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Dynamic changes in autonomic nervous system reactivity: Three short stories that might provide insight into emotional wellbeing

Three short stories examining dynamic changes in ANS reactivity



- 1. Affect contagion
- 2. Vagal flexibility
- 3. Differentiated stress states

1. Affect contagion



Psychophysiological approach to affect contagion: Continuous physiological responses to index affective states



Physiological
covariation
(concurrent)

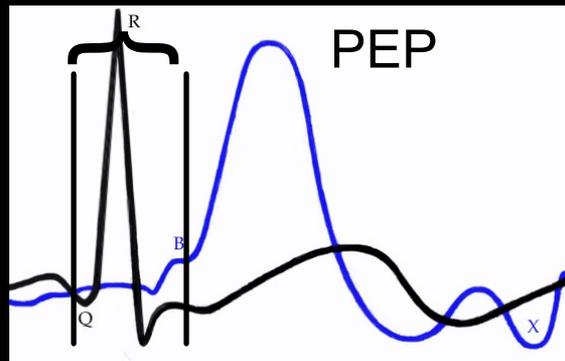
Partner A

Partner B

Physiological
linkage
(time-lagged)

Partner A

Partner B



Pre-ejection period (SNS) and RSA (PNS)
as the primary indicators
of affect during dyadic interactions

Mother-baby affect contagion

Can babies detect their mother's emotional responses?



Evaluated speech/math

Positive emotion film



Recruited mothers and 12-14 month infant

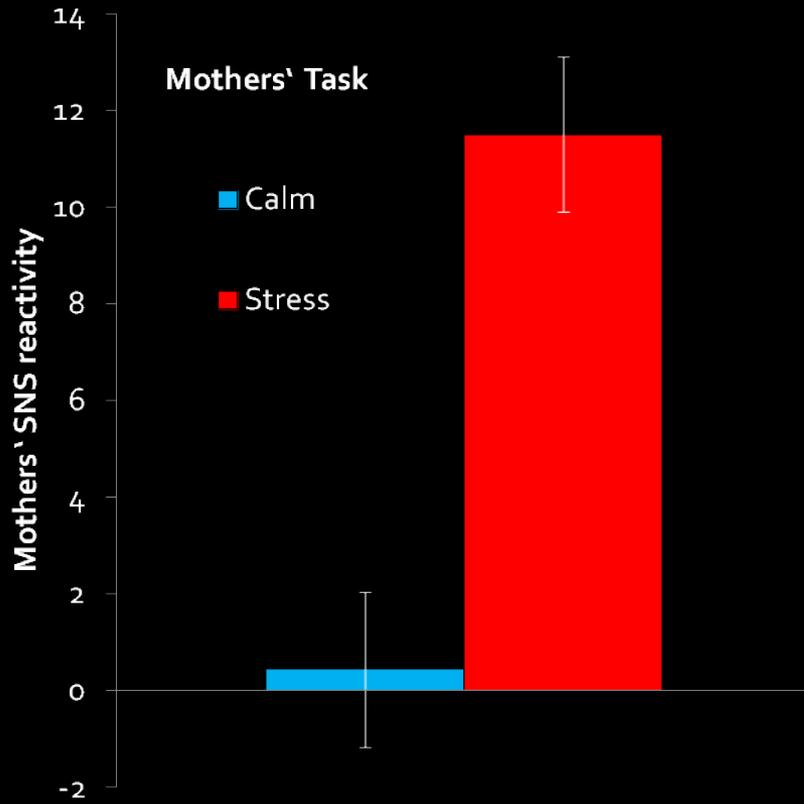


While infants were playing in another room
Mothers completed either a laboratory stressor
or watched a positive emotion induction film

