



Why Attachment Matters in Social Neuroscience



Dr Pascal Vrtička

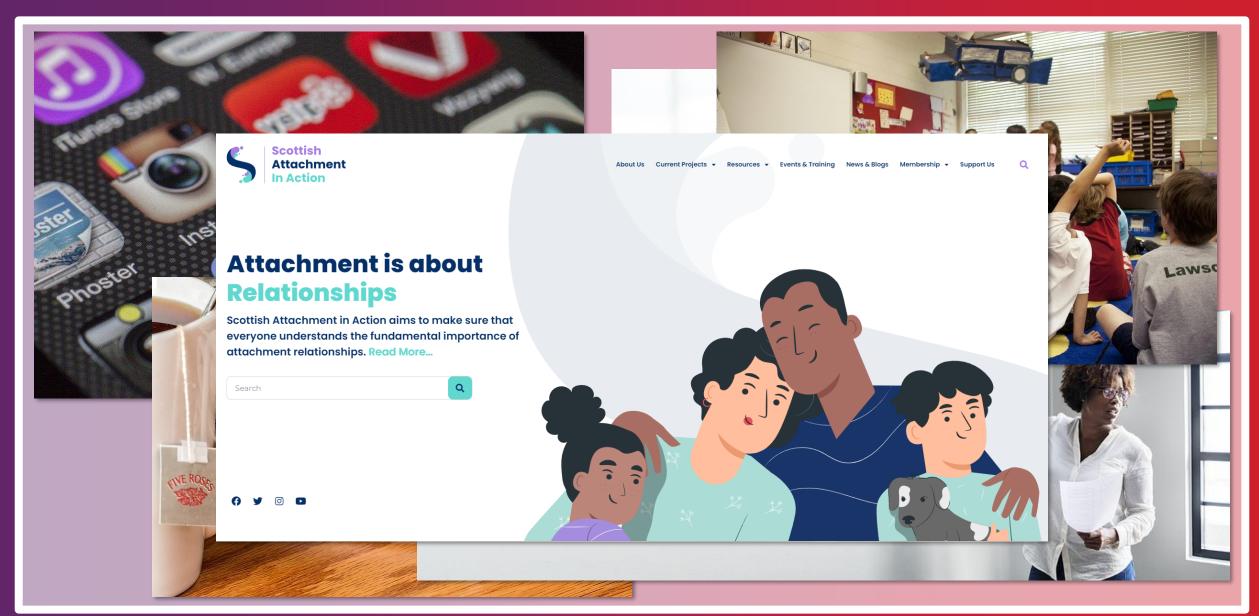
Lecturer / Assistant Professor in Psychology p.vrticka@essex.ac.uk



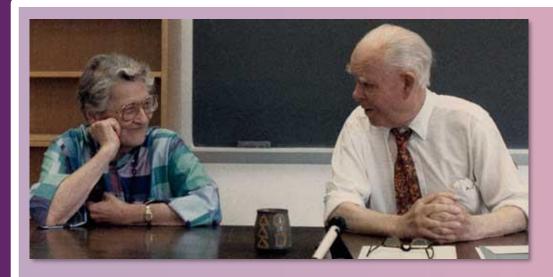












- Developed by Mary Ainsworth and John Bowlby about 70 years ago
- One of the most comprehensive current psychology frameworks
- Interindividual differences in how we form & maintain close social bonds throughout life
- Attachment = enduring emotional bond
- Formed with a special set of people who are most likely to offer protection and care
- Attachment influences social, cognitive and emotional development as well as bodily and mental health across the life span











Strange Situation Procedure (SSP)



Adult Attachment Interview (AAI)



Experiences in Close Relationships (ECR)















Strange Situation Procedure Adult Attachment Interview (SSP) (AAI)

Experiences in Close Relationships (ECR)

Neurobiological Basis of Attachment



Biobehavioral Organization in Securely and Insecurely Attached Infants CD Society for

