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Caregiver Cues: The Role of the Body in Infant-Caregiver Relationships

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Caregiver Cues: The Role of the Body in Infant-Caregiver Relationships

Senior Project Submitted to
The Division of Social Studies
of Bard College

by
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Annandale-on-Hudson, New York

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Dedication

for ma & pa

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Abstract

Touch, gaze, posture, and their synchrony between an infant and their caregiver are the means by which an attachment between the two is formed. The nonverbal elements of communication between the infant-caregiver dyad can explain the nature of their relationship and can serve as a tool for classifying attachment styles. Attachment Theory (AT) proposes that the *attachment* the infant forms with their caregiver establishes a model for relationships that the infant will carry into adulthood. This paper will untangle the underlying processes of the infant-caregiver relationship to make a case for refining the corporeal lens through which we view AT. It is significant to develop methods of analysis that observe the embodied process of *attachment* to assist in the formation of secure attachments, and prevent the adverse outcomes of insecure attachment styles.

Introduction

In·fant /'ɪnfənt/

late Middle English: from Old French *enfant*, from Latin *infant-* 'unable to speak', from *in-* 'not' + *fant-* 'speaking' (from the verb *fari*). (from, *Oxford Languages*)

The origins of the word *infant* derive from the Old French *enfant* and from the Latin *infant*, the latter meaning *unable to speak*. So, infancy hinges on the nonverbal. This period of learning and exposure for an infant relies on facets of communication that are primarily somatic. When we consider the infant's primary relationship during this period—presumably the one with their caregiver—and the way their relationship forms nonverbally, we gain insight into how we use our bodies to move *beyond words* from infancy into adulthood. Attachment Theory (AT) proposes that the infant-caregiver relationship serves as a model for attachment into adulthood. But how embedded are the corporeal aspects of this bond? What does the body synchrony of an infant and their caregiver communicate to an observer about the quality of their attachment? Research indicates that there is great long-term benefit to the formation of secure attachments in infancy. This paper will outline the ways in which looking at attachment through a body-based lens can enhance our understanding of the infant-caregiver relationship.

In Section 1: Attachment Theory, I first discuss the *Origins* of this theory and introduce its founder, John Bowlby. I describe how Bowlby took from psychoanalytic ideas to construct this new subfield of psychology. In *The Strange Situation*, I go over the study developed by Mary Ainsworth which set the foundation for how we observe and then categorize attachment behaviors between infant-caregiver dyads. Then in *A Secure Attachment*, a case is made for why secure attachment styles can be protective factors for infants against certain psychological

disorders. In Section 2: Mind & Body, I outline the trajectory of how some researchers have been thinking about *Infant Cognition*. I present Ed Tronick's, *The Still Face Paradigm* and begin to discuss the ways in which the body serves to reinforce the attachment relationship. In *Maternal Sensitivity & Mutual Regulation*, I outline the role of the caregiver in forming a large part of the infant's model of attachment but also discuss the ways in which this relationship is largely reciprocal and bidirectional. Finally, in Section 3: Assessing Non-Verbal Communication, I present different measures of assessing the infant-caregiver relationship. The methods of assessment introduced in both sections, *Face-to-Face and Parental Embodied Mentalizing (PEM)* focus on how the dyad communicates non-verbally and support the argument that the body is the central mechanism by which attachment forms. To end, I refer to other disciplines in the section, *Somatic Sympathy* and incorporate other ways of considering non-verbal communication outside of the field of psychology.

Section 1: Attachment Theory

Origins

Attachment Theory (AT) developed as a subfield of Psychology in the mid-twentieth century and while its origins are predominantly psychoanalytic, AT also took great influence from several other fields such as ethology and evolutionary biology. Throughout its evolution, AT has aimed to highlight the infant-caregiver relationship and its potential implications for infant development. It is significant to trace AT's elaborate history to best understand how researchers have come to agree on the lasting effects of infant attachment. Delineating the trajectory of AT will also establish the framework from which the argument made in this paper will take off. At its start, the role of the *body* in the formation of infant-caregiver attachments was not examined as closely as it is in recent literature. To propel the field in the direction of adopting a more refined body-based approach to AT, we must first understand its origin.

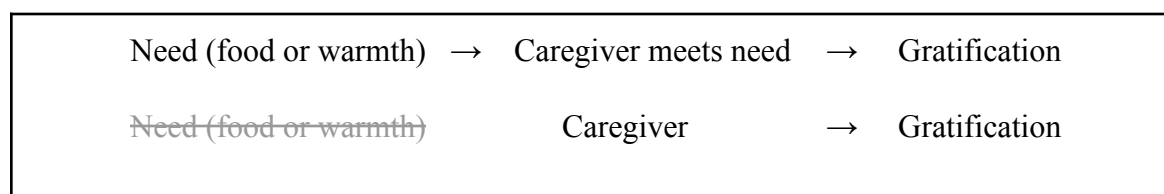
Initially, psychoanalysts framed the infant-caregiver relationship as one motivated by subconscious instinct and drive. At this time, it was assumed that the mechanisms by which infants seek parental proximity was inborn (Bowlby, 1969). John Bowlby, who is often credited as the founder of AT, complicated this existing understanding of the infant-caregiver relationship by also incorporating insights from behaviorism. In particular, Bowlby shifted away from theories about infant cognition that speculated about subconscious motivations and rather observed infants' *proximity-seeking* behaviors and drew conclusions directly from his observational data. These *proximity-seeking* behaviors started to be referred to as *attachment related* behaviors by Bowlby and this established the main focus of AT. Ultimately, Bowlby's

behaviorist insights introduced the possibility for empirically studying infant-caregiver behaviors and this reframed the way the field understood infant cognition.

Building off of Bowlby's work, other researchers began to find new ways to analyze infant-caregiver relationships empirically. Another main figure in the field of AT, Mary Ainsworth, developed the Strange Situation Procedure (SSP) to classify the varying degrees and characteristics of infant-caregiver relationships. The SSP was innovative in developing consistently reliable categories for analysis within the context of AT that continue to be central in current research. Around this same time, psychologist Harry Harlow was studying the relationship of infant rhesus macaques with their caregiver, and through these observations, found that infants relied on their caregivers for reasons beyond meeting their physiological needs. Harlow's research remains significant as it was among the first to demonstrate that infants seek out physical contact from their caregivers even in the absence of primary needs like food. To researchers at this time, these studies suggested that for the infant, attachment to the caregiver exists separately from their drive to satiate their biological needs. From these new understandings, a larger question about the role of the physical presence of the caregiver emerged and researchers began considering the role of the body in the formation of attachment in greater depth. At this point, we get a glimpse into how the field first began considered the body in relation to attachment and will begin to see how this understanding evolved.

The main ideas that Bowlby puts forward concerning infant-caregiver attachment include understanding what was observably important to the infant: Where do infants place their attention? Patterns in infant behavior gave Bowlby insight into how infants were *meaning-making* or building associations within their environments. Early on, Bowlby noticed

that because infants' primary and invariable physiological needs, food and warmth, were typically met by caregivers, infants associated the physical gratification of these stimuli with a general close proximity to its source. Given this understanding, it became clear that *proximity-seeking* on behalf of the infant serves the evolutionary purpose of ensuring proximity to resources necessary for survival. However, in Bowlby's 1969 publication *Attachment & Loss* he proposes that though proximity is pursued for its biological purpose initially, through the process of repeated experience the caregiver later becomes the primary source of gratification and the resources they provide are just the mechanisms by which that attachment was formed.



This behaviorist approach to attachment proposes that frequent exposure to the same procedure or stimuli will construct specific associations or *expectancies*. If an infant is exclusively fed in proximity to their caregiver, the infant will associate food with the caregiver even in its absence. As an example, Bowlby describes the way maternal breastfeeding exemplifies this “[infant] propensity to be in touch with and cling to a human being” (Bowlby, 1969). It became well-understood within the field that there was another component to infant physical attachment to the caregiver, one that extends beyond meeting the infant's physiological needs. Bowlby's work became the groundwork for substantial research which aimed to better understand the role of the body in attachment formation.

