

The Music of Attuned Touch and Epigenetic Changes from a Body Psychotherapy Perspective

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ABSTRACT

This article explores aspects of attuned touch and its potential to induce epigenetic modifications. It posits a hypothesis explaining the changes in clients, and illustrates the application of animal model research to elucidate these clinical phenomena, particularly in the context of body psychotherapy techniques that use touch, such as biodynamic massage.

Keywords: Touch, epigenetic changes, attuned touch, music

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T

ouching – An organismic basic need in mammals

Personal and interpersonal touch modulate intrapsychic and interpsychic experience throughout life. In 1971, Ashley Montagu, a British-American anthropologist, produced the first edition of his fascinating analysis, *Touching: The Human Significance of the Skin*. This pioneering book presented the first scientific and accessible examination of the profound significance of human touch.

Touching ourselves and others is a basic natural phenomenon in all mammals as a pro-social interaction from birth throughout the lifespan (Harlow & Zimmermann, 1958; Panksepp, 1998). Scholarly literature references the concept of touch through terminologies such as “tactile stimulation” (Fotopoulou & Tsakiris, 2017) or “social touch” (Suvilehto et al., 2023), reflecting the diverse scientific perspectives on the subject. When caring parents soothe their babies, hold their babies, rock their babies in a very particular rhythm that works for their particular baby, in those magical moments, when the babies feel held, contained, and loved within Balint’s view of primary love – the desire to “... be loved always, everywhere, in every way, my whole body, my whole being - without any criti-

*Touch, like all
psychotherapeutic interaction,
is synchronized polyphony,
not monophony.*

“There is a dearth of research on harmonious attuned touch as an organismic sequence of processes that includes all its components: the participants, the types of relationship between the participants, as well as the intensity, rhythm, tempo, frequency, depth, direction, intention, type of movement, and feedback/feedforward dynamic processes.”

cism, without the slightest effort on my part...” (Balint, 1935, p. 50), these magical attuned moments do not contain thoughts or analysis, but are unique states of being where the attuned musicality of human interaction is in perfect harmony – harmony that can make unbearable suffering bearable, soothing the babies’ and parents’ pain, and making life worth living.

The harmonious holistic quality of *touching* has critical long-term intrapersonal and social consequences that affect the formation of the person’s capacity for self-regulation (auto-regulation within themselves as an endo-neuro-psychobiological process) and co-regulation (interactive regulation with others) (Changaris, 2015; Field, 2001; Olausson et al., 2016; Uvnas-Moberg, 2003).

There is also a growing body of research in the field of physical touch. The field still holds a mechanistic rather than an organismic approach (Pepper, 1942). A left-brain, mechanistic worldview perceives the world of natural phenomena in a reductionist manner, as if there were a universal law governing behavior to allow predictability and stability, versus a right-brain, organismic worldview that perceives natural phenomena as living organisms, where meaning emerges at a holistic level of inquiry (McGilchrist, 2009). There is a dearth of research on harmonious attuned touch as an organismic sequence of processes that includes all its components: the participants, the types of relationship between the participants, as well as the intensity, rhythm, tempo, frequency, depth, direction, intention, type of movement, and feedback/feedforward dynamic processes.

The philosophical and scientific conflict surrounding the notion and use of touch in psychotherapy (Kertay & Revier, 1993; Smith et al., 1998) has long been, and continues to be, debated in body psychotherapy (Brown, 1990; Asheri, 2009; King, 2011; Warnecke, 2011). Some psychotherapists, potentially attracted to the field of biodynamic psycho-

therapy due to their own desire for touch – both to receive and reciprocate it – may become immersed in it to the point of overly idealizing its benefits and use. At the same time, the effects of attuned touch cannot be denied, especially when considering its effects from an epigenetic scientific point of view.

We biodynamic body psychotherapists sensed the power of human contact, experienced the impact of touch in our own lives, and eventually learned specific sensitive ways of attuned touch through many years of practice. Sensitive ways have the potential to promote healing in our clients’ lives. There are reasons to believe that the process of attunement affects nervous system activity via the sensitive haptic communication that creates the “magic” a practitioner can achieve in the intersubjective space with a client.

However, when we say *sensitive*, what do we mean? Sensitive to which one of the many variables in human phenomenology? This is an important question to explore that can shed light on the construction and contextualization of intentions and meaning in haptic conversation that is accomplished through various multimodal resources.

I will next explore some of the microarchitecture of the *flow of dance*, the *music* that enables precise sensitive haptic communication as a dynamic process. I will present a hypothesis based on scientific findings showing that attuned touch contributes to epigenetic changes that enable shifts in perception. These shifts eventually lead to major changes in emotional and physiological unconscious bottom-up self-regulation processes, and top-down cognitive reappraisals that eventually reduce stress, anxiety, and depression. Cognitive reappraisal refers to “an individual’s intention to selectively interpret the meaning of an event, it directly aims at appraisals by changing the subjective evaluation of an emotion producing situation” (Xu et al., 2020, p. 2).

The process of *affect attunement*

The process of *affect attunement* arises through the web of phenomena through which we can attune to the emotional world of ourselves and others, and has been identified as an important aspect of relationality (Mitchell, 2000). This process can be channelled via a multitude of verbal and nonverbal communication pathways. However, this short article specifically explores the theoretical ways affect attunement is applied via the nonverbal pathway of haptic communication, and its subsequent possible epigenetic changes.

The result of haptic attunement can be more coherently understood and identified as *attuned touch* – an implicit and explicit way of nonverbally communicative affect attunement; “the path to sharing inner feeling states” (Stern, 2004, p. 84). As with all branches of affect attunement, it is a way to support people seeking to resolve psycho-affective challenges through sequences of regulation and “acceptance of intrinsic affective states and their communication by active contact” (Trevarthen, 2004). In line with Fotopoulos’ concept of homeostatic mentalization (Fotopoulou & Tsakiris, 2017) as a social cue, attuned touch should be considered an essential part of the process of supporting homeostatic mentalization in the intersubjective space.

However, impeding the effort to understand attuned touch in the context of biodynamic psychotherapy is the marked lack of sufficiently “detailed inquiry” (Sullivan, 1970, p. 89) tracking the subtle microscopic care of the moment-to-moment complex choreography of interpersonal micro-adaptations and micro-co-regulations that explain attuned touch on a fundamental level.

Touch is especially important in the field of early childhood psychological trauma, as many of the effects of childhood trauma, neglect, physical abuse, and sexual abuse are mediated via touch, deprivation of touch, or misattuned touch. As traumatized children mature, they develop expectations about

physical contact and touch with others. Their past experiences become expectations that the past will repeat itself, which then becomes a prediction. These psychosocial predictions create disturbances in their capacity to adjust, to develop personal intimate relationships, attachment, and bonding, as well as to live in community. It is important to ask how these predictions can be updated, using Friston’s free-energy principle (Friston, 2010; Linson & Friston, 2019).