G. Spangler and K. E. Grossmann

Institute of Psychology, University of Regensburg

SPANGLER, C., and GROSSMANN, K. E. Biobehavioral Organization in Securely and Insecurely Attached Infants. CHILD DEVELOPMENT, 1993, 64, 1439–1450. Attachment research has shown the emergence of individual differences in the security of infant-mother attachment during the first year of life as well as their importance for later social-emotional development. A biobehavioral perspective may help settle disagreements about the validity and interpretation of 12 month-old infants' different behavioral patterns of attachment assessed by Ainsworth's Strange Situation. It was shown that, despite less overt distress in insecure-avoidant infants after short separations from the mother, overall cardiac measures indicate arousal patterns similar to the secure infants during separation. However, differences in cardiac response emerged with regard to object versus person orientation during reunion. Additionally, findings of increased cortisol in both insecure-avoidant and disorganized infants support the theoretical interpretation that these infants, in contrast to secure infants, lack an appropriate coping strategy.



Behavioural observation (i.e., SSP)

Research in

Child Development



Physiology (i.e., heart rate)



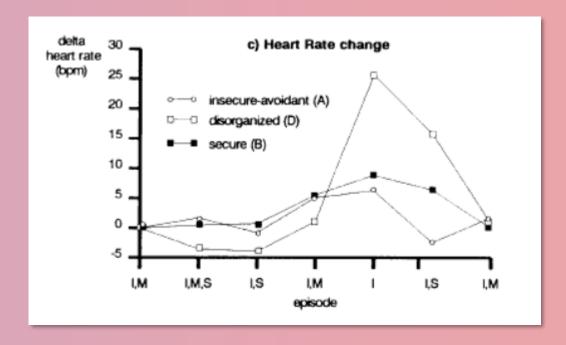
Endocrinology (i.e., cortisol)



Insecure-avoidant infants showed less overt distress after short separations from their mothers



Insecure-avoidant infants' heart rate indicated increased arousal – similar to secure attachment





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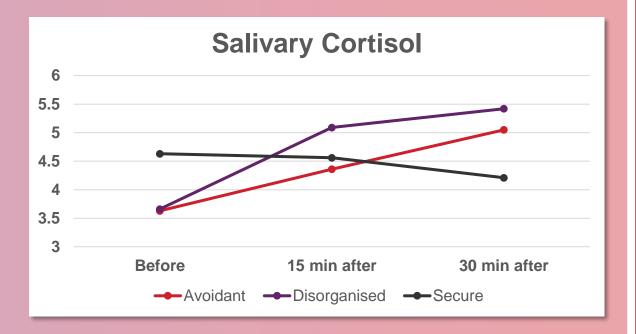
Endocrinology (i.e., cortisol)



Insecure-avoidant infants showed less overt distress after short separations from their mothers



Insecure-avoidant infants' cortisol levels showed quite a strong increase throughout the SSP





Biobehavioral Organization in Securely and Insecurely Attached Infants

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Behavioural observation (i.e., SSP)

Society for

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Physiology (i.e., heart rate)



Endocrinology (i.e., cortisol)



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Insecure-avoidant infants' heart rate indicated increased arousal – similar to secure attachment



Insecure-avoidant infants' cortisol levels showed quite a strong increase throughout the SSP





Insecure-avoidant infants only look calm on the outside – but on the inside they show a lack of an appropriate distress regulation strategy...!







Added Value of objective neurobiological measurement variables



Behaviour, Interviews & Self-Reports





Physiology (e.g., heart rate)





Endocrinology (e.g., cortisol, oxytocin)