Bowlby's ideas about the *learned associations* and *expectancies* infants were developing were slightly contrasted by Harlow's work with rhesus macaques. In Bowlby's opinion, infants were *learning* to associate their caregiver with comfort as a result of frequent positive and comforting experiences with their caregiver. However, Harlow's study demonstrated that infant macaques held a preference for proximity to a caregiver figure in the absence of food and in the absence of a *learning period*. In the study, newborn rhesus macaques were placed in enclosures accompanied by a cylindrical figure meant to represent a caregiver. In both conditions, the caregiver figures were identical in their supply of milk but different in texture: one figure was "bare welded-exposed wire" and the other was "cushioned by a sheathing of terry-cloth" (Harlow, 1959). Harlow notes that though the caregivers were *physiologically equivalent* and infants drank the same amount of milk and gained the same amount of weight throughout the study, infant contact with the cloth figure was prominent whereas there was no infant contact with the wire figure. These results confirmed the notion that *affection* as Harlow refers to this infant behavior, or *proximity* as Bowlby would refer to it, is preferred over the provision of food and warmth in infant rhesus macaques. What Harlow's work contributed was the possibility that *affection* is not learned from the association of hunger reduction (Harlow, 1959). In other variations of this experiment, Harlow found that when the infant macaques were subject to stress they sought comfort from the cloth figure irrespective of whether their nursing experience was with the cloth or wire figure. Harlow concluded that *body-contact* is an important variable for infant attachment and proposed the infants' behaviors were communicating that the cloth figure served as a *base of operations* and general source of comfort (Harlow, 1959). These were among

the first developments in the field which inched attachment theorists towards considering the body as a critical variable in the formation of attachment.



(Harlow, 1959)

The extent to which body-contact played a role in infant-caregiver attachment became a major question after Harlow's publication. Harlow considered the possibility that warmth was the significant variable in that infants were prioritizing, but among the variations of this study was one that isolated and tested this variable. Results from some of Harlow's variation experiments showed that a heating pad was not preferred over a cloth figure and a heated cloth figure did not increase attractiveness to the infant macaques (Harlow, 1959). Harlow conducted similar studies to test the extent of this attachment. One of such questions that emerged was, Was this attachment bond exclusive to one caregiver or are infants comforted by caregiver-like figures as well? Bowlby would disagree with the idea that infants transfer their associations over to another caregiver since he claims the infant's repeated experience with the caregiver establishes

their expectations for care. Though Bowlby would argue that infants *do* have a preference for their primary caregiver, Harlow might disagree since his studies were demonstrating that infant macaques were comforted by the mere texture of the figure rather than any of its other properties. At this point Mary Ainsworth's Strange Situation Procedure (SSP) becomes relevant because it was first to classify the variations in infant *proximity-seeking* behaviors.

The Strange Situation

Mary Ainsworth empirically studied the process of proximity-seeking and developed the Strange Situation Procedure (SSP) to measure and categorize its variation among infants. Working in direct conversation with Bowlby's work, the SSP constructed a study which would artificially generate a stressful situation for infants in order to *activate* attachment behaviors and classify their variations (Ainsworth & Bell, 1970). Bowlby introduced this concept of *activating* and *terminating* social or attachment behaviors. He was first to suggest it is important to identify which conditions *activate* or *terminate* attachment behaviors and the *intensities* at which they would occur. From his observational data, Bowlby concluded that distance from the caregiver would activate the infant's attachment behavior and due to the protective function of proximity, the infant will insist on it (Bowlby, 1969). Building off of Bowlby Ainsworth developed different iterations of the SSP where infants were introduced to an unfamiliar room with their caregiver and first, their exploratory behavior in the space was observed. The procedure offered a period of acclimatization to the space and then the following sequence of six episodes were conducted: play and introduction to a stranger, separation from caregiver, reunion with caregiver, left alone in the room, reunion with stranger, and a final reunion with caregiver. Ainsworth then scored

infants in five classes of behaviors, (1) proximity and contact-seeking behaviors, (2) contact-maintaining behaviors, (3) proximity and interaction-avoiding behaviors, (4) contact and interaction-resisting behaviors, and (5) search behavior. (See Appendix A for a breakdown of how these variables were coded.) The strength of the behavior, its frequency, duration, and latency all influenced the scoring of these classes (Ainsworth & Bell, 1970). These intricate parameters for classifying infant-caregiver behaviors were new to the field and refined the ways in which researchers later thought about implementing these observational modes of analysis. Ainsworth used the results from this study to suggest a gradient of attachment styles which Ainsworth, Blehar, Waters, and Wall (1978) later determined to be: secure, anxious-avoidant, anxious-resistant. These categories describe the type of behavior displayed towards the caregiver, behaviors that were *activated* by the given situation and reflective of the dormant attachment style of the infant. Based off Ainsworth's study, Lopez & Brennan (2000) summarize these categories as follows:

1. Infants classified as secure: exhibited distress when separated from their mothers but comforted on reunion and resumed their independent exploratory behaviors
2. Infants classified as anxious-ambivalent: demonstrated considerable distress on maternal separation and were not promptly comforted by their mother's return, instead frequently exhibited angry protest behaviors.
3. Infants classified as avoidant: overtly appeared undistressed by their mothers' departure and did not seek proximity with her on her return to the observational room.
4. They also summarize the fourth attachment style which was added by subsequent research (Main & Hesse, 1990), disorganized/disoriented which is characterized by a mix of the responses and strategies listed above.

Therefore, although there are qualitative distinctions between infant behaviors, these qualitative distinctions are useful for analyzing what variables are correlated with some attachment styles

rather than others. The conclusions drawn from this study significantly developed the field's approach to analyzing the infant-caregiver dyad and introduced an observable and empirical way to analyze this cognitive process.

A Secure Attachment

In 1944, Bowlby published an article titled *Forty-four juvenile thieves*, which shed light on the long-lasting effects of infant's attachment behaviors. It became clear from this study and others like it that attachment research could have significant implications for infant health development. In Bowlby's study, he assessed eighty-eight children from a children's clinic, forty-four of which were considered juvenile thieves, and forty-four children who had not committed any crimes and served as a control (Bowlby, 1944). The main aim of the study was to assess both groups of children for *affectionless psychopathy*, and Bowlby found these characteristics consistent with children who had spent a significant amount of time separated from their caregivers before the age of five. Follan & Minnis (2009) weigh in on what Bowlby meant by *affectionless psychopathy* and suggest it referred to what is considered Reactive Attachment Disorder (RAD) in current Psychological literature. In the Diagnostic and Statistical Manual (DSM), a diagnosis of RAD presents as "disturbance in their capacity to develop appropriate social relationships." (Follan & Minnis, 2009) (See Appendix B for a breakdown of the DSM classification criteria for RAD) Ultimately, Bowlby's paper presented interesting correlations and long-term data related to attachment, but many questions remained unanswered: To what extent did separation during infancy affect development? Or how lasting were the effects of early separation?

Researcher Everett Waters significantly contributed to the discussion regarding the reliability and stability of differences in infant-caregiver attachment. Waters (1978) longitudinally analyzed infant's attachment classifications at 12 and later 18-months. The consistency in attachment style led Waters to propose that this was a critical window of time when infants were solidifying their attachment *expectancies*, as Bowlby would say. Bowlby's findings had initially indicated that attachment relationships were influential in the first five years of the child's life, but Waters refined this window of time and suggested the attachment model became foundational much earlier than that. Within the field of attachment research there grew an understanding that there was a *sensitive period* of time where attachment behaviors solidified. A later study, Waters, Merrick, Treboux, Crowell, & Albersheim (2000) used data from a twenty-year longitudinal study to demonstrate that attachment classifications during infancy (specifically at 12-months in this study) remain consistent into adulthood when measured through the Adult Attachment Interview (AAI). The use of the AAI highlights the extent to which attachment style can be applied in adulthood and for what sorts of relationships it remains relevant. The AAI is an instrument that measures attachment style by asking the participant about familial relationships, specifically parental, but also of other intimate partners to whom attachment related behaviors may extend (Waters et al., 2000). (See Appendix C for example questions from an AAI) Therefore, after these publications it became clear that there are long-term effects to the infant-caregiver relationship, but is the quality of attachment that an individual possesses significant beyond the point that it is lasting? Though these models of attachment may be enduring, research indicates that they are only relevant with partners of more intimate relationships. As Bowlby and Ainsworth would say, only in intimate relationships is

attachment behavior *activated*. Therefore, one may still question the significance of establishing secure attachments during infancy.

Lopez & Brennan (2000) claim there is great benefit to incorporating an attachment framework into counseling psychology. Since clinicians aim to “optimize human functioning” within realms of intra and interpersonal matters, personality, emotional dynamics, and social skills, understanding an individual's attachment tendencies may be relevant (Lopez & Brennan, 2000). Lopez & Brennan (2000) propose that in order for the field of counseling psychology to best conceptualize the “healthy and effective self”, there must be an understanding of how to integrate personality and developmental themes in the way attachment theory does. Therefore, attachment behaviors may generate greater insight into how individuals interact within their relationships. Besides a general push to consider how attachment may benefit individuals within a therapeutic setting, recent studies have found that attachment experiences in infancy may correlate with the development of some pathological disorders. As Bowlby suggested early on, data from more recent publications have supported the conclusion that insecure attachment styles lead to attachment related disorders like Reactive Attachment Disorder (RAD) as well as other disorders like Borderline Personality Disorder (BPD).

