

Paced Presentation Symposium (formerly called Pecha Kucha Group Session)

Note: The integrative statement and each summary will be uploaded to the 2011 Submission Website as individual PDF files. For the purpose of example, we joined all of these files together into one file. For reference only, word counts appear at the end of the integrative statement and each summary.

Symposium: The Neurocognitive, Physiological, and Cognitive Markers of Insecure Attachment Across the Lifespan

In recent years, attachment research has been enriched by exploring links between the quality of internal working models of attachment and the physiological, neurocognitive, and neurobiological correlates of these models. Based on the theory that insecure attachment lays the groundwork for suboptimal emotion regulation and cognitive functioning, the five studies presented here provide additional compelling data concerning the physiological and neurocognitive signatures of attachment organization. These novel studies advance the state of the science by spanning developmental phases and incorporating diverse methodologies, including electrophysiological, psychophysiological, and cognitive paradigms.

Using an event-related potential design, the first paper demonstrates that disorganized infants evidence neurocognitive indices of fear in response to viewing images of their primary caregivers. A second study explores concurrent associations among attachment organization and questionnaire-based, neuroendocrine, and psychophysiological indices of emotion dysregulation in school aged children, with findings that insecure children show increased emotion reactivity and poorer emotion regulation as compared to secure children. The third presentation illustrates that adults diagnosed with borderline personality disorder, a disorder shown to be associated with difficult attachment experiences, exhibit hyperresponsiveness during a facial emotion recognition paradigm. The fourth study integrates neurocognitive, qualitative, and self-report measures to demonstrate how insecure attachment in adulthood heightens the association between stressful arousal and difficulties with cognitive processing. Finally, the fifth study documents links between insecure adult attachment and heightened electrophysiological responsiveness to social exclusion. Taken together, the studies provide important evidence for the association between attachment insecurity and a range of biological markers of suboptimal emotional and cognitive functioning across the lifespan.

[255 words]

Presentation 1: An Electrophysiological Investigation of Disorganized Infants' Attention to Caregivers

Parental frightening behavior is associated with infant disorganized behavior in the Strange Situation (SS; e.g., Abrams et al., 2006). This finding is often considered evidence for Main and Hesse's (1990) hypothesis that fear of the parent underlies home-reared infants' disorganized behaviors in the SS. Institutionally-raised infants can also display disorganized behaviors in the SS, but given their anomalous rearing conditions, disorganization may be due to factors other than frightening caregiver behaviors (see Solomon & George, 1999). Given infants' inability to fully verbally express their thoughts and feelings, researchers often employ electrophysiological techniques as a "window in(to)" infants' cognitive and affective experiences. Bridging neuroscience and attachment research, this study is the first to explore the electrophysiological correlates of infant disorganization in home and institutionally-reared infants.

In this study, neurocognitive responsiveness was evaluated using event-related potentials (ERPs), or patterns of brain electrical activation that are linked in time to a given stimulus. Previous infant research indicates that one ERP component, the NC, is evoked during allocation of attention. Further, the amplitude of the NC increases during the processing of fear related stimuli, perhaps because frightening stimuli inherently elicit attention (Nelson & de Haan, 1996). In light of these data, we hypothesize that if home-reared disorganized infants are frightened of their caregivers, then within a home-reared sample ($n = 27$, 6 disorganized) disorganized infants will evidence a larger NC amplitude when viewing pictures of their caregiver's (neutral) face than will organized infants. In contrast, we hypothesize that disorganized infants will not show larger NC amplitudes in a comparison condition involving the face of an unknown female "stranger," presumably because this face will not induce fear. Finally, given that infant disorganization in institutional settings may be due to factors other than frightening caregiver behavior, we hypothesize that NC amplitudes on both sets of facial stimuli will not differ for the disorganized vs. organized infants raised institutionally ($n = 19$, 12 disorganized).

Results support study hypotheses. Specifically, among home-reared infants, disorganization was related to greater NC amplitude to caregiver pictures at both midline and lateral electrode sites; in contrast, the NC to stranger did not differentiate disorganized from organized home-reared infants.

Finally, no differences were seen for institutionally-raised disorganized vs. organized infants for either caregiver or stranger stimuli. These data suggest that home-reared disorganized infants devote greater attentional resources to parental stimuli, possibly due to their frightening emotional valence, than do organized infants. In contrast, the lack of NC amplitude differences amongst the institutionally-reared infants suggests that disorganization in this context may result from processes other than frightening caregiving. Suggestions for future multi-method investigations of disorganization's ontogeny are discussed.