Brain function, anatomy, and connectivity





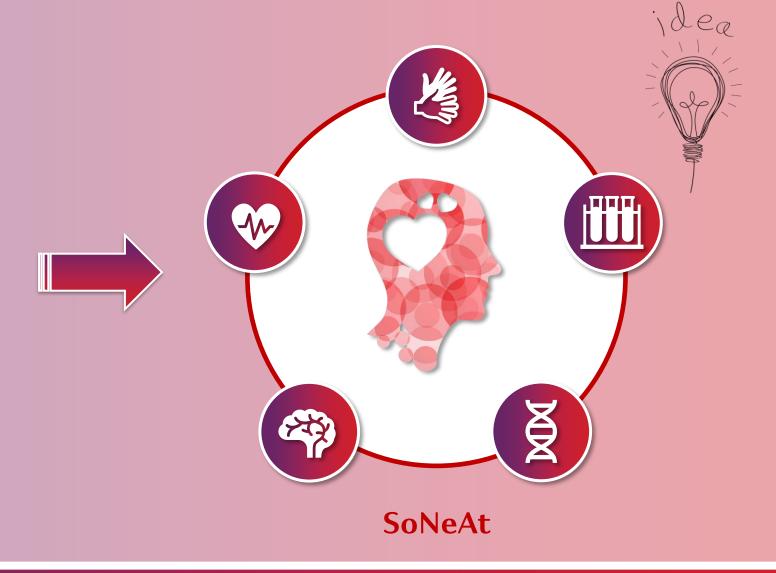
Genetics & Epigenetics





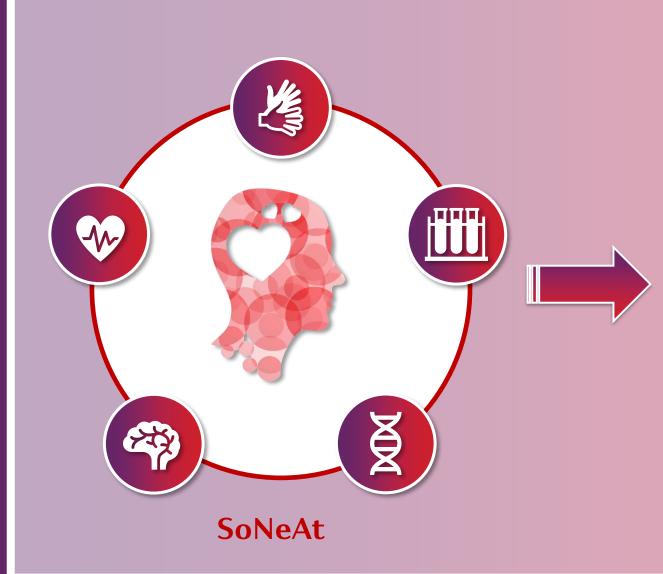


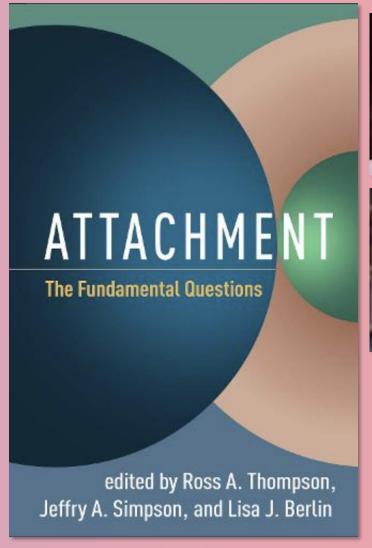
Not just added value but
necessary to fully
capture the complex
nature of attachment