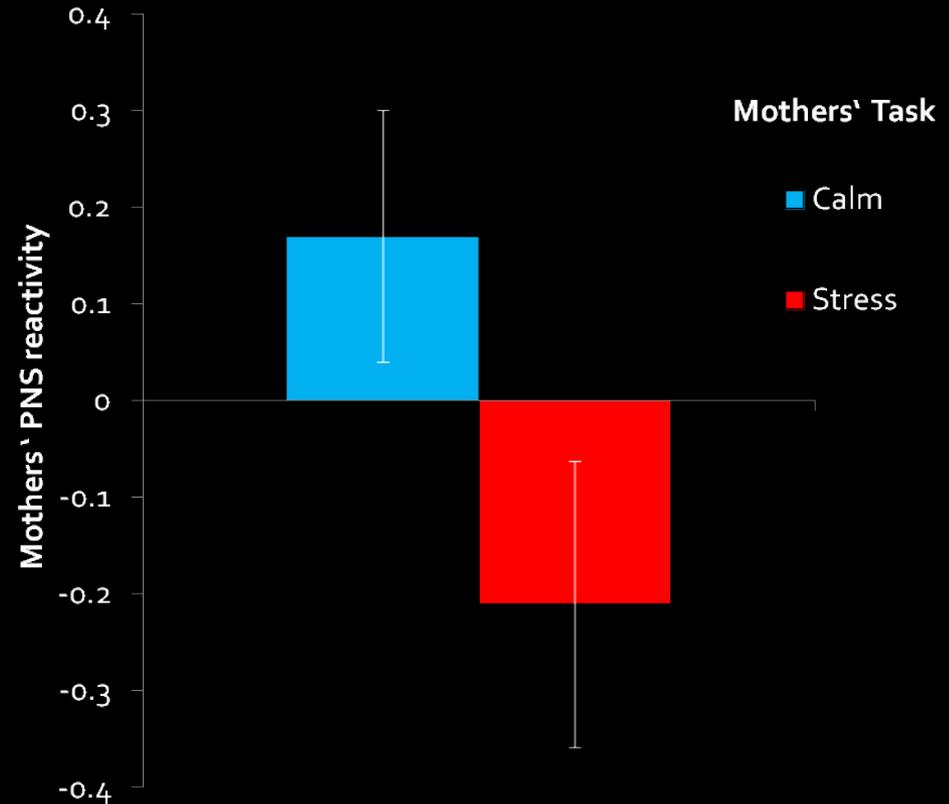
Reunited mother and infant

Waters, Karnilowicz, West, & Mendes, *JEP: General*, 2017

Large differences between mothers' SNS and PNS reactivity from stress and calm conditions