One could diminish the importance of attachment security by arguing that despite the recommendations of counseling psychology, attachment behavior only becomes relevant within intimate partnerships and one could still achieve the “healthy and effective self” without considering attachment. However, if we consider insecure attachment behaviors as risk factors for psychopathological disorders, further dissecting this theory can be immensely useful for understanding the origins of and potential treatments for disorders like BPD.

Fonagy et al. (2003) aim to untangle the developmental roots of BPD and claim that it is specifically the failure of a *secure base* which constitutes the development of the clinical representation of BPD. In particular, Fonagy et al. (2003) propose that early attachment relationships establish the infant's later capacity for mentalization. Thus, a secure base, or the experience of appropriate parental mentalization equips the infant with a tool for later social experiences. Fonagy et al. (2003) state,

“It follows that disruption of early affectional bonds not only sets up maladaptive attachment patterns but also undermines a range of capabilities vital to normal social development. We suggest that BPD can be understood in terms of the absence or impairment of the capacity for stress regulation, attentional control and mentalization, which are acquired in the context of attachment relationships.”

It is significant to understand the potential implications of insecure attachments established during infancy. As research has described, models of attachment are persistent throughout an individual's lives. Therefore, better understanding how these bonds form during infancy can be helpful in mitigating the development of insecure attachment styles. Further analyzing attachment formation during infancy and observing infant-caregiver relationships can generate insight into how to encourage the construction of an attachment model that will most benefit the infant in both the short-term and the long-term. Throughout this paper, I will continue to propose that considering AT through a body-based lens can reveal further information about how clinicians interpret infant-caregiver interactions.

Section 2: Mind & Body

The first section of this paper covered the origins of Attachment Theory (AT) and referenced various research studies to make the argument that establishing a secure infant-caregiver attachment is important for the long term health of the infant. In order to further break down the process of attachment, this section will introduce specific theories of infant cognition. For many centuries, theorists have contemplated the inner world of infants, but this is not an exploration unique to the discipline of psychology. There are also philosophical urges to contemplate the ways in which others think and learn, but aside from satisfying purely philosophical curiosity, Section 1 demonstrates that the cognitive models learned during infancy can have long-term impacts. Therefore, there is significant practical use to understanding the infant experience. This next section will lay out the ways cognitive psychology has linked AT to the body by looking at the foundational models of infant cognition as well as the more recent developments in the field. Cognitive models like those proposed by Ed Tronick focus on how the caregiver and infant bodies communicate with one another through a reciprocal, dynamic exchange of displays. Research that paves new directions for interpreting the infant-caregiver relationship in this corporeal context is useful in providing a theoretical framework from which measures of assessment can be built.

Infant Cognition

First, we will return to Bowlby to get a sense for the foundational understandings of infant cognition. According to Bowlby, *proximity-seeking*, or attachment behaviors were important to ensure safety and development for the infant. For example, maintaining proximity

to the caregiver ensures infants have any threat or need adhered to at their cry; a feature that becomes essential to the period of infancy where the overarching developmental goal is environmental exploration (Cassidy, Ehrlich, & Sherman, 2014). Bowlby labels the infant's dependency on their caregiver for safety at this time as an *exploration of their secure base*. For the infant, the *secure base* constitutes a representative model of the repeated experiences with their caregiver; Bowlby refers to these experienced-based representations as Internal Working Models (IWMs). Also referred to by others as *cognitive schemas*, IWMs allow infants to “efficiently predict, interpret, and guide their interactions with others” and therefore an efficient *representational* model which builds from previous experience and maps onto new experiences (Cassidy et al., 2014). Therefore consistent patterns within the caregiver relationship will lead the infant to expect what they have been exposed to. But similarly, as we see characterized by insecure attachments, consistently inconsistent caregiving patterns can also characterize the model of attachment for the infant.

It is important to understand how Bowlby's older perspectives are interacting with newer theories of attachment. A more recent article that ties Bowlby's earlier foundational ideas to current research on attachment is one by Cassidy, Ehrlich, and Sherman published in 2014. Cassidy, Ehrlich, & Sherman (2014) take Bowlby's theory of *representational models* and propose an additional *non representational* cognitive process is taking place alongside Bowlby's IWMs. The primary focus on the element of infant response to threat and reassert Bowlby's premise that “experience-based representations of the availability of the attachment figure” play a significant role in determining their response (Cassidy et al., 2014). What these authors add to the IWM framework is a “non-representational, physiological regulatory processes that reflect

response to threat at the biological level.” (Cassidy et al., 2014) By *non-representational*, authors branch off from Bowlby’s ideas and claim that the infant’s experiences with their caregivers are *directly* reinforcing the infant’s response to threat. Therefore, though Bowlby agreed that infants were constructing models of attachment from their relationship with their caregivers which they would then apply to other contexts, Cassidy et al. (2014) state that these models are also embedding into their physiological responses to threat. In order to present support for the physiological associations of attachment, Cassidy et al. (2014) turn to Bowlby’s concept of the *secure base*. Outlining Bowlby’s ideas on the *secure base* will generate a foundation for understanding the ways our bodies are involved in the attachment formation.

Bowlby’s concept of the *secure base* illustrates a standard of secure attachment and exemplifies the function of attachment for general infant survival. The physical proximity to a caregiver which communicates the assumption of safety, allows for the productive and necessary learning that comes from environmental exploration. Cassidy et al. (2014) considers the instances of threat that activate an infant’s return to their *secure base* and state a need for an “examination of response to threat beyond the behavioral and emotional levels to an examination of response to threat at the physiological level” (Cassidy et al., 2014). According to these authors, there are “physiological subsystems that become disrupted in response to maternal separation,” that serve as regulatory mechanisms in response to stress, as seen in studies which have looked at infant cortisol levels in different caregiving experiences (Cassidy et al., 2014). Several studies have found different levels of cortisol reactivity among securely attached versus insecurely attached infants when participating in the SSP: insecurely attached infants showed higher levels of cortisol stress responses (Luijk et al., 2010). This data is not entirely surprising

and confirms that the behavioral responses infants were displaying were outward indicators of physiological stress responses. It is significant to consider this kind of data because it highlights the dysregulation that comes from insecure attachments at a *physiological* level. For infants, hormonal imbalances of this kind can be disruptive of developmental processes since, as Cassidy et al. (2014) describe, “the stress reactivity system serves to help the organism mobilize protective resources in times of threat, and, in the absence of threat, to devote metabolic and psychological resources elsewhere (e.g., food gathering, exploration).” We can therefore assume that the preventative activation of these systems in insecurely attached relationships compromises the development of the infant if we consider the securely attached infant who can devote these resources elsewhere. Cassidy et al. (2014) also cite studies that consider other variables of caregiving such as *maternal sensitivity* or *maternal depression* as big influences for infant cortisol production in stressful situations. From these studies, we can take away the understanding that the unpredictability of maternal emotional response to infant distress, that may develop in insecure attachment styles, becomes visible through both behavioral and biological dysregulation. Using Cassidy et al. (2014), we can begin to understand the ways in which the infant-caregiver attachment becomes embedded within the body.

What do our understandings of the physiological impressions of stress responses contribute to how we define models of infant cognition as *representational* or *non-representational*? Cassidy et al. (2014) address this question and claim that *representations* of an unavailable caregiver can activate the stress response system in times of threat, but simultaneously *representations* of protective resources can mitigate the stressful response. This was examined in a study which found that photographs of mothers were *calming* (inferred by

greater engagement in play) to 24-month old infants when experiencing extended separation (Passman & Longeway, 1982; Cassidy et al., 2014). These findings are compelling and allow us to consider how else the body responds to such representations and where its limitations lie. In support of my thesis, this section brings attention to the ways in which the attachment models that are established during infancy are registered in the body.