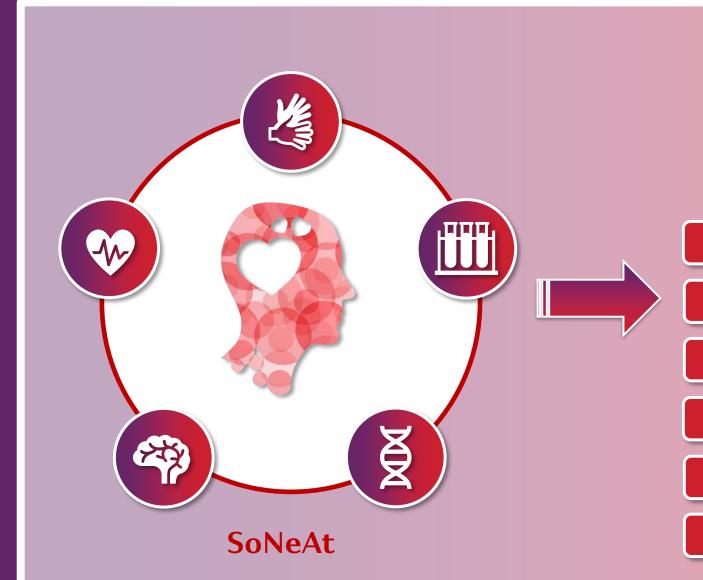


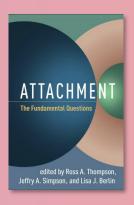












What constitutes an attachment relationship?

What is the best way to measure attachment security?

How do internal working models operate?

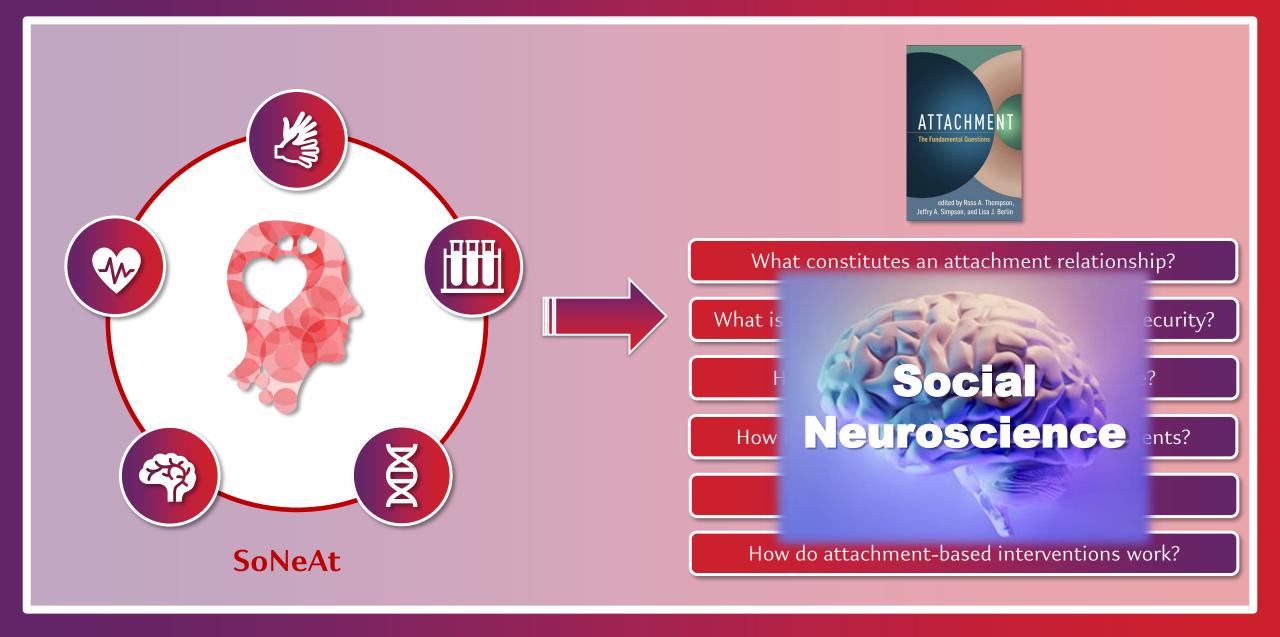
How important and stable are early attachments?

What is the role of culture?

How do attachment-based interventions work?