[434 words]

Presentation 2: Attachment in Childhood: Links with Subjective, Neuroendocrine, and Psychophysiological Indices of Emotion Reactivity/Regulation

Theory and research suggest that infant self-regulation of emotion emerges from the co-regulation of emotion within the context of the infant-parent attachment relationship (e.g., Cassidy, 1994), with more secure attachments fostering children's healthy psychosocial development (Fonagy et al., 2001). Research in younger children (e.g., Sroufe et al., 2005) and in adults (Pietromonaco et al., 2006) supports a link between secure attachment and emotion regulation, but this association has yet to be evaluated in school aged children. This age gap, due in part to the lack of appropriate attachment assessments, now can be addressed using the Child Attachment Interview (CAI; Target, Fonagy, & Shmueli-Goetz, 2003). This study extended current research by examining concurrent associations among school aged children's attachment organization and three indices of emotion reactivity and regulation: self- and parent-report, neuroendocrine, and psychophysiological. Based on extant research conducted with infants and adults, we hypothesized that insecure children would demonstrate increased emotion reactivity and poorer emotion regulation on study tasks.

Hypotheses were evaluated in a sample of ninety-seven 8 to 12 year-old children (56.6% boys; mean age 10.01 years old; 86.6% Caucasian). Children completed the CAI (Target et al., 2003) and provided salivary cortisol samples before and after this interview. Children also completed a self-report questionnaire regarding their emotional experience (How I Feel; Walden et al., 2003) and a fear-

potentiated startle modulation paradigm (Grillon et al., 1999) in which their response to auditory startle probes was measured via contractions of their orbicularis oculi (i.e., a possibility they would receive a puff of air to the neck) and safety (i.e., no puffs of air). This psychophysiology paradigm is a modification of the traditional startle paradigm that permits the assessment of emotion regulation via children's differential negative arousal during conditions of threat and safety. In addition, parents reported on their child's emotion regulation (Emotion Regulation Checklist; Shields & Cicchetti, 1995, 1997).

Results from analyses of covariance (ANCOVAs) indicate that children classified as secure were rated by their parents as having better emotion regulation as compared to insecure children. Dismissing children evidenced a smaller decrease in cortisol levels in response to the attachment interview as compared to secure and preoccupied children. After standardizing individual startle responses within participants, startle data was analyzed utilizing a growth curve modeling technique (Singer & Willett, 2003). The results of the model suggested that disorganized children showed increased initial reactivity and a slower decay rate in startle response during conditions of threat. In addition, employing a continuous scale of attachment security, results of a hierarchical regression model revealed that the startle responses of children with higher levels of attachment security indicated greater discrimination between safety and threat.

In general, findings suggest that insecure attachment is related to negative emotion reactivity and poorer emotion regulation. Implications for the impact of parental care on children's emotional development will be discussed.

[469 words]

Presentation 3: Mentalization and the Perception of Facial Emotions in Individuals with Borderline Personality Disorder

Mentalization is the ability to recognize the underlying emotions and mental states that motivate oneself and others. Effective mentalization is thought to develop in secure attachment relationships (Fonagy & Target, 2006) and to confer a heightened ability to sensitively perceive and interpret others' emotional cues. In contrast, insecure attachment experiences, including exposure to

trauma in childhood, is linked to mentalization deficits about others' emotional states (Fonagy, 2005; King-Casas, Sharp, Lomax-Bream, Lohrenz, Fonagy, & Montague, 2008; Pollak & Sinha, 2002). Adults with BPD have a high prevalence of exposure to early trauma as well as ongoing difficulty in close interpersonal relationships; these individuals are also hypothesized to have difficulty mentalizing about others' emotional states. Using a novel facial morphing paradigm, the current study explores emotion recognition deficits in adults with BPD, both under normal laboratory conditions and following attachment-related stress. We hypothesize that in comparison with control participants, individuals with BPD will be hyperresponsive but less accurate in the recognition of facial emotional expressions, especially when the attachment system is activated.