It is known that trauma, such as the deprivation of attuned touch in childhood developmental trauma disorder (DTD) (Lanius et al., 2010), creates situations in which individuals can find it challenging to update their expectations due to changes in their physiology and brain function, leading to anxiety in adulthood. The question is whether the situation is reversible. Do we have any scientific evidence demonstrating it is possible for attuned touch, when a person comes to psychotherapy as an adult, to have a positive effect, reverse some of the effects of childhood trauma, and alleviate the person’s suffering to a certain extent?

In this short article, prepared for the European Body Psychotherapy Conference (EABP) in September 2023, I briefly explore the connection between the neuroscience of touch and attachment, and the detailed inquiry of the *music* of attuned biodynamic touch as a psychotherapeutic tool.

Being in attuned touch

Being in (Fromm, 1989) attuned touch, rather than *doing* touch, is crucial for a successful experience. Many body psychotherapists are in the field because they know, at a deep level, that interpersonal touch and haptic communication via touch are of paramount importance to human development from birth to death. We know from intrinsic knowledge, not yet entirely available for accurate scientific inquiry, that touch is important not only for a person’s individual development, but also for the development of healthy attachment in the context

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of the evolutionary development of human society (Simpson & Belsky, 2008). As Fonagy & Campbell wrote (2017, p. 39), “reaching the developmental achievements by which a person can make sense of himself or herself as an embodied subject is supported, it is compellingly argued, by embodied interactions with others.”

Body psychotherapists are in the field because they feel that touch is important as an inner personal experience. A breakthrough in empirical research in the field of touch occurred following Harlow and Harlow’s demonstration of what happens to the development of touch-deprived monkeys (Harlow & Zimmerman, 1958; Harlow, Dodsworth, & Harlow, 1965), along with studies that followed the delayed development of Romanian orphans during Ceaușescu’s term as head of state (Spitz, 1945). These studies marked a milestone for new insights into optimal development, and gave legitimacy to scientific research in the field of touch. Empirical research accumulated over the past seventy years provides overwhelming data that understanding touch as a human phenomenon is essential to understanding the sequential process of human development.

The multiplicity of touch effects

We know from research that the effects of touch extend far beyond the power of the word in talk therapy or mentalization processes in the most simplistic definition. Some of the impressive results of the effect of touch on people and animals encourage additional ways of expression in the psychotherapeutic process. Table 1 presents the multiplicity of touch effects that have been scientifically demonstrated.

Animal models and epigenetic change

Research in animal models has been invaluable in supporting a comprehensive ontogenetic understanding of how chronic exposure to stress activates the hypothalamic–pituitary–adrenal axis (HPAa) in different critical periods – genetic, epigenetic, prenatal, infancy, childhood, adolescence – and can impact different brain structures in human and animals and thus affect their function, connectivity, observable social behavior

(Sandi & Haller, 2015), and cognition (Lupien et al., 2009).

The advantage of animal research is that it can examine the impact of stress on different ontogenetic processes. For example, the prenatal period can exemplify an ontogenetic process via a long list of mechanisms such as brain-derived neurotrophic factors (BDNF), Catechyl-O-methyltransferase, HPAa programming, endocannabinoids, inflammation factors, estradiol, and insulin (Boscarino et al., 2011).

Murmu and colleagues (2006) measured the impact of chronic unpredictable prenatal stress on rat pups’ brain development after their pregnant mothers were exposed to stress at 15–20 days of pregnancy, when key areas of the limbic lobe and HPAa were developing (Bayer et al., 1993). Afterwards, the pups demonstrated anxiogenic and depressive-like behavior (Alonso et al., 1991). After brain tissue preparation, they found morphological changes, like some in layer II/III pyramidal neurons, which reduced the complexity (length and spine-density) of apical dendritic trees in the limbic dorso-anterior cingulate and orbitofrontal cortex.

Similar changes were found by others (Chen, et al., 2013 ; McEwen et al., 2015) with regard to the impact of chronic stress on mice’s HPAa (Ron de Kloet, Joëls, & Holsboer, 2005), particularly in certain areas of the hippocampus (CA3 & CA1) and basolateral amygdala, which play a major role in long-term memory. Human long-term memory is heavily impacted by psychological trauma. Improving long-term memory through the hippocampus is crucial in allowing placement of traumatic memories onto a conscious chronological timeline. This gives people suffering from post-traumatic flashbacks and intrusive memories an important tool for internal organization, and enables a significant reduction in symptoms. Naturally, these molecular and cellular analyses cannot be done at a human level, but could explain such human phenomena as reduction in cognitive function (Bock et al., 2015), as well as changes in brain structure (Turk et al., 2023) and neural pathways (Thomason et al., 2021).

However, the lifespan of lab animals is significantly shorter than that of humans, and therefore cannot provide enough information about neuropsychiatric disorders (Robinson et al., 2019) and later life medical diseases in observed in PTSD populations, especially in people who suffer DTD – defined in

Table 1. *Multiplicity of touch effects*

Multisensory integration processes	<ul style="list-style-type: none"> ■ Body ownership
Enhanced proprioceptive awareness	<ul style="list-style-type: none"> ■ Body awareness ■ Body ownership
Nonverbal haptic communication	<ul style="list-style-type: none"> ■ Intention ■ Expression ■ Perceiving the emotions of the other
Corrective emotional experiences	<ul style="list-style-type: none"> ■ Attunement ■ Posture ■ Pleasurable
Placebo effect	<ul style="list-style-type: none"> ■ Anterior Cingulate
Physiological changes	<ul style="list-style-type: none"> ■ CT afferent (C tactile) ■ Decrease blood pressure ■ Decrease sleep disturbance ■ Decrease in cortisol ■ Increase Oxytocin (Agren et al., 1995) ■ Increase dopamine ■ Increase serotonin
Effects on the central nervous system	<ul style="list-style-type: none"> ■ Change in perception of stress (Korosi & Baram, 2010; Weaver et al, 2004) ■ Reduction of stress ■ Reduction of anxiety, depression and anger
Pleasant experiences	<ul style="list-style-type: none"> ■ Endorphins, μ receptors (Kehoe & Blass, 1986) ■ Toward secure attachment
Non-invasive vagal stimulation	<ul style="list-style-type: none"> ■ Influence emotions ■ Enhance parasympathetic activity
Touching the body activates memories	<ul style="list-style-type: none"> ■ Monitored exposure psychotherapy
Emotional and physiological regulation	<ul style="list-style-type: none"> ■ Expanding the window of tolerance
Reassurance	<ul style="list-style-type: none"> ■ Safety ■ Secure attachment and social bond (Insel, 2000; Nelson & Panksepp, 1998)
Pain modulation and reduction	<ul style="list-style-type: none"> ■ Physical (Kehoe & Blass, 1986) ■ Emotional

the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5, 2013) as a PTSD subgroup exposed to one or more traumatic events associated with overwhelming fear in early life, with an estimated prevalence between 5-10% to 25% or higher (Fellitti et al., 1998; Yehuda et al., 2015).