Next we will analyze a different but similar model of infant cognition which also allows us to consider a different way in which the body is implicated within the formation of attachment. Tronick & Beeghly (2011) propose infants are *open dynamic systems*: dynamic (and therefore, malleable), nonsymbolic, and biopsychosocial. To break down the characteristics of their proposed system, Tronick & Beeghly (2011) first show that these systems are dynamic: reactive and responsive to social stimuli such as the intentions and emotions of others and thus malleable to a certain degree by positive and negative feedback. And they are nonsymbolic, which refers to the nonverbal quality of the infant experience of meaning making, more specifically the absence of language as a symbol to assign meaning. In particular, they propose that there are two main processes by which infants create meaning, a sensorimotor and a sensori-affective process. Tronick & Beeghly (2011) state the sensorimotor process is similar to muscle or procedural memory and suggest that the infant develops a meaning of objects based on their understanding of ‘what they can *do* to it’. Therefore objects do not yet have symbolic value but rather are “‘bangable’, ‘mouthable’, or ‘throwable’.” In this same way, authors frame the sensori-affective procedure as one that establishes objects or people not by their favorable or unfavorable qualities like *noisy* or *unfamiliar* but “rather something to be avoided” and in such an example, the meaning (to the child) would be *fearfulness*. Tronick & Beeghly (2011) suggest

these processes work simultaneously and alongside each other to make up a larger complex biopsychosocial system that generates meaning for infants. The term *biopsychosocial* underlines the interactivity of these procedures and the multilevel development that is taking place, but the most significant quality of this system is its capacity to “create a polysemic (multiple-meaning) sense of what is happening now and alter the nature of possible future meanings.” (Tronick & Beehly, 2011) The malleable quality of the infant’s meaning-making is important to piece apart in order to understand its limitations for when and how representations solidify in adverse circumstances. Similar to the model proposed in Cassidy, Ehrlich, & Sherman (2014), the open dynamic system introduced by Tronick & Beehly (2011) considers the role of the body in establishing meaning and representation in the world of infants. What if we were to consider the ways infants undergo the sensorimotor and sensori-affective processes with direct reference to their caregiver? Ed Tronick’s Still-Face Paradigm (SFP) is useful in understanding how infant’s interpret cues from their caregivers and demonstrates how these physical cues can be representational of caregiver availability.

The Still-Face Paradigm

Developmental researcher Ed Tronick has published various works that also contemplate the nature of infant cognition. Most cited and renowned within the field for his Still-Face experiment, Tronick has steered the field into asking about how infants are interpreting cues in their environment and how else they are responding to them. Central to his early research is the idea that there is a significant reciprocal characteristic to the infant-caregiver relationship *and* that infants can be adept at regulating emotional displays. His work supports the idea that infant

cognitive processes are *active* and *responsive* to their surroundings. The SFP in particular, looks at how infants are reactive to their caregiver's affective displays and how disruptions to normal affect patterns can be dysregulating for the infant. Tronick's work helps us take a closer look at the role of the body in parent-infant attachment and inches us towards a more complete understanding of the potential influences on insecure attachment formation.

The three steps of the Still-Face Paradigm as described by Mesman, Ijzendoorn, & Bakermans-Kranenberg, (2009):

1. A baseline normal interaction episode between caregiver and infant
2. The 'still-face' episode in which the adult becomes unresponsive and maintains a neutral facial expression
3. A reunion in which the adult resumes normal interaction

This paradigm places the infant in a position where they experience a violation of expectations within a social interaction with their caregiver. Eye contact with the caregiver remains but the lack of responsiveness from the caregiver when the infant tries to engage the adult is absent and thus communicates a *contradiction* to the infant. In response, typically infants avert their gaze, smile less, and display more negative affect in comparison to baseline (Mesman, Ijzendoorn, Bakermans-Kranenberg, 2009). The replicability of these results among other studies investigating the SFP demonstrate that infants have expectations built into social interactions with their caregivers.

One feature of the SFP demonstrates that infants have an understanding of social expectations *and* that they have the skills to correct it by attempting to re-engage the parent by smiling or through gaze to return to the previous affective state. This behavior can be interpreted as skills infants have acquired to correct adverse circumstances—in this case an unfulfilling

social interaction. But these behaviors can also be interpreted as skills the infant possesses for regulating others' emotions—in this case, that would be those of their caregiver. This becomes a clear example of the mutual regulation or *reciprocity* that takes place between the dyad where the behavior states, arousal, or the physical needs one member influences or reinforces the existing paradigm of the relationship with the other. When re-engaging the parent is unsuccessful, data from the SFP is then useful in illustrating how the infant exercises their learned emotion regulation skills (looking away etc.). We can assume that there is a cognitive understanding that the visual perception of the interaction is causing the infant distress and therefore looking away can be a mechanism by which they relieve the stress of the event. The SFP was a pivotal study in the field of AT as it honed in on the temporal exchange and reinforcement that takes place between the infant and caregiver, while also illuminating how each individual uses their body to communicate with the other. We will continue to consider other ways we can look to the body to understand how the infant-caregiver dyad develops and strengthens their attachment bonds.



Tronick (1978) describes the image as follows, “Figure [A] shows the infant greet- ing. Then, in [B] and [C] he warily looks away and then checks back toward her again. In [D] he withdraws with a sober facial expres- sion, eyes averted, head turned full away. This baby was 74 days old.”

According to Tronick et al. (1978), one conclusion that can be drawn from this experiment is that both the infant and caregiver are using their bodies in *interactional reciprocity*. This introduces the concept of *exchange* between the infant and caregiver, and establishes both as agents with active influence over the interaction. Both the infant and caregiver are seen responding and adjusting to cues from the other. Another main conclusion drawn from the SFP reflects that infants can regulate emotional displays that have been activated by physical cues from the caregiver. This piece introduces an understanding about how the attachment figure influences the infants’ cognitive development through behavior. Similar to Ainsworths’ SSP, the SFP generates a scenario that activates infants’ emotion regulation systems as they are faced with an adverse occurrence (specifically those that violate relationship expectancies), either the physical absence of the caregiver as in SS or an affective absence from the caregiver.

Within their paper, Mesman et al. (2009) review studies that depict infants’ physiological responses to the SFP. Among the variables recorded within these studies are heart rate, cortisol levels, vagal tone, and skin conductance. Specifically, in comparison to baseline, heart rate and cortisol levels increase in the still-face episode and then decrease at reunion. (Mesman et al., 2009) These changes in physiological state can be representative of reaching a state of emotional regulation or dysregulation. Another theory that emerged from the SFP proposed by Field (1994) as described by Mesman et al. (2009) suggests that the parent serves as the infant’s external regulator of optimal states of arousal. Field (1994) suggests emotional regulation may derive from synchronous interaction for the infant, and therefore if the caregiver is unavailable and

there is a lack of synchrony, the infant becomes dysregulated. In a different paper, Feldman (2014) cites other studies which support these theories about how infants outsource their regulation capacities to their caregiver. Feldman (2014) cites Hofer (1994) and describes how their research on rat pups illustrates the caregiver as providing a set of biobehavioral regulators for the infant through touch, odor, movements, and body rhythms as seen through his work on pups. Feldman (2014) also cites another study that states the synchronous exchanges that occur between an infant and caregiver such as coordinated gaze patterns, covocalizations, mutual expressions of positive affect, and touch between three and nine months, influences the infant's later capacity for self-regulation, symbol use, capacity for empathy, social adaptation, and depression rates. Therefore, the SFP serves as an appropriate example of how critical the effects of emotional unavailability from the caregiver can be. Field (1994) argues that the effects of emotional unavailability are "more severe than those of parental physical absence...[since] stimulation is not missing, but is disruptive and noncontingent." Moreso, as research has suggested, this also has large implications for the infants' capacity for emotional regulation. These studies indicate that the mechanism by which attachment models are formed between the infant and caregiver are through the body.

Among the many theories that developed in response to the results of the SFP is Tronick's Mutual Regulation Model (MRM) which describes the caregiver-infant interaction as "jointly regulated toward a state of reciprocity through a process of feedback that operates primarily on an affective level." (Mesman et al., 2009) This theory suggests that the dyad communicates through primarily facial affect which expresses changes in mental states and desires (often the infant's), towards which the *sensitive* caregiver then responds to. *Sensitive*,

within this context is used to describe caregivers that are particularly attune to these changes in the infant's affective state. The SFP exemplifies an instance of mismatching or failure in communication in order to first prompt the infant to attempt to repair the mismatch and then activates the infant's regulatory capacities when they fail to receive a reciprocal response.

Mesman et al. (2009) explain that within the SFP, infant regulatory responses were exemplified as gazing away from the caregiver or self-soothing motions like a hand-to-mouth movement. As a laboratory task, the SFP like the SSP, creates an artificial situation which may exaggerate the mismatch, asynchrony, or absence from the caregiver, in order to activate a response mechanism from the infant which researchers then interpret from infants' behavior. Uncoordinated interactions—where the dyad is asynchronous or missing cues from one another, can be frequent, but as Mesman et al. (2009) describe, with *sensitive* caregivers, the infant can successfully repair the imbalance with affective displays. The kinds of interactions described here may refer to instances when the infant solicits greater stimulation and attempts to engage the caregiver with their gaze or by smiling—and then is met with reciprocity or imitation and not flat affect as is shown in the SFP.