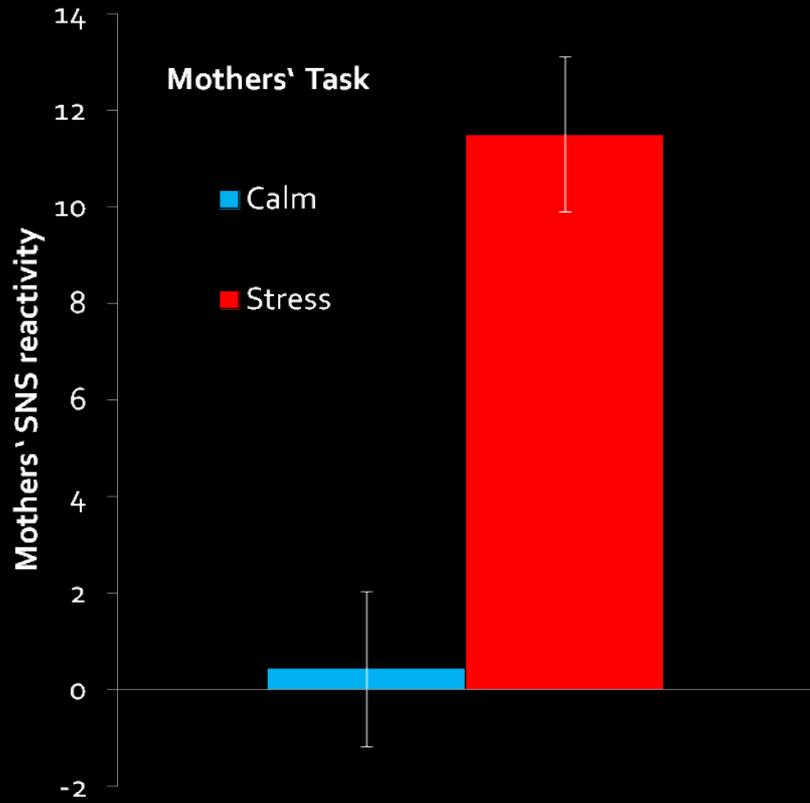


$F(1,92)=21.48, p < .001$

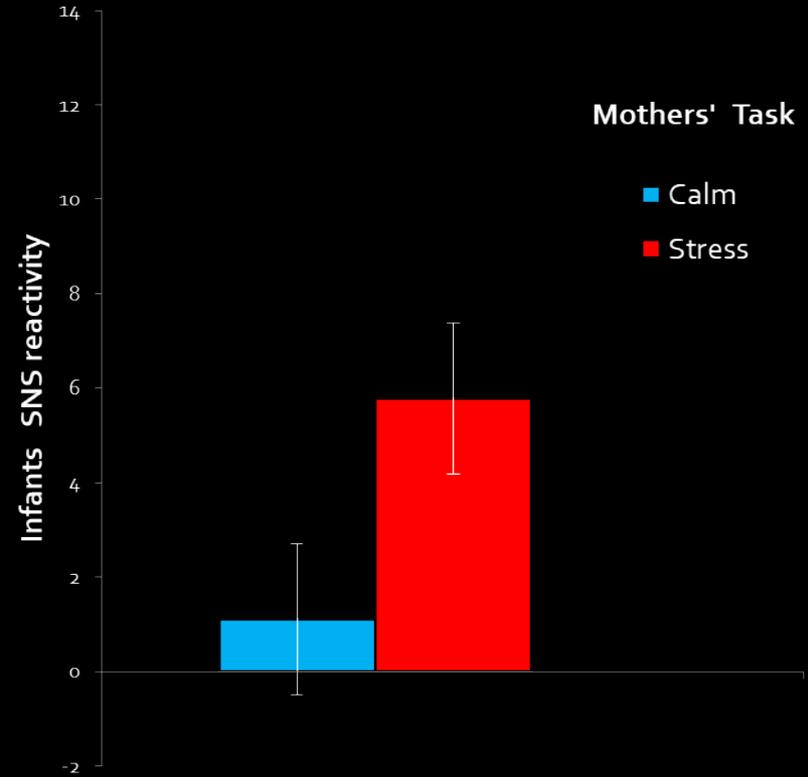
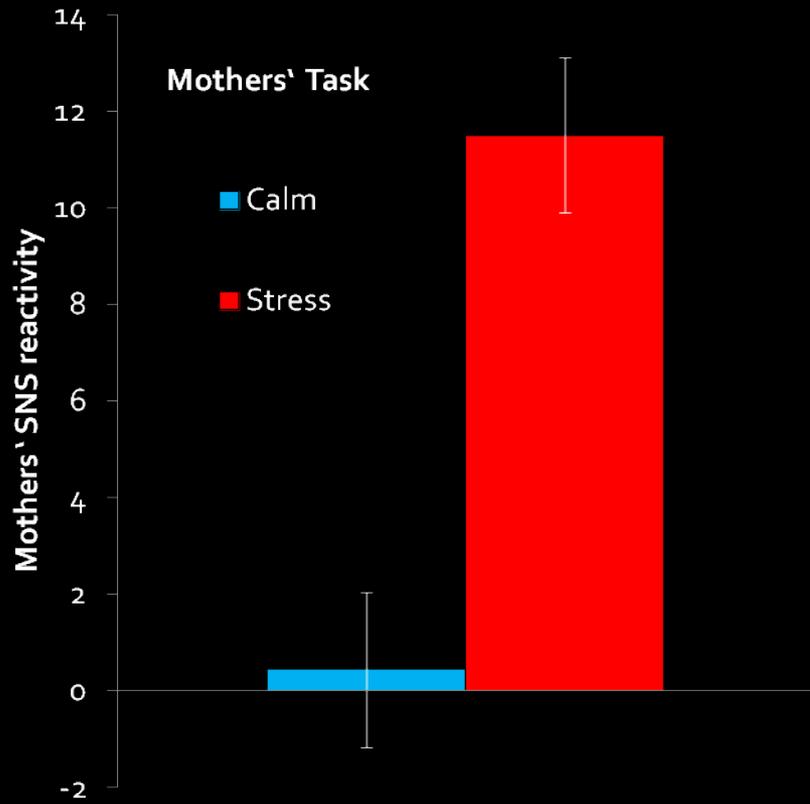