As drugs failed to support people with DTD (Abbott, 2011; Papassotiropoulos & de Quervain, 2015), studies using animal model research had to aim toward next generation treatment based on new clinical targets like neuroplasticity, prosocial compounds, epigenetic changes, and others (Insel,

2012). Neuroplasticity (Puderbaugh & Emmady, 2023) describes the flexibility of the brain, and its ability to change according to changing conditions (external and/or internal). It is a process that involves adaptive functional and structural changes in the brain that allow reorganization of the structure from the cellular (including epigenetic) to the systemic levels.

Resilience and epigenetic brain changes

Meaney’s group (Weaver, et al., 2004) demonstrated through in vivo and in vitro checking the hippocampal tissue that increased pup licking and grooming (LG) and arched-back nursing (ABN) by mother rats (MR) altered the offspring’s epigenome (NIH, 2020), comprising histone acetylation, DNA cytosine-methylation of glucocorticoid promoter, and nerve growth factor-inducible (NGFI-A) at exon-17-GR-promoter in the hippocampus.

They observed that pups with low-LG-ABN-MR matured with high levels of anxiety (LoA), and pups with high-LG-ABN-MR matured to low-LoA adults. This difference between pups was impressive.

Thus, pups that were touched in a way that was attuned to their needs grew up to be adults with

low levels of anxiety, while pups deprived of attuned touch grew up to be adults with high levels of anxiety (touch-deprived, as are many clients). This difference was apparent during the first few weeks of life.

During autopsy, the rats’ brain tissue was examined, and epigenetic differences were found – changes in specific types of cells in a particular area of the hippocampus. Differences were noted in the genetic expression of genes for the receptors for glucocorticoids, the stress hormone. Thus, the rat pups that received attuned contact had less genetic expression of receptors to stress hormones, and were therefore less sensitive to stress, and demonstrated more behavioral resilience.

In addition, they investigated what happens when pups were reversed with cross-fostering. That is, rats born to a non-touching mother (low-LG-ABN-MR) were raised by a touching-mother (high-LG-ABN-MR), and rats born to a touching mother (high-LG-ABN-MR) were raised by a non-touching-mother (low-LG-ABN-MR). They observed that both cross-fostering groups grew into adults with low levels of anxiety. That is, pregnancy with a touching mother had a protective effect, despite suboptimal rearing conditions of the rat pups after birth. In addition, rearing by a touching mother created epigenetic changes that made the rat pups born to the non-touching mother more resilient.

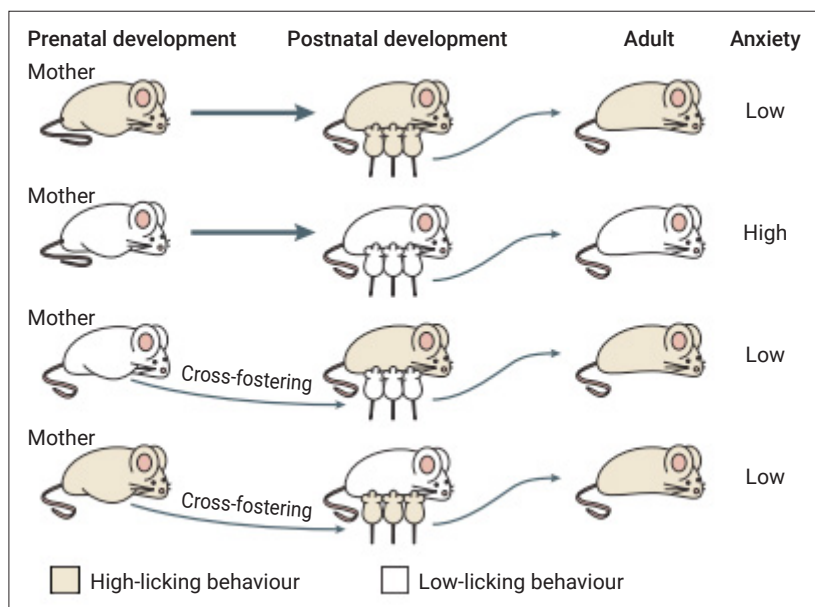


Figure 1.

Licking-and-grooming mother rat behavior.

Reprinted with permission from Nature Reviews Neuroscience (Gross and Hen, 2004).

Inferring from these comprehensive studies, it is thus possible to hypothesize that when a person comes to psychotherapy that combines treatment with attuned touch, there will be the possibility of epigenetic changes in areas such as the hippocampus, which will allow for a reduction of anxiety in the client.

A systematic review of the literature on the developmental origins of anxiety (Gross & Hen, 2004) examined similar research to the studies of Meaney's group, which demonstrated similar results. This correlates with some of the phenomena observed in humans, where skin-to-skin contact and massage had encouraging physiological and psychological consequences on adult illness (Hart et al., 2001), children, and preterm babies (Feldman & Eidelman, 2003; Field, Diego, & Hernandez-Reif, 2010).

Rats raised by mothers that display low licking-and-grooming behavior exhibit more anxiety-related behavior than rats raised by high licking-and-grooming mothers. Cross-fostering studies show that the offspring of low licking-and-grooming mothers raised by high licking-and-grooming mothers are less prone to anxiety-related behavior as adults. This indicates that the effect is mediated by the postnatal maternal environment. However, offspring of high licking-and-grooming mothers raised by low licking-and-grooming mothers do not have an increased tendency to develop anxiety-related behavior in adulthood, indicating that specific factors inherited by the high licking-and-grooming offspring protect them from the effects of being mothered by low licking-and-grooming females (Caldji et al., 1998; Liu et al., 2000).

In conclusion, findings of studies in animal models demonstrated changes in the expression of receptors for stress hormones in areas such as the hippocampus. This changed the animals' HPA axis stress responses, and these changes enabled a reduction in the animals' feelings of anxiety when they grew up. These findings suggest relationships between epigenomic state, receptor expression, and the maternal effect on offspring's stress responses. They show that a gene's epigenomic state can be established through behavioral programming, and is potentially reversible – thus offering a social intervention to build resilience to stress via appropriate touch.

These findings are relevant to a psychotherapeutic process that includes attuned touch as part of work within a reparative, developmentally sensitive framework (Clarkson, 2003). It can explain clinical phenomena such as the feedback from a client I worked with using biodynamic massage for about a year. She told me, "Elya, I don't know what you did to me. Everything is the same; the same gray weather of London, the same husband, the same children, the same house – but everything is different." She reported an "update" in how she now sees reality, with persisting changes in perception that allowed her to see the world around her differently. A situation of cognitive reappraisal was created in which her subjective perception (as a top-down process) of the world changed as a result of attuned touch that was offered as a bottom-up process.