One may argue that the SFP does not reveal anything new about infant cognition but rather confirms the expectation that infants exhibit distress in response to a disruption of normal affective displays from their caregiver. However, the SFP is a great introduction and alternative to the SSP which generates observable data for variables like Maternal Sensitivity (MS), as introduced by Ainsworth to analyze the characteristics of caregiver behaviors. Researchers can look at how the SFP brings up aspects of MS and expand from this study and ask in what other conditions may *activate* behaviors that code for MS. This is crucial because it can allow the field

to understand further how the quality of caregiving can impact the construction of representational attachment models for infants. This section has considered how the infant cognitive model is primarily corporeal and has reciprocal demands. Tronick acknowledges that it is clear that the quality of caregiving significantly influences the *representations* the infant builds. The next section will go into detail about the MS variable and how caregiver cues reinforce the infant's working models.

Maternal Sensitivity & Mutual Regulation

First, we will continue to consider MS within the context of the SFP. Within the Mesman, et al. (2009) review was a section dedicated to parental interactive behavior in relation to infant still-face responsiveness. Researchers found that maternal interactive behavior serves as a predictor of infant still-face response (Mesman et al., 2009). Mesman et al., 2009 cite a study by Tronick et al. (1982) and state that MS measured during baseline was shown to be indicative of “more positive elicits” from the infant during baseline as well as in more positive affect regulation. These correlations of MS ratings were similar to when assessing parental interactive behaviors such as mirroring and game-playing (Mesman et al., 2009). These results highlight the benefits of synchrony in establishing emotional regulation as stated prior and these support Tronick's MRM which suggests the caregiver is the infant's module for emotion regulation. Mesman et al. (2009) also claim, “Maternal involvement and positive affect predicted more infant positive affect,” and depictions of anxiety or resignation from mothers was labeled *maternal intrusiveness* and these infants displayed more negative affect and less positive affect. Some of these studies being cited label MS more broadly, others look more specifically at some

variables they call *maternal involvement*, *maternal intrusiveness*, *maternal comforting*, or *maternal responsiveness*. Though these terms refer to the same ideas of reciprocity, it touches on the different characteristics of caregiving. A significant aspect of this paper is to breakdown the ways in which researchers have constructed these categories of analysis through nonverbal and primarily corporeal measures. These indices that describe the characteristic of MS that contribute to the makeup the process of infant-caregiver attachment formation.

Mary Ainsworth, who developed the SSP, conducted a study called The Baltimore Longitudinal Project (1969) and developed the MS construct to classify the actions of the caregiver. This construct intended on identifying the characteristics of parental care that establish “secure base behavior” or secure attachments with their caregivers. In her definition, MS consists of two main categories, in Ainsworth’s words they are: (1) Sensitivity vs. Insensitivity to the Baby’s Signals, (2) Cooperation vs. Interference with Baby’s Ongoing Behavior, (3) Physical and Psychological Availability vs. Ignoring and Neglecting and (4) Accepting vs. Rejection of the Baby’s Needs. In this context, the term *sensitivity* refers to whether the caregiver is accurately interpreting signals of the infant and adjusting their behavior in response. Figure 1 below sorts these categories as presented in Ainsworth (1969).

Figure 1.

Maternal Sensitivity Scale from Ainsworth, M. D., The Baltimore Longitudinal Project (1969).

Rating	<u>Sensitivity vs. Insensitivity</u>	<u>Cooperation vs. Interference</u>	<u>Physical and Psychological Availability vs. Ignoring and Neglect</u>	<u>Accepting vs. Rejection</u>
9	<p>Highly sensitive</p> <p>E.g. “[Caregiver] is exquisitely attuned to B’s signals; and responds to them promptly and appropriately...able to see things from [infant’s] point of view...perceptions of [infant’s] signals and communications are not distorted by [the caregiver’s] own needs and defenses...responses temporally contingent upon [infant’s] signals and communications.”</p>	<p>Conspicuously cooperative</p> <p>E.g. “[Caregiver] avoids interrupting an activity the baby has in progress...[when shifting the infant’s] activity, [the caregiver] engages his cooperation, by mood-setting, by [inviting, diverting, and engaging the infant] in reciprocal activity of some sort, often enough vocalization or play.”</p>	<p>Highly accessible</p> <p>E.g. “[Caregiver] arranges things so that [they] can be accessible to [infant] and infant to caregiver... keeps [infant] close enough so that [caregiver] can be aware of [infant’s] states, signals, and activities...very alert to [infant’s] whereabouts and doing.”</p>	<p>Highly accepting</p> <p>E.g. “[caregiver] is highly accepting of [infant] and [infant’s] behavior, even of behaviors which other mothers find hurtful or irritating.”</p>
7	<p>Sensitive</p>	<p>Cooperative</p>	<p>Usually accessible</p>	<p>Accepting</p>
5	<p>Inconsistently sensitive</p> <p>E.g. “[Caregiver’s] awareness of [infant] may be intermittent--often fairly keen, but sometimes impervious...may be prompt and appropriate in response to [infant’s] communications at times and in most respects, but</p>	<p>Mildly interfering</p> <p>E.g. “[Caregiver’s] interference tends to be mild, however, rather than being direct, abrupt, and physically forceful...tends to issue more verbal commands and prohibitions to</p>	<p>Inconsistently accessible</p> <p>E.g. “[Caregiver] is inconsistent in [their] accessibility to [infant]. Fairly long periods of close attention alternate with periods of seeming obliviousness to</p>	<p>Ambivalent</p> <p>E.g. “[Caregiver] may be somewhat impatient and irritable with the [infant] at times, rejecting [them] when [they cease] to be compliant or endearing, and yet there is enough</p>

	either inappropriate or slow at other times and in other respects. On the whole, however, [caregiver] is more frequently sensitive than insensitive.”	control the baby cross a distance than do [caregivers] with higher ratings... pays much less attention to mood-setting and to other techniques that aid smooth transitions from one activity to another.	[infant], during which [caregiver] is occupied with other things despite [infant’s] presence and perhaps even despite [infant’s] attempts to catch her attention.”	positive interaction to preclude a lower rating.”
3	Insensitive	Interfering	Often inaccessible, ignoring or neglect	Substantially rejecting
1	Highly insensitive E.g. “[Caregiver] seems geared almost exclusively to [their] own wishes, moods, and activity...This is not to say that [caregiver] never responds to [infant’s] signals...The delay in response is in itself insensitive...routinely ignores or distorts the meaning of [infant’s] behavior...[caregiver’s] response is inappropriate in kind or fragmented and incomplete.	Highly interfering E.g. “[Caregiver’s] are conspicuous for the direct, physical, forcefulness of their interruptions or restraints Others are conspicuous for the extreme frequency of interruption of the baby’s activity-in-progress, so that they seem "at" the baby most of the time-- instructing, training, eliciting, directing, controlling.”	Highly inaccessible, ignoring or neglect E.g. “[Caregiver] responds to [infant] when [they] deliberately [turn their] attention to do something to or for [infant]...[caregiver] is often so completely unaware of [infant’s] signals that [their] interventions are characteristically at [their] own whim and convenience.”	Highly rejecting E.g. “constant opposition to [infant’s] wishes, a generally pervasive atmosphere of irritation and scolding, by jerking him about with ill-concealed anger...positive aspects may be rare and isolated..”

Though the role of the caregiver is essential in influencing the infant’s *procedural representations*, there is a large aspect to the infant-caregiver relationship that requires mutual engagement and regulation. Bowlby often uses the term *mutual adaptation* to reference the ways in which both the mother and the infant coordinate their behaviors. According to him, the

caregiver brings genetic and temperamental variations, an attachment history and their own states of mind, while the infant also brings their own set of temperament variations resulting from their own *regulatory capacity* and *sensory sensitivities* (Bowlby, 1969). As mentioned before, though not the only outcome, most behaviors within the dyad are meant to maintain proximity but foster a *secure base* from which the infant can depart and return to. Bowlby states that four main components establish the spatial relationship between the caretaker-infant dyad: the child's attachment behavior, the child's behavior and *play*, the caregiver's caretaking behavior, and the specific caregiver's behavior which may be characterized as neglectful. He adds that each of these behaviors are dependent on the other and varying situations either elicit or inhibit certain behaviors as a consequence (Bowlby, 1969).