$F(1,94)=4.09, p < .046$

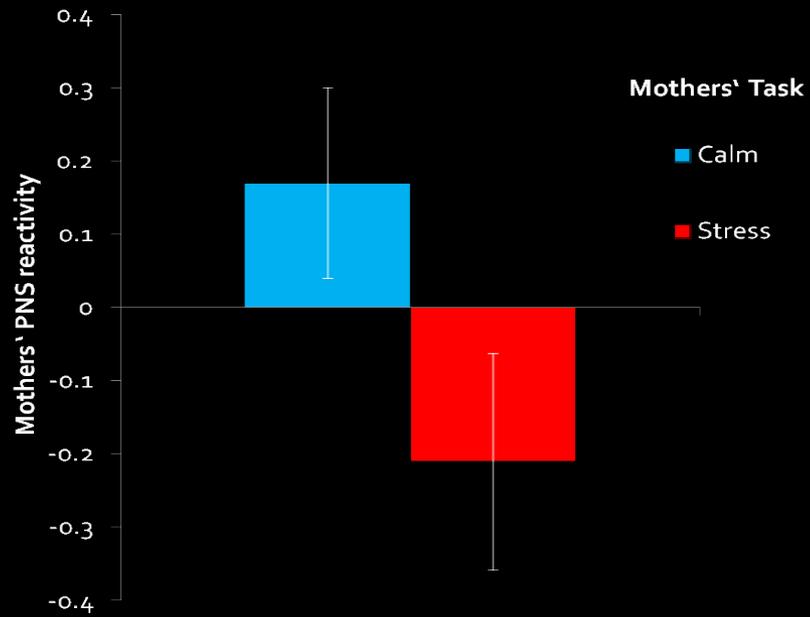
Infants' SNS reactivity from stress and calm conditions



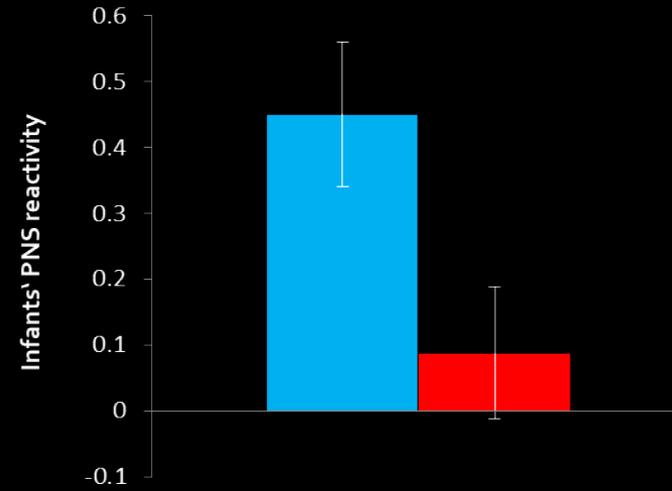
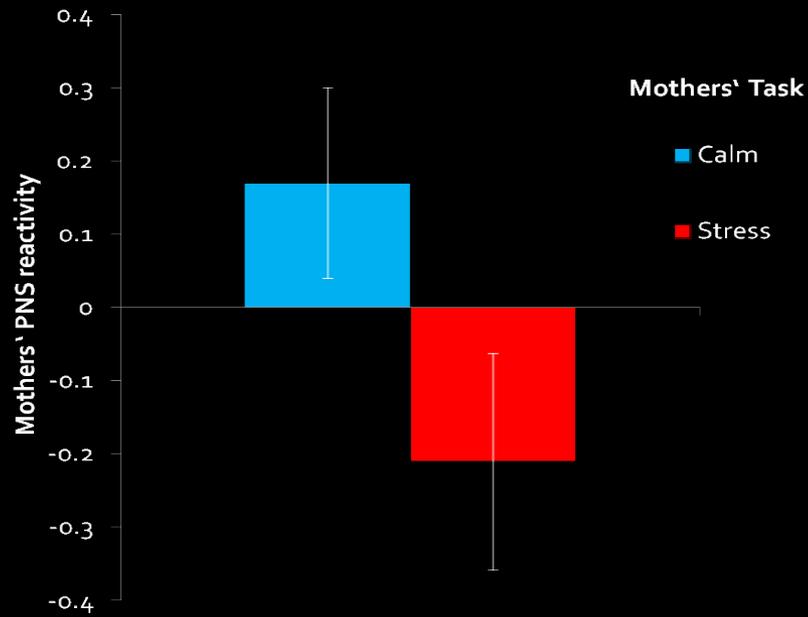
Infants' SNS reactivity from stress and calm conditions