Touch in the psychotherapeutic process

There is no doubt about the significance of touch and its potential to create a salutogenic effect in human relationships. Salutogenesis asks what makes us healthier, in contrast to pathogenesis, which asks what makes us ill (Antonovsky, 1979; Antonovsky, 1987; Antonovsky, 1999; Mittelmark et al., 2017; Steinberg, 2010). The question is HOW can we employ and enable the use and benefits of touch in the psychotherapeutic process, and encourage touch in interpersonal relationships, so that these salutogenic qualities, as shown in the table above, will be realized. There exist other inquiries of similar importance, such as Ashley Montagu's question (1971, p. 19): "What kinds of skin stimulation are necessary for healthy development of the organism, both physically and behaviorally?"

As well as how a therapist, as a "surrogate parent," constrained within the ebbs and flows of interaction in developing a secure attachment (Bowlby, 1988), can employ touch (like the mother rats grooming and licking their offspring) in psychotherapy, while remaining fully "psychobiologically attuned to the dynamic crescendo and decrescendo" of the client's "bodily-based internal states of autonomic arousal" (Schore, 2002). Further, how would a therapist constrained in this situation use touch in other states occurring in the client in a way that would contribute to the development

of “earned secure” attachment (Wallin, 2007), thus enabling positive transformative changes in the structure of the individual, and subsequently structures in human society as a whole? As Wallin wrote: “While the attachments of childhood initially structure the self, the client’s attachment to the therapist may later restructure it, changing an insecure working model to an earned secure one” (Wallin, 2007, p. 85).

Considering that what happened to us “wires” us from conception (Perry & Winfrey, 2021), creating our predictions from a very early age, how is it practically possible to update those predictions later in life to enable the shift from insecure attachment to earned secure attachment?

How do we touch?

“How do we touch?” is the primary question that will be explored.

The “how” is composed of multiple derivative questions, such as: What are the exact details of the biodynamic touch sequence of processes? Which are precise in achieving their aims, and simultaneously allow for further development of earned secure attachment? This touch should be dynamically attuned, and its attunement and implementation processes should be examined in more depth. Attuned touch within the context of a psychotherapeutic process is a governing concept in the question “how do we touch,” which requires exploration of significant landscapes of human experience.

Since the canvas is very broad, I will focus here on one aspect, one variable out of the many that exist in the human phenomenology of haptic communication. I will focus on the process of tuning the touch, like tuning a musical instrument, to allow contact like Malcolm Brown talks about, contact that “... steer[s] a middle course between proceeding too quickly and too catalytically, on the one hand, and too slowly and too passively, on the other hand.” A kind of compassionate touch that “... is perhaps the only safeguard against overusing energy-mobilization methods...” (Brown, 1990, p. 118).

In addition, a challenge for a psychotherapist operating in a psychotherapeutic space that allows for physical touch is that the psychotherapist wants to enable the construction and healing pro-

cesses of others and themselves without inducing unconscious traumatic “repetition compulsion” (Freud, 1909; Freud, 1914; Freud, 1926), toward which classical psychoanalysts have been apprehensive since the shaky experience of Freud and Breuer (1985). The central question is how we enable touch in the psychotherapeutic relationship without it being colored by the powerful driving forces of subconscious enactment, or becoming aware of it as soon as possible. This is a particularly dangerous pitfall, as enactment can easily lead to retraumatization due to the repetition compulsion of components from past trauma related to physical touch. Ideally, the client needs a touch that achieves these components while avoiding such drawbacks. This could be called a healing touch – one particularly useful for treating people who bear wounds such as those that emerge from one or more of the four pillars of developmental trauma: neglect, physical abuse, emotional abuse, and sexual abuse (van der Kolk, 2014).

Attuned touch

Tuning touch can be likened to tuning a musical instrument. As in music, the act of touch creates many musical compositions over time that can be performed in different ensembles. Touch is not one discrete activity, but a complex process of interpersonal and mutual creation of a felt experience within a personal and social context. It is a musical piece that reaches a certain wholeness when there is a sensitive balance between the technical and mechanistic details of the precise performance, and the harmonized flow, in which the sounds from all the instruments and singers come together into an integrative, organismic experience – an organismic experience where the composer’s emotional world touches the listener’s emotional world, and takes them (together) into a meaningful interpersonal field. This dynamic flow creates an all-encompassing effect on the listener, performer, and composer. When the instruments are attuned and synchronized, an effect of inner relaxation and safety is created, which can be called wholeness, as we are neurobiologically wired to music (Barton, 2022). This is a sense where the organized sounds we hear are right for us; a global experience of pleasure takes place in the flow of moments.

This experience can take place in the presence of not only tonal harmonic music, but also atonal-

ty-based music. In atonality-based modern music, there remains a general agreement between the composer and performers, who aim to maintain order and attunement despite the musical intervals contradicting the classical tonality we are used to. When we are not accustomed to non-classical atonal musical intervals, entering into this unpredictable, unfamiliar, and unknown melody can induce in the listener an experience of atonal processes within the self. For example, through this experience, a person may get in touch with their inner shadows, as Carl Jung would describe the unconscious processes that compose repressed ideas and desires that the person perceives as unacceptable and immoral. The person may enter a state where there is a need to assimilate “the thing a person has no wish to be” (Jung, 1966/1981, para. 470). In this modern music, the listener’s experience will be “correct” for them in sound and attunement, per their own perception – otherwise, they would not listen to it. It will be experienced as accurate due to the orderly organization, integration, and connections of the sounds. In this sense, atonal music is different from cacophony (many jarring noises heard simultaneously), in which the sounds have no integrative connection, no internal organization, and take place without discourse or mediation. Atonality is fundamentally different from the misattunement of sounds due to the mediating and organizing discourse – one that allows for a unifying flow and musical discussion. In attuned touch, as in any psychotherapeutic process, there are moments of tonality alongside atonality that require listening and deepening one’s perspective and understanding to allow for a (new) synthesis of a new equilibrium (heterostasis rather than homeostasis (Selye, 1973, p. 443¹; see also Hochwalder, 2022; Langeland, et al., 2022) for the future unknown possibilities of internal and external human connections.

A famous composer of modern music, secular Israeli-Jewish Leon Schidlowsky (1931–2022), professor emeritus of composition and music theory at the Rubin Academy of Music at Tel Aviv Uni-

versity said: “I believe that today we enjoy all the possibilities of using the historical acoustic musical language. It is not a return to the past, but a synthesis for the future. Music was created by humans for touch with humans” (Ron, 1972). In doing so, Schidlowsky emphasized that modern music brings the historical context and interpersonal context to the forefront of the mind, precisely because the intervals of the sounds touch the unknown, and stimulate a curious internal querying of the personal and interpersonal field.