For example, Bowlby describes the roles of different *signaling behaviors* from the infant like crying, babbling, and smiling. These gestures which call for attention and increase proximity within the dyad have varying effects and result from different conditions. His analysis of a cue like smiling as a *signaling behavior* is significant because it is distinct from crying which may elicit a specific action related to particular needs like hunger or comfort. Bowlby states that instead, the infant's smiling elicits the encourages other behaviors from the mother like talking, stroking, picking up which all serve to lengthen their interaction. Therefore, this gesture may not serve to soothe a need like hunger but may work to enhance the relationship of the dyad. As Bowlby suggests, gestures like smiling may reinforce positive feelings for the caregiver and thus might increase the probability that the caregiver will respond to other signals in the future (Bowlby, 1969) If we consider that the infant is using their body to encourage the caregiver to *favor* their survival, we can begin to see the bidirectional effects of the attachment. Ultimately,

the role of the body as the mechanism by which the infant-caregiver bond forms is supported by a myriad of research studies. How can we incorporate the theories that suggest there is a reciprocal nature to the infant-caregiver relationship, into how we look at what is being communicated through their nonverbal cues?

Section 3: Methods of Assessment

Face-to-Face

Building closely off of Ainsworth's Maternal Sensitivity (MS) construct, researchers Beebe & Steele published a paper in 2013 that aimed to analyze infant-caregiver interactions in greater detail than it had been. Beebe & Steele (2013) conducted microanalytic observation by second-to-second assessments of videotaped face-to-face interactions between an infant of 4-months and their mother. Beebe & Steele (2013) claims that the method of microanalytic second-to-second assessment is beneficial to analyzing MS in the parent-infant dyad. These researchers concluded from their previous studies that videos would often need to be reexamined in slow motion in order to be coded properly. Beebe & Steele (2013) deemed it vital to code for both the *content* and *qualitative features* of the dyadic interaction. *Content* was accounted for by recording the exact sequence of communication between the dyad, and *qualitative features* were operationalized as rates of gaze aversion and affective valence. By categorizing these behavioral patterns of the dyad, researchers found the *quality* of these interactions predicted later classifications of attachment style at 12-months (Beebe & Steele, 2013). Using Bowlby's terminology, Beebe & Steele (2013) suggest these correlations illustrate interactive patterns between the parent and infant which ultimately construct *procedural representations* for the infant. This is not to say that infants are exclusively building their IWMs from microanalytic cues that are inaccessible to standard observation, but rather, these correlations indicate what specific qualities or actions from caregivers may have the greatest impact for the infant. In this paper, Beebe & Steele (2013) reference Beebe (2010) and summarize the results from this study

which predicted attachment outcomes at 12-months when observing a 2.5 minute mother-infant face-to-face interaction. Future disorganized (vs. secure) infants were more likely to exhibit more vocal and facial distress, emotional destabilization, and failure to touch which was characterized by touching their own skin less at four months (Beebe & Steele, 2013). In this study, the mothers of the infants who would be classified as disorganized (vs. secure) at 12 months were more likely to depict extensive gazing away from the infant's face, unpredictable head movements, lower emotional coordination with infant emotional changes, lower maternal contingent touch coordination with infant touch (Beebe & Steele, 2013)

Introducing the scrupulous lens of microanalytic analysis to the bodies of the caregiver and the infant allows researchers to better understand how these behaviors are directly constructing or reinforcing *procedural representations*. The methods described in Beebe & Steele (2013) are useful in exemplifying a procedure that considers the body as the principal mode of communication between the dyad. The findings of Beebe & Steele (2013) support the argument made in this paper which asserts that within the parent-infant dyad, the behaviors of both individuals as expressed through the body, can be used to better understand the relationship of the dyad. More specifically, when observing an infant-caregiver interaction, their bodies can communicate significant aspects of their relationship such as attachment style and thus communicate significant details about the security felt within the relationship. As research has shown, these variables are key to consider for there is potential for these variables to have great influence on the development of the infant. Ultimately, these methods can contribute to the field's understanding of what is necessary to establish cognitive models congruent with healthy attachment styles as well as contribute to how we interpret the malleability of these working

models past infancy and how to make these cognitive models more malleable past the point of the sensitive period.

Parental Embodied Mentalizing (PEM)

As discussed, the elements that drive the infant-caregiver attachment are primarily corporeal. Nonverbal cues like body synchrony and affect imitation between parent and infant become the primary mechanisms by which this dyad becomes a foundational model of emotional dependency for the infant. Understanding the role of the body within the formation of attachment helps researchers develop strategies to enhance the formation of secure attachment styles and potentially repair unhealthy attachment. A measure introduced in 2011 by Dana Shai and Jay Belsky called Parental Embodied Mentalizing (PEM) presents a body-based lens with which to analyze interactions of the parent-infant dyad. In particular, PEM looks at how bodily movement can be an expression of mentalization. Shai and Belsky use mentalizing theory to frame PEM—as stated in their paper, this theory suggests an infant’s overall development is influenced by the parent’s capacity to acknowledge and be influenced by the infant’s mental states. Shai & Belsky (2011) claims previous research has been looking at mentalization as a variable in the field through a singular verbal-based lens. They argue that observing mentalization capacities is possible beyond exclusively analyzing “verbal and declarative expressions”. Shai & Belsky (2011) build off of previous research to support their claims that the body is an appropriate site for analysis even within the parent-infant dyad. Shai & Belsky (2011) suggest the nonverbal cues in analysis will be communicating two things about caregivers: their implicit interpretation of the infant’s whole-body movements as communicative of their mental states, and the ways they

adjust their own *kinesthetic patterns* accordingly. This section will break down the constructs of PEM and transition into discussing the other ways in which the body can serve as a significant site for analysis in other therapeutic contexts.

Shai & Fonagy (2014) elaborate on the originally published PEM and further support the claim that the quality of *embodied* experiences with a caregiver influences the infant's mental and emotional development, and individual differences in these experiences can predict attachment security. Beebe (2000) is cited within this paper to add this point about the bidirectional mutual influence of the parent and infant: "the quality of this multimodal dialogue—nonverbal, reciprocal, rhythmic, and temporal exchanges between parent and infant—is associated with crucial developmental achievements, including formatting attachment relationships, developing a sense of agency, and improving in self-regulation." (Beebe, 2000; as cited in Shai & Fonagy, 2014) Therefore, because the parent-infant relationship is essential in building foundational models and expectancies for the infant, looking at the quality and characteristics of these interactions through a different lens may generate more insight into when and how behaviors translate into cognitive models for the infant.

This section will break down some of the specific language used within the PEM construct. PEM's approach consists of several main characteristics with regard to both the parent and infant body, some of them include: directionality, tension flow, pacing and tempo.

Directionality refers to "the direction of movement in relation to the individual's body center" and therefore refers to an instance where the infant may be moving their limbs to their body center in a shrinking or growing manner. When coding for this behavior, observers note whether the parents' movements are being made with the torso or extremities (including head) and the

relative degree of intensity at which the movement was made. *Tension flow* references the “sequences of fluency and restraint of the muscles” and therefore an increase in muscle tension throughout parts of the body. This may appear as stiff or tense movements, “rigid holding of body parts, torso, or the full body attitude.” *Pacing* refers to the “velocity of changes or alterations in movement” ranging from abrupt or rushed to gradual or sustained. This spectrum differentiates between movements that appear to be planned, controlled, and continuous, to movements without clear sequence or connections. Lastly, *tempo* refers to “the pulse of movement within a time unit” or its velocity. From these examples, researchers may interpret these cues as communicating a sense of withdrawal or displeasure in response to changes in tempo or directionality which are violating a certain fluidity or expectation that has been established between the two. In other words, the cues are being scored in response to the same cues. Shai & Belsky (2014) do not elaborate on how it may be difficult to discern what a ‘correct’ caregiver response to infant ‘withdrawal’ or ‘displeasure’ would be because this remains heavily dependent on a variety of factors such as what the infant’s expectations are. Since this measure cannot extract information about the infant’s desires or motivations, this measure does remain limited in the way many other Psychological methods rely exclusively on the observational data communicated by individuals. However as discussed in Section 2, MS is a variable that accounts for the infant’s and how sensitive caregivers express mentalization through their bodies would be accounted for using this measure. To use the language of PEM, a dyadic interaction where the caregiver demonstrates adaptable and stable directionality, tension flow, and tempo and responds to the infant’s cues would be consistent with higher caregiver sensitivity ratings.