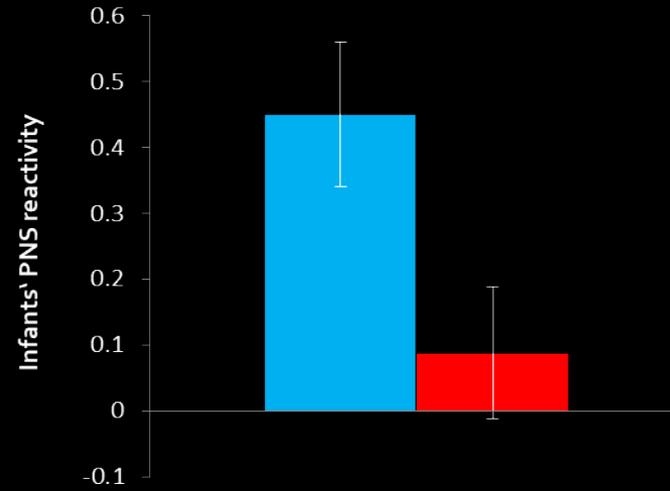
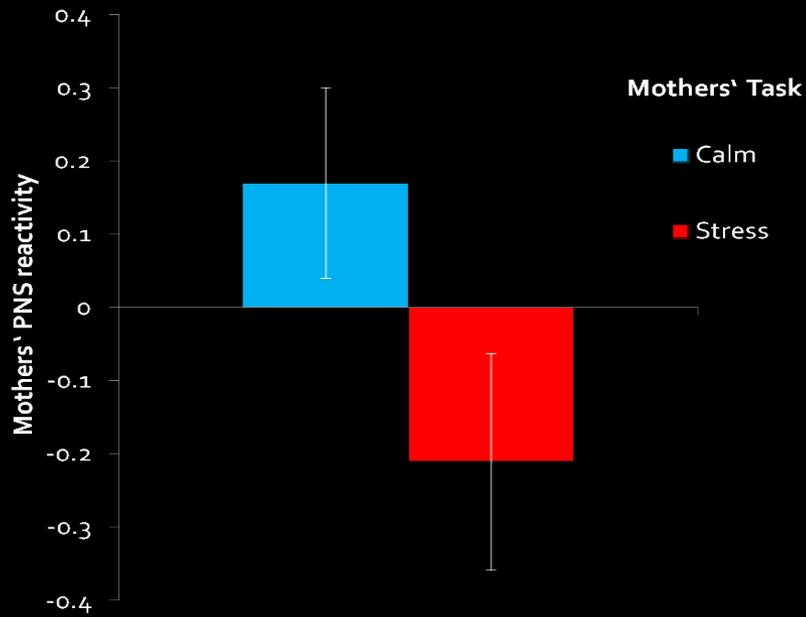
Infants' PNS reactivity from stress and calm conditions



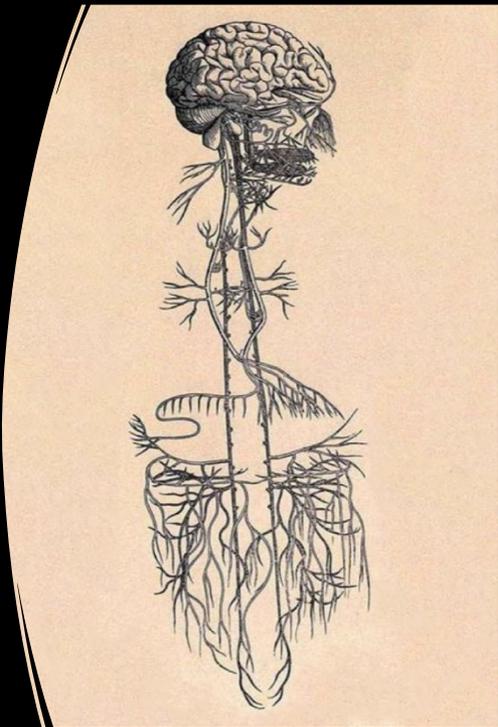
Infants' PNS reactivity from stress and calm conditions