In physical touch as in music, there are many ways to compose and many ways to improvise. Composing is the act of writing music in advance, and improvisation is an act in which music is created “while” performing. There are many techniques of composing and improvising, varying across cultures. In most, a personal interpretation of written music is the melodic elaboration of a skilled and experienced musician attempting to imbue the original music with reverberations of their own emotions, changing aspects of the musical piece. In this way, the musician oscillates between the original written notes and the improvisational elements that result from their emotions during the performance, and bring the musical piece to new and renewed qualities beyond the mechanistic dimension. Every moment is fresh. The performing player’s feelings could not be fully dictated by the notes and instructions of the musical score. From this, it can be concluded that no two performances of a single piece of music are the same, even when we are talking about the same performers performing the same piece at different times.

Like music, biodynamic massage involves many touch techniques, different lyrics, and different songs, which vary according to the client’s and therapist’s cultural and historical contexts. In addition to the interpersonal variability that changes from moment to moment, there is variability that cannot be predetermined by the words and execution instructions written in the score, i.e., in the instruction set of the fusion technique, the

1. The process is not limited to, metaphorically speaking, homeostasis level, but expands in a heterostasis manner. In psychotherapy we are not satisfied by homeostasis – “homeostasis [home=like; stasis = fixity], which has been defined as the maintenance of a normal steady state by means of endogenous (physiologic) responses” [Selye 1973, p. 443]. But as Carl Rogers pointed out, there is a need for reorganization. Reorganization is not the same, but a new state of equilibrium, i.e. heterostasis. Heterostasis [heteros = other; stasis = fixity] as the establishment of “a new steady state ... of adaptive mechanisms through the development and maintenance of dormant...” potential (Selye, 1973, p. 443).

biodynamic massage itself. There is the personal interpretation of the therapist and client, which is created in the mutual reciprocal process that sub-aspects one or more of the aspects that make up the technique, and creates, while dynamically improvising, a new execution specifically tailored to the participants in the psychotherapeutic process.

From this it can be concluded that no two performances of a single biodynamic massage technique, especially if they are attuned, are the same. At the same time, any successful and adjustable execution will involve both mechanistic precision and the context of interpersonal connection. Moreover, successful execution will be the customized construction with specific adjustments and attunement according to the interpretations and personal meaning of the client and the therapist. Tuning is an interpersonal process for which the therapist must listen to the client's "music." And this music that can be heard in the interpersonal field is the most important, and the only, "musical score" that the psychotherapist needs during the therapy session. This is similar to what psychiatrist Elvin Semrad believed: "The client is the only textbook we require" (Rako & Mazer, 1980, p. 13).

Part of answering the "how" question that was previously presented is developing an explicit understanding of the methodologies that "compose" the melodies, and the guidelines for improvisation. This is an important building block in "the responsibility of intuitively sensing the appropriate timing and level of concentration when using body methods" (Brown, 1990, p. 117).

Misattunement

Musical misattunement of sounds, i.e. a situation where intonation is inaccurate, is a jarring and unpleasant experience for the listener. Poor intonation, known as *misattunement* in the most common sense, indicates the level of accuracy and pitch of the sound, and is a product of precision in the production of the player or singer during a musical performance. Musicians and singers must develop their skills to sing or play in good intonation. Good intonation can be measured by precise mathematical means. The conductor's musical ear is required to diagnose exactly which instrument is misattuned in a concert performed by an orchestra. Which instrument is responsible for the jarring ef-

fect? Even a person with normal hearing will detect a musical misattunement, even if they are unable to identify the specific instrument and the way the misattunement occurred.

If we were at a live concert and a certain player produced a misattuned tune, we would sometimes remember the concert and its jarring effect for years, since it was such an unpleasant experience. So it is with touch processes; there is a "potential hazard" (Brown, 1990, p. 118). Touch within the psychotherapeutic process, like the whole therapeutic process, needs to be attuned so that salutogenic processes can develop. The psychotherapist is like the player or singer who must practice for years to reach an accurate intonation in the physical touch.

Accurate tonal and atonal intonation allows subtraction from the psychotherapeutic process of the subtleties that make the difference between an attuned and misattuned way of working. Here the psychotherapist is also the builder of the musical instrument, the musical instrument, and the performer, and it requires a great deal of experience and a high level of skill to reach tuning of the touch.

This brings us to explore other aspects of answering the "how" question: Why is it necessary to be attuned? How can we build the inner 'tool'? And how do we train and allow for adjustment and attunement of physical touch during the interpersonal relationship? In addition, there's the question of how to develop the "musical ear" that detects misattunement, and recognizes the bad intonation. When the "intonation" of the touch is poor, i.e. when touch is misattuned, a rupture may form in the relationship, and the client can be re-traumatized. Identifying the poor intonation and deep understanding of the misattunement that emerged during the performance process can allow the rupture to be repaired when an interactive mismatch occurs (Tronick, 2007; Tronick & Gold, 2020).

Touch, like all psychotherapeutic interaction, is synchronized polyphony, not monophony. One of the limitations of psychotherapeutic processes "is that the quality of the therapeutic process can't be simply defined as an absolute measure. The existence of the quality of the therapeutic encounter is dependent on multiple factors" (Steinberg, 2017, p. 41). It is not one voice. It is not just a monophony; it is more like a complex polyphony. Polyphony, says Elizabeth Handley, musicologist and lec-

“There is a shortage of research on the harmonious attuned syntax of haptic communication as an organismic sequence of processes. This kind of research could enable us to rekindle the dynamic neuro-psycho-social-physiology of physical touch as a pillar in the foundation of attunement and secure attachment.”

turer for The Arts Society (2022), is many different sounds; it is the “interweaving of parallel strands of melody in instrumental and choral music.” Polyphony is a landscape where an attuned melody of multidimensional strands of information flow could emerge. The psychotherapeutic process is, and is guided by, a multiplicity of dimensions, metaphorically – like a musical scroll consisting of many simultaneous lines of independent melody interweaving together, when synchronized, to a wonderful symphony played by an orchestra. Symphonies are notated in a musical score that contains instructions for all the instrument parts.

In the psychotherapeutic encounter, the “instruments” are the different aspects of at least two people’s biology, emotions, cognition, spirit, history, and culture, along with their interaction. At a cellular level, the instruments are systems, hormones, nervous systems, intrapsychic processes, interpsychic processes, and the context of the systems in which they live. This can be properly analyzed only by giving a long catalogue of aspects of analysis of each notation in the musical score, and the complex ways they counterpoint, work together, and mingle – by disassembling and reassembling the composition.