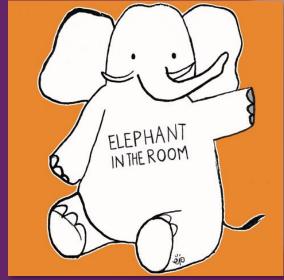












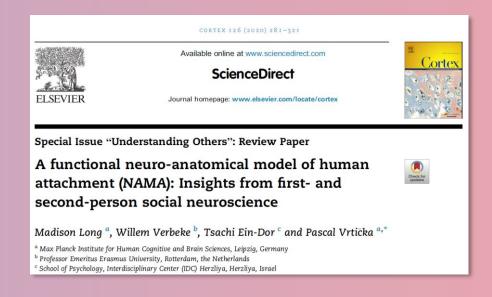




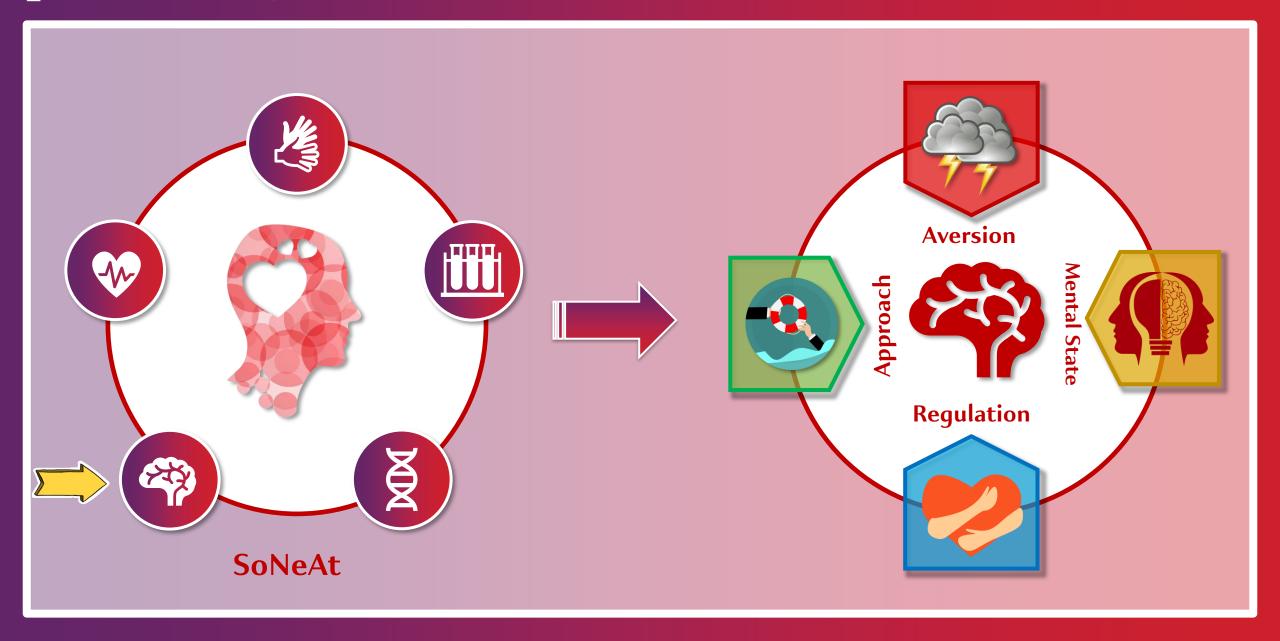
NAMA

Functional Neuro-Anatomical Model of (Organised) Human Attachment

(Long et al., 2020)





















Predictions

expectations

- **Important** external or internal event
- **Significant** challenge that upsets balance
- **Threat** detection and appropriate fear response
- Signal that action is needed

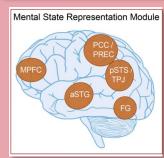
- Support seeking
- Call for help
- Looking for others' presence and responsiveness

- Social coregulation
- Close physical proximity
- More indirect coping (selfregulation)
- Return to balance
- Positive and rewarding
- Link to social interaction

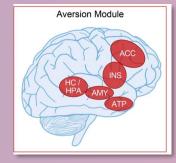
Approach Module

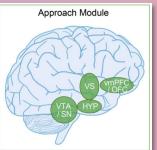
about the self and others IWMs of attachment