An Example of Coding Parental Embodied Mentalizing

“Let us use a typical interaction between a parent and an infant to illustrate how parental embodied mentalizing is assessed. A mother offers her baby a toy by extending her arm forward, away from her body center (directionality) in a fast movement (pacing), in a linear direction toward (pathway) and close to the baby’s face (space). In response, the infant pulls his torso back (directionality) in a sudden movement (pacing) while his fists tense up (tension flow). To rate the mother’s embodied mentalizing capacities in this embodied circle of communication, observers have to examine how she responds to this behavioral sequence enacted by her baby. If the mother responds by withdrawing her arm that is holding the toy (directionality) and perhaps also by moving her torso back (directionality) to create more space between her and the baby (space), she would be rated high on the parental embodied mentalizing measure. Another interactive possibility is that the mother persists in holding the toy close to the infant’s face (space). The infant moves further back and twists his body away from the mother (directionality) and tenses up not only his fists but also his arms (tension flow). The mother, in response, starts shaking the toy at high speed (tempo) and moves it even close into the infant’s face (space). This persistent behavior on the part of the mother continues even when the infant inserts a thumb into his mouth (affect regulation) and loses his upright body posture (tension flow). A mother interacting this way would be rated very low on the parental embodied measure.” (Shai & Fonagy, 2014)

Though still a very new measure of assessment, some studies have used PEM and published findings which affirm its construct validity. When used in combination with verbal parental mentalizing, constructs such as the Parental Development Interview (PDI) indicate higher ratings of PEM, meaning the parent was exhibiting behaviors that were attuned to those of the infant, or successful *embodied mentalizing*, correlated with higher ratings of the PDI. In line with these findings, higher PEM ratings also correlated with higher MS ratings and predicted infant attachment security seven months later with higher ratings indicating higher likelihood of a secure attachment style.

Somatic Sympathy

Fonagy, Steele, Steele, Leigh, Kennedy, Mattoon, & Target (1995) refers to the cognitive elements of PEM to explain the mechanisms through which PEM establishes healthy attachment. Fonagy et al. (1995) explains that body-based mentalistic interactions “become somatic

registrations of the attachment relationship embedded in procedural memory.” This relates to the previous cognitive structures examined in this paper like Bowlby’s IWM. The phrase “registrations embedded in procedural memory” is describing an element similar to *representations* as Bowlby would call it. Both researchers claim that infants build models from their past experiences with their caregiver and these define their later expectations for relationships. Fonagy introduces the element of memory which, if thinking about explicit memories, may imply more conscious awareness of constructing such a model or intentionally mapping on one’s learned experiences to other individuals or experiences. Since Bowlby was coming from a strictly psychoanalytic background, he did not refer to memory as Fonagy did and perhaps understood it instead as a subconscious construction of *representations*. What Fonagy adds to Bowlby’s argument is that the body-based mentalistic interactions or the *registrations* that occur when the dyad is communicating or responding to each others’ cues, are primarily somatic and may even have physiological consequences (as seen in Section 2). Fonagy also uses the word somatic here to mean body or sensory based. Understanding how individuals interpret somatic data consciously becomes somewhat of a philosophical endeavor, however, the construction of measures such as PEM which interpret physical behavior as signaling certain mental states can be significant to consider for its empirical benefit.

In our understanding of infant-caregiver attachment, it is useful to consider similar concepts from other disciplines in order to approach this subject holistically to strengthen existing models and build new ways of analyzing these behaviors. The discipline of dance uses similar language to both 2011 and 2014 that introduce PEM as a method of assessment. In the article, *Kinesthetic Understanding and Appreciation in Dance* (2013), Carrol & Seeley discuss

the kinesthetic transfer that occurs when choreographic movements are communicated to audiences. Though they elaborate on this concept, Carrol and Seeley (2013) attribute the introduction of this concept to John Martin in his publication, *The Modern Dance* (2004). Martin asserts that *sympathetic muscular memory* allows individuals to surpass the need to consciously interpret movement. This works in a similar way to mirror neurons which are a large-scale network of neurons that have been found to activate in social events and are particularly relevant when considering the cognitive mechanisms of empathy (Iacoboni, 2009). Studies have shown that when an individual observes another individual execute an action, the same neurons are activated in both of their brains (Acharya & Shulka, 2012). Therefore, depending on conditions, there is potential for physiological imitation from one individual to another. This relates to the term *kinesthetic sympathy* used by Martin to explain the mechanism through which an individual responds to the movements of a dancer. Martin uses this premise to define movement as “the link between the dancer’s intention and your perception of it.” (Martin, 2004) Shai and Fonagy (2011) form this exact link between the analysis of movement and its components more generally and how it can be transferable to dyadic relationships like the mother-infant relationship which is primarily non-verbal and thus heavily reliant on the body for communication.

Another discipline that expands on these concepts regarding attachment and regulation through the body are Body Psychotherapy and Somatic Psychology which are subfields of Psychology that focus on shifting individuals’ attention to body-related sensations or *somatic experiences* for therapeutic purposes (United States Association for Body Psychotherapy, 2021). Clinical Psychologist and founder of the Somatic Experiencing Trauma Institute, Peter Levine

developed several clinical strategies for guiding clients through trauma management using a psychotherapeutic, somatic lens. An example of what these strategies look like are presented in a video published in 2017 by the National Institute for the Clinical Application of Behavioral Medicine titled, *Two Ways to Help Clients Feel Safe*. In this video, Dr. Levine guides clinicians through the “tools for relative safety” or some techniques that help clients self soothe and self regulate by bringing attention to the body or our “container of all our sensations and feelings” (Levine, 2017). The practice then involves instructing the client to place one hand on their forehead and the other on their chest or belly while then prompting them to “feel what goes on between the hands”. Another example of a practice that was described in this video instructs the client to place their “right hand under left arm[pit] on the side of the heart and other hand on shoulder”. Two other techniques he describes are the tapping technique and the muscle squeezing technique which instruct the client to tap their skin or squeeze their muscles to get a sense of the physical boundaries of their body. According to Dr. Levine, these techniques are useful in establishing an “island of safety” within one’s body which trauma may have disrupted but also “[enhance] the client’s ability to access bodily sensation” (Levine et al. 2018).

There is wide evidence throughout the field of Psychology that points to the benefits of mindfulness in reducing stress and anxiety among individuals (Hoffman, 2010). These strategies used by Psychotherapists may be arriving at the same end goal by employing mindfulness practices by bringing attention to physical sensation. Psychoanalysts may propose that as infants—since we are non-verbal—use our exclusively sensation-based experiences to build our regulatory models, and therefore these techniques benefit from the primary models individuals established in infancy. If we consider that attachment models develop and become foundational

during the sensitive period of infancy, can we assume that sensory patterns are also encoded during this period? As Dr. Levine's work demonstrates, the aim of fields like Body Psychotherapy is to better understand the 'somatic expressions of trauma' and use that information to develop coping strategies for individuals (Levine et al. 2018). Therefore, better understanding the role of the body within the formation of attachment can help researchers develop strategies to enhance the formation of secure attachment styles and potentially repair unhealthy attachment tendencies.

Conclusion

Attachment Theory Applied

Tracing the development of AT illustrates the changing nature of this subfield which continues to evolve today. This paper proposes that attachment theorists refine the body-based lens through which infant-caregiver interactions are analyzed. The physiological effects of failed behavioral expectations from a caregiver—as we see in results of the Strange Situation or the Still-face Paradigm, indicate that there is a somatic registration of these attachment-based working models. Improving the measures that consider the body as the primary means of communication can be beneficial for better understanding what both the infant and the caregiver are receiving and communicating. Research cited throughout this paper has indicated that secure attachments equip infants with emotion regulation and mentalization skills to a greater extent. Other studies indicate that ensuring a secure attachment can be a protective factor against several pathological disorders. Therefore, further research into attachment and how it forms is crucial for the short term and long-term well-being of infants

A paper published by Forslund et al. (2021) outlines the ways in which attachment research has been relevant in family courts. In particular, family-court settings use Attachment Theory as evidence with regard to child protection and child custody decision-making (Forslund et al., 2021). Forslund et al., (2021) claim it is significant to consider assessments of attachment quality and caregiving behavior in particular, to inform family-court decision making. The various researchers in this paper disagree on whether “assessments of attachment quality [should] inform child custody and child-protection decisions,” they claim these assessments are “most suitable for targeting and directing supportive interventions.” Some assumptions they

reference as being misused in court include, *the assumption that attachment quality equals caregiver sensitivity or relationship quality, or attachment security*. These elements are important to consider when analyzing infant-caregiver relationships. There is much more nuance to what aspects of the relationship may pose as risk factors for the infant. Therefore, assessments of attachment when used in collaboration with other measures including those of caregiving behavior, may be useful in legal settings where input from other fields is encouraged. Refining current tools and developing new methods of assessing the infant-caregiver relationship through a body-based lens in particular can influence both basic and applied research.