Touch in the psychotherapeutic process is one instrument in the orchestra of the psychotherapeutic relationship. Its attuned qualities must be guided, as all elements of the polyphony, using feedback and feedforward processes to enable a flow of interaction and “natural harmony” (Ichheiser, 1949, p. 8). Needless to say, any touch within the psychotherapeutic context constitutes psychotherapy, and must be processed as such from an ethical standpoint with clear sexual boundaries (Southwell, 1991 [2022]). Metaphorically, we can say that touch has its own syntax. The word “syntax,” which comes from the ancient Greek “coordination,” i.e. together in ordered sequence, presents a linguistic field where morphemes, the smallest meaningful constituents of linguistic expression,

combine to form larger units such as phrases and sentences. The sum of all the details of the word order, the grammatical relationship, hierarchical sentence structure, and other elements together create the full meaning of a word.

Haptic communication, when two people physically touch, is similar. It has small units like morphemes, which together create the full meaningful expression of the haptic syntax. There is research on small units, touch-morphemes; however, there is a shortage of research on the harmonious attuned syntax of haptic communication as an organismic sequence of processes. This kind of research could enable us to rekindle the dynamic neuro-psycho-social-physiology of physical touch as a pillar in the foundation of attunement and secure attachment.

Flow

Concerning flow, “we can no more catch the flow of interactions... than we can catch water in our hands. We need to relate the dynamic patterns of flow of the interaction, to the quality of the motion of a movie, rather than to separate pictures” (Steinberg, 2017, p. 41). These dynamic patterns of interaction assemble the composition of the music we metaphorically hear when physical touch occurs. This fundamental aspect of the dynamic assessment in biodynamic psychotherapy enables psychotherapists to explore, objectively and subjectively, in an attuned manner, the sequences of experiences of “moment-to-moment” interactions with their clients over time. This will be true for every component of the biodynamic psychotherapeutic interaction, including attuned touch.

Future

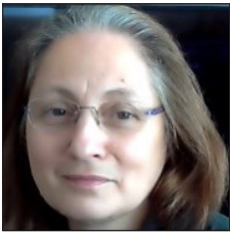
In summary, the complex process leading to the integration of different psychological frameworks and neuroscientific perspectives, as explored

above, demonstrates the manifold factors influencing experiences of touching and being touched. Future investigation should focus on this comprehensive and dynamic, multidisciplinary biopsychosocial model to further understand how experiences of touch impact our understanding and interpretation of emotion and cognition, building towards a better understanding of health and disease. This could guide us on how best to work with regressive experiences (Balint, 1968) and clarify the full gravity of “corrective emotional experi-

ences” (Alexander & French, 1946, p. 66) from the micro aspects, like epigenetic changes, to the macro level of the holistic organismic perspectives of all bodily systems, such as muscular, digestive, respiratory, nervous, endocrine, and immune systems.

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REFERENCES

- Abbott, A. (2011).** Novartis to shut brain research facility. *Nature*, 480(7376), 161-162.
- Agren, G., Lundeberg, T., Uvnäs-Moberg, K., & Sato, A. (1995).** The oxytocin antagonist 1-deamino-2-d-Tyr-(Oet)-4-Thr-8-Orn-oxytocin reverses the increase in the withdrawal response latency to thermal, but not mechanical nociceptive stimuli following oxytocin administration or massage-like stroking in rats. *Neuroscience Letters*, 187, 49-52.
- Alexander, F., & French, T. (1946).** *Psychoanalytic therapy: Principles and application.* (F. Alexander & T. French, Eds.). Ronald Press.
- Alonso, S., Arevalo, R., Afonso, D., & Rodriguez, M. (1991).** Effects of maternal stress during pregnancy on forced swimming test on behavior of the offspring. *Physiology and Behavior*, 50, 511-517.
- American Psychiatric Association (2013).** *Diagnostic and statistical manual of mental disorders.* American Psychiatric Publishing.
- Antonovsky, A. (1979).** *Health, stress, and coping.* Jossey-Bass.
- Antonovsky, A. (1987).** *Unraveling the mystery of health: How people manage stress and stay well.* Jossey-Bass.
- Asheri, S. (2009).** To touch or not to touch: a relational body psychotherapy perspective. In L. Hartley (Ed.), *Contemporary body psychotherapy: The Chiron approach* (106-120). Routledge Taylor & Francis Group.

- Balint, M. (1935).** *Primary love and psycho-analytic technique*. Taylor & Francis.
- Balint, M. (1968).** *The basic fault: Therapeutic aspects of regression*. Northwestern University Press.
- Barton, A. (2022).** *Wired for music: A search for health and joy through the science of sound*. Greystone Books Ltd.
- Bayer, S., Altman, J., Russo, R., & Zhang, X. (1993).** Timetables of neurogenesis in the human brain based on experimentally determined patterns in the rat. *Neurotoxicology*, 14, 83-144.
- Bengel, J., Strittmatter, R., & Willmann, H. (1999).** *What keeps people healthy? The current state of discussion and the relevance of Antonovsky's salutogenic model of health*. Federal Centre for Health Education.
- Bock, J., Wainstock, T., Braun, K., & Segal, M. (2015).** Stress in utero: Prenatal programming of brain plasticity and cognition. *Biological Psychiatry*, 78, 315-326.
- Boscarino, J., Erlich, P., Hoffman, S., Rukstalis, M., & Stewart, W. (2011).** Association of FKBP5, COMT and CHRNA5 polymorphisms with PTSD among outpatients at risk for PTSD. *Psychiatry Research*, 188, 173-174.
- Bowlby, J. (1988).** *A secure base: Parent-child attachment and healthy human development*. Basic Books.
- Brown, M. (1990).** *The healing touch: An introduction to organismic psychotherapy*. LifeRhythm.
- Caldji, C. (1998).** Maternal care during infancy regulates the development of neural systems mediating the expression of fearfulness in the rat. *Proceedings of the National Academy of Sciences of the United States of America*, 95, 5335-5340.
- Changaris, M. (2015).** *Touch: The neurobiology of health, healing, and human connection*. LifeRhythm.
- Chen, Y., Kramar, E., Chen, L., Babayan, A., Andres, A., Gall, C., Lynch, G., Baram, T. (2013).** Impairment of synaptic plasticity by the stress mediator CRH involves selective destruction of thin dendritic spines via RhoA signaling. *Molecular Psychiatry*, 18(4), 485-496.
- Clarkson, P. (2003).** *The Therapeutic Relationship* (2nd ed.). Wiley.
- Feldman, R., & Eidelman, A. I. (2003).** Skin-to-skin contact (Kangaroo Care) accelerates autonomic and neurobehavioral maturation in preterm infants. *Developmental Medicine & Child Neurology*, 45(4), 274-281.
- Felitti, V., Anda, R., Nordenberg, D., Williamson, D., Spitz, A., Edwards, V., Koss, M., Marks, J. (1998).** Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine*, 14(4), 245-258.
- Field, T. (2001).** *Touch*. MIT Press.
- Field, T., Diego, M., & Hernandez-Reif, M. (2010).** Preterm infant massage therapy research: A review. *Infant Behavior and Development*, 33(2), 115-124.
- Fonagy, P., & Campbell, C. (2017).** What touch can communicate: Commentary on "Mentalizing homeostasis: The social origins of interoceptive inference" by Fotopoulou and Tsakiris. *Neuropsychoanalysis*, 19(1), 39-42.
- Fotopoulou, A., & Tsakiris, M. (2017).** Mentalizing homeostasis: The social origins of interoceptive inference, *Neuropsychoanalysis*, 19(1), 3-28.
- Freud, S. (1909).** *Analysis of a phobia in a five-year-old boy (Little Hans)*. In *The standard edition of the complete psychological works of Sigmund Freud* (Vol. 10, 1-147). Hogarth Press.
- Freud, S. (1914).** *Remembering, repeating and working-through, recommendations on the technique of psycho-analysis II*. In *The standard edition of the complete psychological works of Sigmund Freud* (Vol. 12, 145-156). Hogarth Press.
- Freud, S. (1926).** *Inhibitions, symptoms and anxiety*. In *The standard edition of the complete psychological works of Sigmund Freud* (Vol. 20, 75-176). Hogarth Press
- Freud, S., & Breuer, J. (1895/1985).** *Studies on hysteria*. In *The standard edition of the complete psychological works of Sigmund Freud* (Vol. 2, 1-305). Hogarth Press.
- Friston, K. (2010).** The free-energy principle: a unified brain theory? *Nature Reviews Neuroscience*, 11, 127-138.
- Fromm, E. (2013).** *The art of being*. Open Road Media.
- Gross, C., & Hen, R. (2004).** The developmental origins of anxiety. *Nature Reviews Neuroscience*, (5), 545-552.

