering Psychophysiology

The nature of relational psychophysiology entails a complex network of interacting behavioral and physiological subsystems. The mechanism of relational psychophysiology for the mother and infant are not unlike what exists for the therapist and client. Rogers referred to this type of mechanistic dyadic process as a stream of becoming in which there is a symbiotic process of conscious and unconscious biopsychological systems that shape the human system. He further explains:

> "I am often aware of the fact that I do not know, cognitively, where this immediate relationship is leading. It is as though both I and the client, often fearfully, let ourselves slip into the stream of becoming, a stream or process which carries us along. It is the fact that the therapist has let himself float in this stream of experience of life previously, and found rewarding that makes him each time less fearful of taking the plunge. It is my confidence that makes it easier for the client to embark also, a little bit at a time." (Rogers 1961, p. 202-203).

In therapist-client and mother-infant relational contexts, the dyads engage in a unique dance of accurate perceptions and misperceptions, which are accompanied with the underlying ebbs and flows of their physiological processes. There is no universal rhythm to learn and prepare for either dyadic dance. Often times, the concordances of the behavioral and physiological systems are messy at best for the mother and infant and for the therapist and client; however, despite such dyadic messiness, these dyads manage to co-create their unique dance steps and routines (Busk et al. 1976; Ham and Tronick 2009; Marci et al. 2007).

A person-centered perspective provides an important theoretical explanation on the mechanism of relational psychophysiology for both mother-infant and therapist-client dyads. Additionally, we can tie this theoretical analysis to the functional purpose of relational psychophysiology for the human meaning making system, as seen from a dynamic systems position. A dynamic system position explains that dyads endure relationally because of the functional purpose of relational psychophysiology. There is meaning and meaning making that is generated through the relational psychophysiology process. Humans as meaning makers—as open biological systems—have no option but to strive to increase the complexity of their states of interacting behavioral and physiological systems. The whole organism—the totality of human biopsychological processes, including but not limited to what we label mind, brain, and behavior—operates to gain meaningful information about the world in order to act *in* the world and to act *on* the world in alignment with the individual's purposes, intentions, meanings, and sense of the self in the world. Over time, these very processes wind back to create new purposes and intentions and a new sense of self in the world (Tronick 2007).

9 Conclusion

In summary, as research demonstrates, relational psychophysiology may offer insights into the bidirectional, agentic, and "messy" relational processes of dyadic growth. As with interactions between mothers and infants, both are agentic, intentional partners in the interaction. Similarly, patients are not simply passive recipients of the therapist's theories, but the therapeutic exchange is bidirectional, and patients are active and engaged. The processes of empathy, positive regard, and mutual regulation require active engagement in physiology, behavior, and intent in mother-infant and therapist-patient dyads.

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