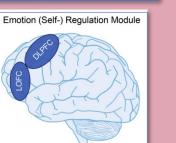
and



























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- Return to balance
- Positive and rewarding feelings
- Link to social interaction
- Predictions

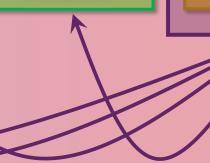
 and
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Aversion









- Important external or internal event
- Significant challenge that upsets balance
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- Return to balance
- Positive and rewarding feelings
- Link to social interaction

- Others are unavailable
- Self-reliance
- Better not to get too emotional in the first place





Mental State



- Others are unavailable
- Self-reliance
- Better not to get too emotional in the first place

Aversion Module

(balanced de- and

- Beneficial stress-reducing influence of secure-based social interactions, priming, and mental representations (anatomy, function, and connectivity)
- Short- and long-term effects
- Protective effect of readily available social (co-)regulation during stress & generally lower likelihood of early adversity



Approach Module



Activation generally reflecting positive motivational attributes towards, and affective representations of others - especially under conditions of threat and stress, i.e. when others are needed to (co-)regulate negative

This pattern accords with a positive model of others characteristic for attachment



Emotion (Self-) Regulation Module



- Emotion (self-)regulation appears functional and efficient (successful aversion module down-regulation through physical contact as well as by positive mental representation of significant others)
- Indication of better connectivity between the emotion regulation and aversion modules
- Mental state representation



Mental State



seems to develop early Predominantly positive represent-tations of others

More extensive (functional) connectivity with the other



Avoidant Attachment

- Lower activation during social exclusion due to expectation of
- Increased activation during negative social information processing when inhibition/supaxis modification pression as emotion regulation strategy cannot be employed
- Indication of long-term elevated stress / HPA axis modification

(de-activation)

rejection by others

Limited efficiency of de-activating



- module activation (both across close and more distant social
- Role of oxytocin and/or endogenous opioids, apart from dopamine, in such processes
- Pattern reflects negative other-model associated with attachment avoidance



- Preferential use of inhibition / suppression when dealing with (social) emotions, both positive and negative
- Emotion regulation appears ineffective when inhibition / suppression cannot be employed - e.g. cognitive re-appraisal fails in down-regu lating aversion module activity during negative social information processing
- Social (co-)regulation appears ineffective and may even activity during stressful



- Only very limited evidence
- One study implies less mentalizing (RMET)
- Possible tendency for hyper-mentalization due to the need for an early assessment of social situations so that inhibition / suppression can be employed if deemed necessary
- More data is still needed



Anxious Attachment (hyper-activation)

- Higher activation during the processing of negative social
- Anatomical alteration pointing to long-term elevated stress / HPA
- This pattern is consistent with hyper-activating strategies that increase the saliency of social cues pointing towards social rejection / the unavailability of others during stressful situations



- Only limited evidence of altered approach module functionality Some findings point to increased (automatic) processing of positive social cues, particularly when they occur unexpectedly, i.e. when social rejection is anticipated but does not occur
- Patten agrees with a partially positive other-model / wish for closeness and care



- Increased activation during natural processing of (social) negative information
- No consistent indication of emotion down-regulation
- Both cognitive re-appraisal and suppression / inhibition appear functional when properly instructed
- Social (co-)regulation under stress also seems effective
- Pattern points to dependence or external contribution towards emotion regulation associated with a negative self-model



- Only very limited evidence
- One study in adolescents indicates both activation in- and decreases as a function of both mentalization content valence (positive versus negative) and focus (self versus close other) More data is still needed





Decreased reward-related activity to positive social stimuli (fMRI) linked to oxytocin signalling and oxytocin receptor gene methylation (epigenetics) & expectation of being socially rejected (EEG)



Supportive presence of close others has a weaker impact on stress and negative emotion processing (fMRI & EEG) & alterations in HPA stress axis related to glucocorticoid receptor gene methylation (epigenetics)



Higher baseline glucose blood level linked to increased self-regulatory demands / lack of social resources





Social Baseline Theory

(Coan & Sbarra, 2015)