- Handley, E. (2022).** Summer school open learning for all, NADFAS (UK). Retrieved from <https://www.litnet.co.za/wp-content/uploads/2021/11/2022-SS-Brochure-Digital-Fin2.pdf>
- Harlow, H., & Zimmermann, R. (1958).** The development of affective responsiveness in infant monkeys. *Proceedings of the American Philosophical Society* (102), 501-509.
- Harlow, H., Dodsworth, R., & Harlow, M. (1965).** Total social isolation in monkeys. *Proceedings of the National Academy of Sciences of the United States of America*, 54(1), 90.
- Hart, S., Field, T., Hernandez-Reif, M., Nearing, G., Shaw, S., Schanberg, S., & Kuhn, C. (2001).** Anorexia nervosa symptoms are reduced by massage therapy. *Eating Disorders*, 9, 289-299.
- Haynal, A. (2002).** Zones of maturation and regression, and psychoanalytic technique. *The American Journal of Psychoanalysis*, 62(1), 53-64.
- Hochwalder, J. (2022).** Theoretical issues in the further development of the sense of coherence construct. In Mittelmark, M. et al. (Eds.), *The handbook of salutogenesis* (569-579). https://doi.org/10.1007/978-3-030-79515-3_53
- Ichheiser, G. (1949).** *Misunderstandings in human relations*. University of Chicago Press.
- Insel, T. (2012).** Next-generation treatments for mental disorders. *Science Translational Medicine*, 4(155ps19).
- Insel, T. R. (2000).** Toward a neurobiology of attachment. *Review of General Psychology*, 4, 176-185.
- Jung, C. (1966).** *The practice of psychotherapy* (2nd ed., The Collected Works of C. G. Jung (Vol. 16). Princeton University Press.
- Kehoe, P., & Blass, E. (1986).** Behaviorally functional opioid systems in infant rats. *Behavioral Neuroscience*, 100(5), 624-630.
- Kertay, L., & Revier, S. L. (1993).** The use of touch in psychotherapy: theoretical and ethical considerations. *Psychotherapy*, 30(1), 32-40.
- King, A. (2011).** Touch as relational affirmation. *Attachment: New directions in psychotherapy and relational psychoanalysis*, 5, 108-124.
- Korosi, A., & Baram, T. (2010).** Plasticity of the stress response early in life: Mechanisms and significance. *Developmental Psychobiology*, 52, 661-670.
- Langeland, E., Liv, H., Gunnarsdottir, H., Arvekle, H., & Vinje, H. (2022).** Promoting salutogenic capacity in health professionals. In M. Mittelmark et al. (Eds.), *The handbook of salutogenesis* (611-624). https://doi.org/10.1007/978-3-030-79515-3_55.
- Lanius, R., Vermetten, E., & Pain, C. (Eds.). (2010).** *The impact of early life trauma on health and disease (The hidden epidemic)*. Cambridge University Press.
- Linson, A., & Friston, K. (2019).** Reframing PTSD for computational psychiatry with the active inference framework. *Cognitive Neuropsychiatry*, 24(5), 347-368.
- Liu, D., Diorio, J., Day, J., Francis, D., & Meaney, M. (2000).** Maternal care, hippocampal synaptogenesis and cognitive development in rats. *Nature Neuroscience*, 3, 799-806.
- Lupien, S., McEwen, B., Gunnar, M., & Heim, C. (2009).** Effects of stress throughout the lifespan on the brain, behaviour and cognition. *Nature Reviews Neuroscience*, 10, 434-445.
- McEwen, B., Bowles, N., Gray, J., Hill, M., Hunter, R., Karatsoreos, I., & Nasca, C. (2015).** Mechanisms of stress in the brain. *Nature Neuroscience*, 18(10), 1353-1363.
- McGilchrist, I. (2009).** *The master and his emissary: The divided brain and the making of the Western world*. Yale University Press.
- Mitchell, S. A. (2000).** *Relationality: From attachment to intersubjectivity*. Routledge: Taylor & Francis Group.
- Mittelmark, M., et al. (Eds.) (2017).** *The handbook of salutogenesis*. Springer.
- Montagu, A. (1971).** *Touching: On the human significance of the skin*. HarperCollins.
- Murmu, M., Salomon, S., Biala, Y., Weinstock, M., Braun, K., & Bock, J. (2006).** Changes of spine density and dendritic complexity in the prefrontal cortex in offspring of mothers exposed to stress during pregnancy. *European Journal of Neuroscience*, 24, 1477-1487.