Thirty-six generic photographs of men and women were presented for each of six emotions: anger, fear, sadness, disgust, surprise and happiness. Each trial began with a neutral face which was slowly morphed into an emotion in 50 stages, with each stage presented for 450ms. Participants were told to press a computer key when they felt confident that the facial morph conveyed any one of the six emotions. In study 1, the capacity for emotion recognition of 35 BPD patients and 35 matched controls was compared using morphed faces under normal laboratory conditions. Preliminary results suggest that, under these conditions, BPD patients are more hyperresponsive and also recognize emotions more accurately than normal controls. With increasing activation of the attachment system, however, we hypothesize that this hyperresponsiveness will lead to increased inaccuracy in emotion recognition. Therefore, in study 2, the same paradigm was used, but participants (n=20 BPD patients and n=20 normal controls), were randomized to an attachment versus neutral prime condition. Finally, in study 3, we investigated whether the ability for emotion recognition of BPD patients changed as a result of inpatient psychodynamic mentalization-based treatment in a sample of 40 BPD patients. Results will be analyzed and discussed in terms of the association between mentalization, attachment-related stress, and BPD. The implications of these results for further developmental research and clinical practice will also be explored.

[395 words]

Presentation 4: The Moderating Role of Insecure Attachment on the Relationship Between Stressful Arousal and Cognitive Functioning

Insecure attachment in adulthood is empirically linked to deficits in stress and emotional regulation as well as preferential attention toward emotional stimuli. Specifically, adult attachment insecurity is associated with greater incidence of psychopathology and more pronounced physiological stress reactivity (Dozier et al., 1999; Rifkin, 2005). Adult attachment insecurity is also linked with increased attention toward emotionally-laden verbal and pictorial stimuli (Maier et al, 2005; Niedenthal et al., 2002). However, little attention has been devoted to explaining the common mechanisms underlying the links between attachment insecurity, stress regulation, and cognitive functioning. As indicated in Figure 1, the current study is the first to investigate a moderational model, in which insecure attachment is hypothesized to strengthen the association between stressful arousal and difficulties in cognitive processing. By relying on both self-report and interview measures of adult attachment and by evaluating a range of cognitive and neurocognitive outcomes, this study provides a novel, multidisciplinary contribution to our current understanding of adult attachment and its correlates.

A sample of 54 college undergraduates (n=27 men, 27 women) completed the Adult Attachment Interview (AAI; George, Kaplan, & Main, 1996) and three attachment self-report measures (RO- Bartholomew & Horowitz, 1991; ECR-Brennan, Clark, & Shaver, 1998; RSQ-Griffin & Bartholomew, 1994). Responses to the three self-report measures were reduced to yield two composite attachment factors (worry and preference for closeness), and the AAI was transcribed and coded for one secure (Autonomous) and three insecure (Dismissing, Preoccupied, Unresolved) adult attachment classifications.

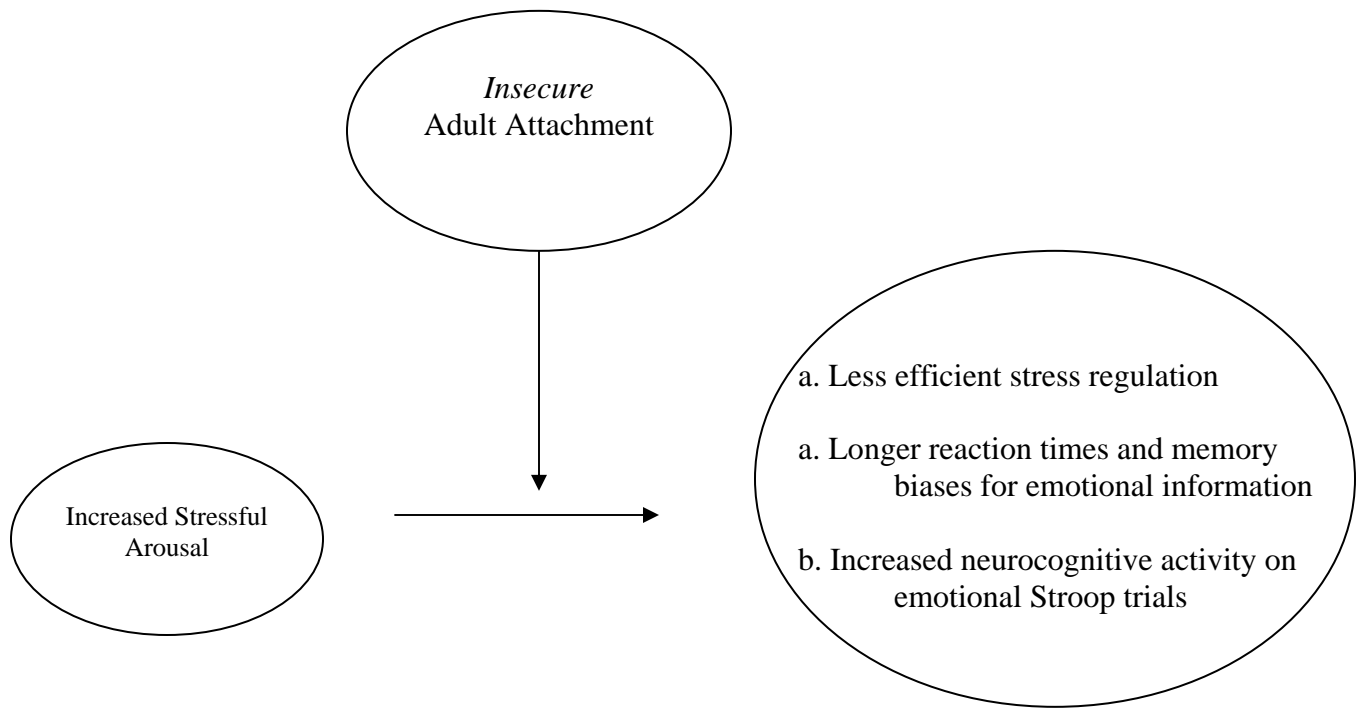
During the second laboratory session, participants' reaction times and accuracy to emotionally-valenced and neutral words were recorded as participants completed two emotional Stroop tasks. Electrodes placed on participants' scalps concurrently recorded brain electrical activation using non-invasive high-density ERP technology. In a standard pre- and post-design, participants completed one Stroop task at the beginning of the session and then completed another following a 30-minute auditory