Infants' PNS reactivity from stress and calm conditions

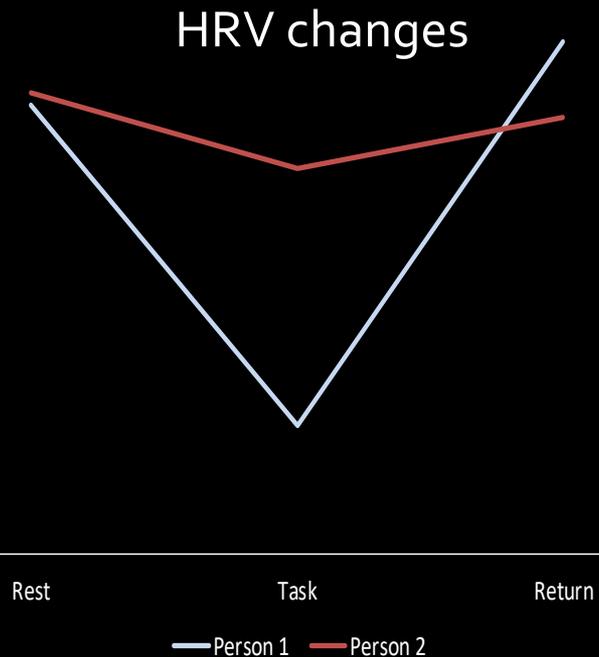
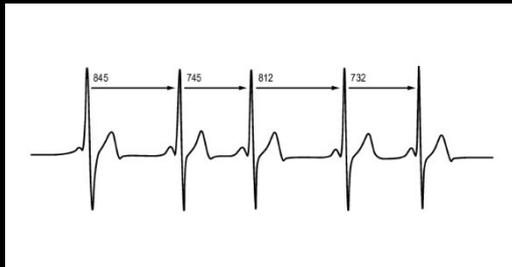


2. Cardiac Vagal Flexibility



- Individual differences in vagal flexibility
 - withdrawing and applying the vagal brake as required by the situational or task demands
 - Examining individual differences in vagal flexibility by specifically looking at HRV decreases during attention tasks
- Is vagal flexibility associated with increased emotional perception and accuracy?

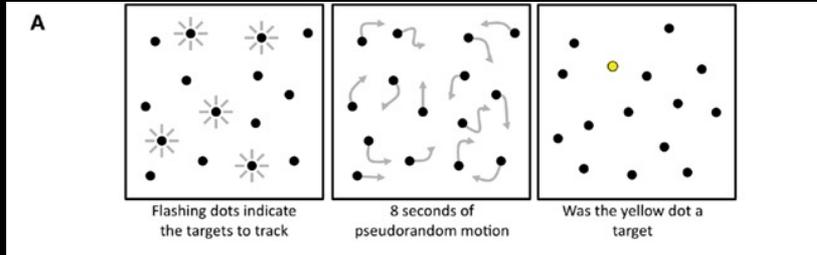
Photolithograph of a 1543 woodcut by Andreas Vesalius



Person 1: large vagal flexibility
Person 2: limited vagal flexibility

Cardiac vagal flexibility (CVF): Is CVF related to social sensitivity?