- Nelson, E., & Panksepp, J. (1998).** Brain substrates of infant–mother attachment: Contributions of opioids, oxytocin, and norepinephrine. *Neuroscience & Biobehavioral Reviews*, 22, 437–452.
- NIH National Human Genome Research Institute (2020).** Epigenomics Fact Sheet. Retrieved from <https://www.genome.gov/about-genomics/fact-sheets/Epigenomics-Fact-Sheet>
- Olausson, H. et al. (Eds.) (2016).** *Affective touch and the neurophysiology of CT afferents*. Springer.
- Panksepp, J. (1998).** *Affective neuroscience: The foundations of human and animal emotions*. Oxford University Press.
- Papassotiropoulos, A., & de Quervain, D. (2015).** Failed drug discovery in psychiatry: time for human genome-guided solutions. *Trends in Cognitive Sciences*, 19, 183–187.
- Pepper, S. (1942).** *World Hypotheses*. University of California Press.
- Perry, B., & Winfrey, O. (2021).** *What happened to you?: Conversations on trauma, resilience, and healing*. Flatiron Books.
- Puderbaugh, M., & Emmady, P. (2023).** *Neuroplasticity*. StatPearls Publishing. <https://www.ncbi.nlm.nih.gov/books/NBK57811/>.
- Rako, S., Mazer, H., & Semrad, E. (Eds.). (2003).** *Semrad: The heart of a therapist*. iUniverse, Inc.
- Robinson, R., Lahti-Pulkkinen, M., Heinonen, K., Reynolds, R., & Räikkönen, K. (2019).** Fetal programming of neuropsychiatric disorders by maternal pregnancy depression: a systematic mini review. *Pediatric Research*, 85, 134–145.
- Ron, H. (1972, November 17).** Music that will forever be new (Translated Title). DAVAR. Retrieved from <https://www.nli.org.il/he/newspapers/?a=p&p=articleclipping&d=dav19721117-01.2.151&dliw=none>
- Ron de Kloet, E., Joëls, M., & Holsboer, F. (2005).** Stress and the brain: From adaptation to disease. *Nature Reviews Neuroscience*, 6, 463–475.
- Sandi, C., & Haller, J. (2015).** Stress and the social brain: behavioural effects and neurobiological mechanisms. *Nature Reviews Neuroscience*, 16, 290–304.
- Schidlovsky, L. (2023, August 4).** Leon Shidlovsky. In Wikipedia. https://he.wikipedia.org/wiki/קסבולדיש_גראל
- Schore, A. (2002).** Dysregulation of the right brain: a fundamental mechanism of traumatic attachment and the psychopathogenesis of posttraumatic stress disorder. *Australian and New Zealand Journal of Psychiatry*, 36, 9–30.
- Selye, H. (1973).** Homeostasis and heterostasis. *Perspectives in Biology and Medicine*, 16(3), 441–445.
- Simpson, & Belsky. (2008).** Attachment theory within a modern evolutionary framework. In Cassidy, J. & Shaver, P. (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (131–157). Guilford Press. <https://www.researchgate.net/publication/279233483>.
- Smith, E., Clance, P., & Imes, S. (Eds.). (1998).** *Touch in psychotherapy: Theory, research, and practice*. Guilford Press.
- Southwell, C. (1982/2022).** Biodynamic massage as a therapeutic tool – with special reference to the biodynamic concept of equilibrium. *Journal of Biodynamic Psychology*, 3, 346–369.
- Southwell, C. (1991/2022).** The sexual boundary in therapy. *Energy & Character*, 22(1), 37–46.
- Spitz, R. (1945).** Hospitalism: An inquiry into the genesis of psychiatric conditions in early childhood. *Psychoanalytic Study of the Child*, 1, 53–74.
- Steinberg, E. (2010).** Promotion of health and biodynamic psychotherapy. *The Psychotherapist*, 8–9.
- Steinberg, E. (2016).** Transformative moments: Short stories from the biodynamic psychotherapy room. *Somatic Psychotherapy Today*, 3, 26–34, 36–41, 99.
- Steinberg, E. (2017).** How can we evaluate the subjective and objective aspects of effectiveness in the therapeutic alliance? Fundamental limitations to current scientific writing about therapeutic processes. *Somatic Psychotherapy Today*, 7(2), 38–45, 63.
- Stern, D. (2004).** *The present moment in psychotherapy and everyday life*. W. W. Norton.
- Sullivan, H. (1970).** *The psychiatric interview*. W. W. Norton.

- Suvilehto, J., Cekaite, A., & Morrison, I. (2023).** The why, who and how of social touch. *Nature Reviews Psychology*, 2, 606–621.
- Thomason, M., Hect, J., Waller, R., & Curtin, P. (2021).** Interactive relations between maternal prenatal stress, fetal brain connectivity, and gestational age at delivery. *Neuropsychopharmacology*, 46(10), 1839–1847.
- Trevarthen, C. (2004).** Intimate contact from birth: How we know one another by touch, voice and expression in movement. In White, K. (Ed.), *Touch: Attachment and the body* (2–15). Karnac.
- Tronick, E. (2007).** *The neurobehavioral and social-emotional development of infants and children*. W. W. Norton.
- Tronick, E., & Gold, C. (2020).** *The power of discord*. Scribe Publications.
- Turk, E., van den Heuvel, M., Sleurs, C., et al. (2023).** Maternal anxiety during pregnancy is associated with weaker prefrontal functional connectivity in adult offspring. *Brain Imaging and Behavior*, 17, 595–607.
- Uvnäs-Moberg, K. (2003).** *The oxytocin factor: Tapping the hormone of calm, love, and healing*. Da Capo Press.
- van der Kolk, B. (2014).** *The body keeps the score: Mind, brain and body in the transformation of trauma*. Penguin.
- Wallin, D. (2007).** *Attachment in psychotherapy*. Guilford Press.
- Warnecke, T. (2011).** Stirring the depths: Transference, countertransference and touch. *Body, Movement and Dance in Psychotherapy: An International Journal for Theory, Research and Practice*, 6(3), 233–243.
- Weaver, A., Richardson, R., Worlein, J., Waal, F., & Laudenslager, M. (2004).** Response to social challenge in young bonnet (*Macaca radiata*) and pigtail (*Macaca nemestrina*) macaques is related to early maternal experiences. *American Journal of Primatology*, 62, 243–259.
- Weaver, I., Cervoni, N., Champagne, F., D'Alessio, A., et al. (2004).** Epigenetic programming by maternal behavior. *Nature Neuroscience*, 7(8), 847–854.
- Xu, C., Xu, Y., Xu, S., Zhang, Q., et al. (2020).** Cognitive reappraisal and the association between perceived stress and anxiety symptoms in COVID-19 isolated people. *Frontiers in Psychiatry*, 11(858), 1–8.
- Yehuda, R., Hoge, C., McFarlane, A., Vermetten, E., et al. (2015).** Post-traumatic stress disorder. *Nature Reviews Disease Primers*, 1(1), 1–22.