attachment-related stressor (Rifkin, 2005). Affective responses to the stressor were evaluated with the PANAS (Watson et al., 1987) and SAM (Bradley & Lang, 1994) self-report scales.

Results indicated that individuals who endorsed high attachment-related worry reported more negative affect over the course of the laboratory paradigm, and individuals who had an unresolved classification on the Adult Attachment interview reported blunted emotional reactions to the attachment-related stressor. Further, unresolved individuals displayed longer reaction times to all Stroop words in the post-stressor condition. Finally, individuals with high attachment-related Worry or an unresolved AAI classification displayed more pronounced positive slow wave (PSW) ERP activation, indicating that in the post-stressor condition these individuals allocated more cognitive resources toward processing emotionally-valenced Stroop words. Results provide preliminary evidence that insecure adult attachment patterns, assessed on both self-report and interview measures, may moderate the relationship between stress responsiveness and unique patterns of cognitive and neurocognitive processing, particularly after exposure to attachment-related stress. The implication for future multimethod investigations of adult attachment and its behavioral and neurocognitive correlates will be discussed.

[478 words - tables and figures do not count toward maximum number of words]

Figure 1. Adult attachment quality moderates the effects of stressful arousal on cognitive and neurocognitive performance.



Presentation 5: Avoidant Attachment, Social Exclusion, and Re-entry into Fair Play

The experience of social exclusion is thought to activate the same neural circuits as those involved in detecting physical pain. This identical circuitry, which includes the medial prefrontal cortex, is also thought to underlie attachment behaviors in humans. In this study, we employ a novel cyberball cognitive task, used previously to study the neural underpinnings of social rejection, to explore the relationship between electrophysiological markers of social exclusion and attachment-related processes in adulthood.

Specifically, we collected high-density (128-electrode) EEG electrophysiological data from male and female participants (n=27) while they played an event-related adaptation of the cyberball game. In this paradigm, the participant throws and receives a ball on a video screen from two other players. Unbeknownst to the participant, the "fair play" block of the game, in which the participant can actively engage, folds into a social exclusion block, in which the ball is purposefully not thrown to the participant. To intensify the attachment-related element of the cyberball game, we added a third "reunion" block in which "fair play" resumes. Finally, adult attachment styles and levels of ostracism distress were measured using standard self-report instruments. Given that the neural circuitry underlying social exclusion and attachment-related processes are shared, we postulate that individual differences in attachment organization ought to relate to brain responses across the cyberball game. We specifically hypothesize that individuals with an insecure attachment style will evidence more electrical brain activation during the social exclusion condition, particularly in the medial prefrontal cortex.

Results indicate that across all participants, ostracism distress was specifically related to slow wave voltages (580ms-900ms) in the medial frontal region during the exclusion block ($r=.62$, $p<.001$). However, avoidant attachment was uniquely associated with greater neural response (difference wave) across the first and second fair play blocks in the medial frontal region ($r=.55$, $p<.01$) (200-350ms). Our data suggest that the attachment-related neural circuitry in individuals with an avoidant attachment style is more active upon re-entry to a fair play situation, perhaps reflecting the lasting effect of prior social exclusion on the return to fair play. Directions for future electrophysiological attachment research will be discussed.

[347 words]