- Baseline HRV
- Attention task – Visual tracking task (HRV)

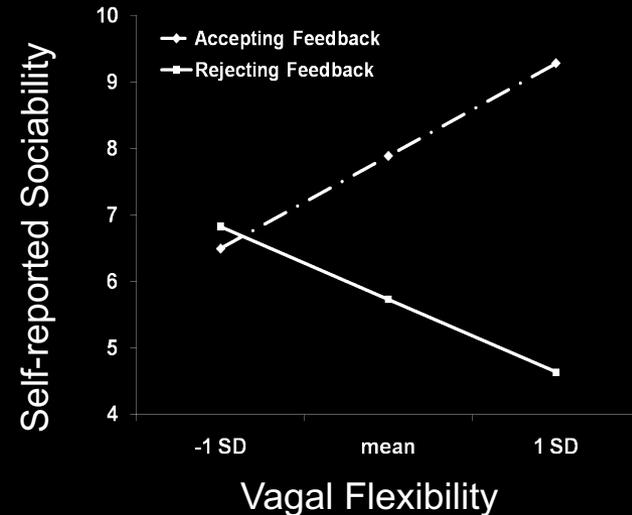


- Changes in HRV from baseline to task (x-1) is CVF

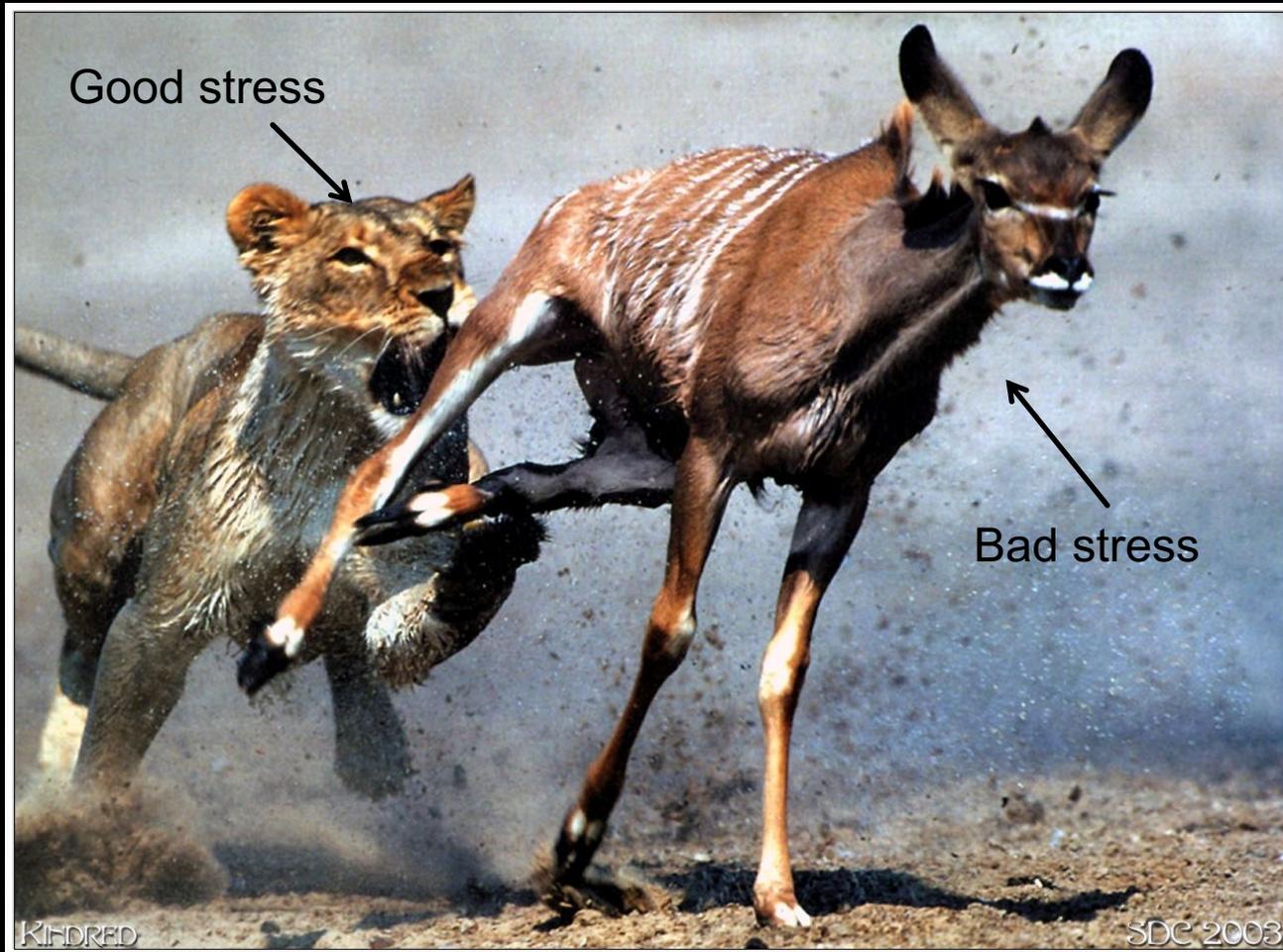


playful comforting
irritated bored

- Mind in the eyes task, CVF: $r = .42, p < .001$
- Greater sensitivity to social situations
- More accurate person perception in a dyadic interaction