A Note on Diversity, Equity, & Inclusion in Psychology

This paper was written within the context of a national movement urging individuals and institutions to acknowledge the disparities of Diversity, Equity, & Inclusion (DEI) within their own spheres. It should be noted that the theories discussed in this paper have derived from studies with mainly WEIRD (Western, Educated, Industrialized, Rich, and Democratic) populations (Heinrich, Heine, & Norenzayan, 2010). We should consider the homogeneity of the populations that make up the majority of current psychological research critically. Particularly within the domain of attachment research where constructs and theories are developed about caregiving styles, at times with data from predominantly WEIRD samples. There have been studies that cross-culturally examine infant-caregiver attachment—the field has not been blind to this fact. However, there will continue to be room for studying Attachment Theory while considering populations that have been excluded from psychological research for a majority of the field's history.

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Appendices

Appendix A: Coding Behavior from the SS

Excerpt from: Attachment, Exploration, and Separation: Illustrated by the Behavior of One-Year-Olds in a Strange Situation (Ainsworth & Bell, 1970)

The narrative record yielded two types of measure. A frequency measure was used for three forms of exploratory behavior—locomotor, manipulatory, and visual—and for crying. A score of 1 was given for each 15-second time interval in which the behavior occurred. The maximum was 12 for an episode, since the standard length of an episode was 3 minutes, and longer or shorter episodes were prorated. Frequency measures were obtained for episodes 2 through 7. Product-moment reliability coefficients for two independent coders for eight randomly selected cases were as follows: exploratory locomotion, 0.99; exploratory manipulation, 0.93; visual exploration, 0.98; crying, 0.99. The second measure was based upon detailed coding of behaviors in which the contingencies of the mother's or stranger's behavior had to be taken into consideration. The codings were then ordered into 7-point scales on the assumption that not only could the same behavior be manifested in different degrees of intensity, but that different behaviors could serve the same end under different intensities of activation. There were five classes of behavior thus scored. Proximity- and contact-seeking behaviors include active, effective behaviors such as approaching and clambering up, active gestures such as reaching or leaning, intention movements such as partial approaches, and vocal signals including "directed" cries. Contact-maintaining behaviors pertain to the situation after the baby has gained contact, either through his own initiative or otherwise. They include: clinging, embracing, clutching, and holding on; resisting release by intensified clinging or, if contact is lost, by turning back and reaching, or clambering back up; and protesting release vocally. Proximity- and interaction-avoiding behaviors pertain to a situation which ordinarily elicits approach, greeting, or at least watching or interaction across a distance, as when an adult entered, or tried to engage the baby's attention. Such behaviors include ignoring the adult, pointedly avoiding looking at her, looking away, turning away, or moving away. Contact- and interaction-resisting behaviors included angry, ambivalent attempts to push away, hit, or kick the adult who seeks to make contact, squirming to get down having been picked up, or throwing away or pushing away the toys through which the adult attempts to mediate her interventions. More diffuse manifestations are angry screaming, throwing self about, throwing self down, kicking the floor, pouting, cranky fussing, or petulance. These four classes of behavior were scored for interaction with the mother in episodes 2, 3, 5, and 8, and for interaction with the stranger in episodes 3, 4, and 7. Search behavior was scored for the separation episodes 4, 6, and 7. These behaviors include: following the mother to the door, trying to open the door, banging on

the door, remaining oriented to the door or glancing at it, going to the mother's empty chair or simply looking at it. Such behaviors imply that the infant is searching for the absent mother either actively or by orienting to the last place in which she was seen (the door in most cases) or to the place associated with her in the strange situation (her chair.)

In scoring these five classes of behavior, the score was influenced by the following features: the strength of the behavior, its frequency, duration, and latency, and by the type of behavior itself—with active behavior being considered stronger than signaling. Detailed instructions for scoring these behaviors as well as for coding the frequency measures are provided elsewhere.¹

¹ The following materials have been deposited with the National Auxiliary Publications Service: instructions for conducting the strange situation procedure, instructions to the mother, instructions for coding behaviors for frequency measures, and instructions for coding socially interactive behaviors. Orders NAPS Document 00762 from ASIS National Auxiliary Publications Service, c/o CMM Information Sciences, Inc., 22 West 34th Street, New York, New York 10001; remitting \$3.00 for microfiche or \$1.00 for photocopies.

Appendix B: DSM classifications of RAD

From: Forty-four juvenile thieves revisited: from bowlby to reactive attachment disorder (Follan & Minnis, 2010)

Table 2. A summary of and comparison between the two diagnostic classifications of RAD

DSM IV	ICD10
<i>Key feature</i> Disturbance of social relatedness in most contexts associated with grossly pathogenic care	Abnormalities in social relationships associated with severe parental neglect, abuse or serious mishandling
<i>Course</i> Onset in first 5 years. Persistent but remission is possible in appropriately supportive environment	Onset in first 5 years. Persistent but reactive to changes in environmental circumstances.
<i>Inhibited form</i> Excessively inhibited or hypervigilant social interactions	<i>RAD</i> Fearfulness and hypervigilance which do not respond to comforting
Ambivalent or contradictory responses	Contradictory or ambivalent social responses particularly at partings and reunions
No Equivalent	Poor social interaction with peers; aggression towards self and others; misery or apathy; growth failure in some cases
<i>Disinhibited form</i> Diffuse attachments	<i>Disinhibited attachment disorder</i> Diffuse non-selectively focused attachments in early childhood
Excessive Familiarity with strangers	Attention seeking and indiscriminate friendliness in middle childhood
No Equivalent	Poorly modulated peer interactions; may be associated emotional or behavioural disturbances

DSM, Diagnostic and Statistical Manual; ICD, International Classification of Diseases; RAD, reactive attachment disorder.

Appendix C: AAI example

From: The Adult Attachment Interview (George, Kaplan, & Main, 1985)

ADULT ATTACHMENT INTERVIEW PROTOCOL

Introduction

I'm going to be interviewing you about your childhood experiences, and how those experiences may have affected your adult personality. So, I'd like to ask you about your early relationship with your family, and what you think about the way it might have affected you. We'll focus mainly on your childhood, but later we'll get on to your adolescence and then to what's going on right now. This interview often takes about an hour, but it could be anywhere between 45 minutes and an hour and a half.

1. Could you start by helping me get oriented to your early family situation, and where you lived and so on? If you could tell me where you were born, whether you moved around much, what your family did at various times for a living?

This question is used for orientation to the family constellation, and for warm-up purposes. The research participant must not be allowed to begin discussing the quality of relationships here, so the "atmosphere" set by the interviewer is that a brief list of "who, when" is being sought, and *no more than two or three minutes* at most should be used for this question. The atmosphere is one of briefly collecting demographics.

In the case of participants raised by several persons, and not necessarily raised by the biological or adoptive parents (frequent in high-risk samples), the opening question above may be *"Who would you say raised you?":* The interviewer will use this to help determine who should be considered the primary attachment figure (s) on whom the interview will focus.

Did you see much of your grandparents when you were little? If participant indicates that grandparents died during his or her own lifetime, ask the participant's age at the time of each loss. If there were grandparents whom she or he never met, ask whether this (these) grandparents) had died before she was born. If yes, continue as follows: Your mother's father died before you were born? How old was she at the time, do you know? In a casual and spontaneous way, inviting only a very brief reply, the interviewer then asks, Did she tell you much about this grandfather?

Did you have brothers and sisters living in the house, or anybody besides your parents? Are they living nearby now or do they live elsewhere?

2. I'd like you to try to describe your relationship with your parents as a young child if you could start from as far back as you can remember?

Encourage participants to try to begin by remembering very early. Many say they cannot remember early childhood, but you should shape the questions such that they focus at first around age five or earlier, and gently remind the research participant from time to time that if possible, you would like her to think back to this age period.

Admittedly, this is leaping right into it, and the participant may stumble. If necessary, indicate in some way that experiencing some difficulty in initially attempting to respond to this question is natural, but indicate by some silence that you would nonetheless like the participant to attempt a general description.

3. Now I'd like to ask you to choose five adjectives or words that reflect your relationship with your mother starting from as far back as you can remember in early childhood--as early as you can go, but say, age 5 to 12 is fine. I know this may take a bit of time, so go ahead and think for a minute...then I'd like to ask you why you chose them. I'll write each one down as you give them to me.

4. Now I'd like to ask you to choose five adjectives or words that reflect your childhood relationship with your father, again starting from as far back as you can remember in early childhood--as early as you can go, but again say, age 5 to 12 is fine. I know this may take a bit of time, so go ahead and think again for a minute...then I'd like to ask you why you chose them. I'll write each one down as you give them to me. (Interviewer repeats with probes as above).

5. Now I wonder if you could tell me, to which parent did you feel the closest, and why? Why isn't there this feeling with the other parent?