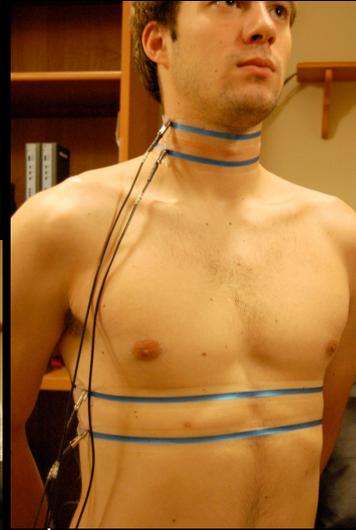
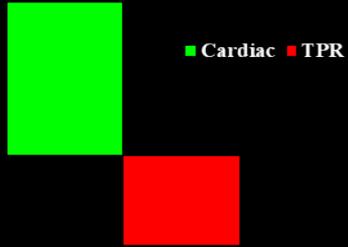


3. Differentiating Stress Reactivity



Not all physiologic reactivity to stress is equal: Good “Stress” vs. Bad “Stress”

Challenge



Threat



Increased SNS reactivity
Increased cardiac output
Decreased vascular resistance



Increased SNS reactivity
No change/decrease cardiac output
Increased vascular resistance

Appraisals: Resources meet or exceed demands

Approach-oriented

Appraisals: Demands exceed resources

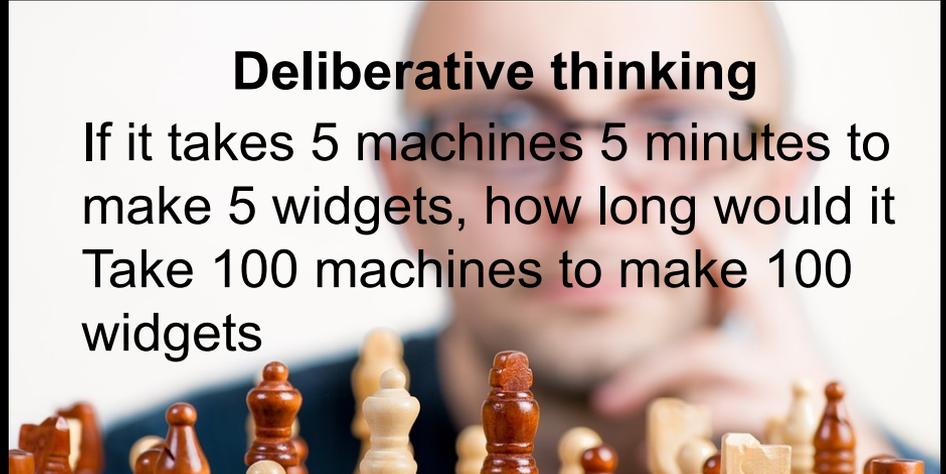
Avoidance-oriented

“Good” stress helps performance



Deliberative thinking

If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets





- **1. Affect contagion** – our own emotions and stress affect those around us (strangers and loved ones) in profound ways; status matters
- **2. Vagus nerve** – heart rate variability (HRV) related to physical and mental health; pay attention to your own levels and expect variation
- **3. Not all stress is bad for you** – “good” stress can help you physical and cognitive performance. Embrace good stress

Three short stories



- **1. Affect contagion** – our emotions and stress affect those around us (strangers and loved ones) in profound ways; PNS seems sensitive to positive emotional states
- **2. Cardiac vagal flexibility** – individual differences in CVF are related to social sensitivity and perceptual accuracy
- **3. Acute SNS reactivity is linked to positive outcomes** – “challenge” profiles are associated with better physical and cognitive performance