Available online at www.sciencedirect.com

ScienceDirect



Social Baseline Theory: the social regulation of risk and effort James A Coan¹ and David A Sbarra²

integrates the study of social relationships with principles of attachment, behavioral ecology, copiethe neuroscience, and perception science. SET suggests the human brain expects access to social relationships that miligate risk and deminish the level of effort needed to meet a variety of poals. This is accomplished in part by incorporating relational partners into neural representations of the self. By contrast, decreased access to relational partners increases cognitive and physiological effort. Relationship disruptions entail re-defining the self as indepotent, which religies greater risk, increased offer may mediate recovery from relationship tolos.

We describe Social Baseline Theory (SBT), a perspective that

¹University of Virginia, United States

Corresponding author: Coan, James A (icoan@virginia.ed

[3rd]. This increase in cognitive and physiological effort is frequently accompanied by distress, both acute and chronic, with all the negative sequelae for health and well being that implies [8^r,9]. Thus, the first sense which SBT refers to a social handine has to do with the default and intrinsically social ecology the brain expects to function within.

But reference to the social baseline also has methodological meaning. In functional magnetic resonance imaging (MRI) research, a standard convention is to compare an experimental treatment to a 'resting baseline' characterized by simply lying alone in the scanner. This convention is predicated on the reasonable assumption that experimental treatments present stimuli otherwise absent from the sensonium while participants are alone. But inspection of brain activity in several studies — elaborated on below — one superests the brain resonable to be in the control of the brain estimates to heims.

- Default state = social connection
- Others' resources are my resources



Compensatory mechanisms related to **(social) allostasis** kick in if social resources are removed / we feel as if they are removed

Short-term benefit → survival strategy (i.e., higher alertness, energy, proximity, ...) → environmental adaptiveness (attachment avoidance / anxiety)!

Chronicity leads to allostasis overload → risk factors → attachment disorganisation → emerging physical and mental health issues





NAMDA: Functional <u>N</u>euroAnatomical <u>M</u>odel of Disorganised Human Attachment

(White et al., 2020)



Extension of NAMA to Attachment Disruption / Disorganisation:

- What happens if early life experiences are much more adverse and involve traumatic events?
- What happens if attachment behaviour becomes disrupted / disorganised at a later stage in association with traumatic events?
- Can we also describe such patterns on a biological and brain level?

This is important, because:

• Typical rates in middle class samples are for infants (15%) and adults (18%) with "unresolved-disorganized state of mind"; prevalence estimates slightly elevated among offspring of teen mothers (23%) and in families with low socioeconomic status (25%), and up to five times higher among clinical adult samples (43%), children with neurological abnormalities (35%), adoptees (31%), offspring of caregivers with substance abuse (43%), previously institutionalized samples (54-73%), and children raised by maltreating caregivers (48-90%).

















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 and
 expectations
 about the self
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Child has no consistent caregiver(s) (e.g., institutionalisation)

Infant's needs are neglected







NAMDA:
Functional <u>N</u>euroAnatomical <u>M</u>odel of
Disorganised Human
Attachment

(White et al., 2020)





So far, there is a great **lack of specificity** – e.g., different adverse early experiences (ACEs) are lumped together although they are very likely to have specific effects on neurobiological mechanisms



Attachment disorganisation is **not just a simple continuation of attachment insecurity** – some neurobiological manifestations
overlap whereas others are specific to either category



ACEs do not necessarily lead to the development of insecure attachment / disorganisation – this process is **heavily context-dependent** and needs to be assessed with caution and care



There is only **very limited evidence** on the neurobiology of attachment disorganisation from studies taking the above issues into consideration – much more work is still needed



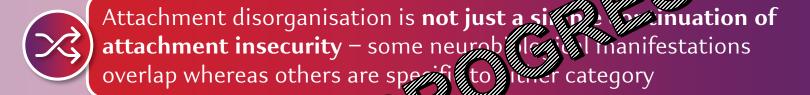


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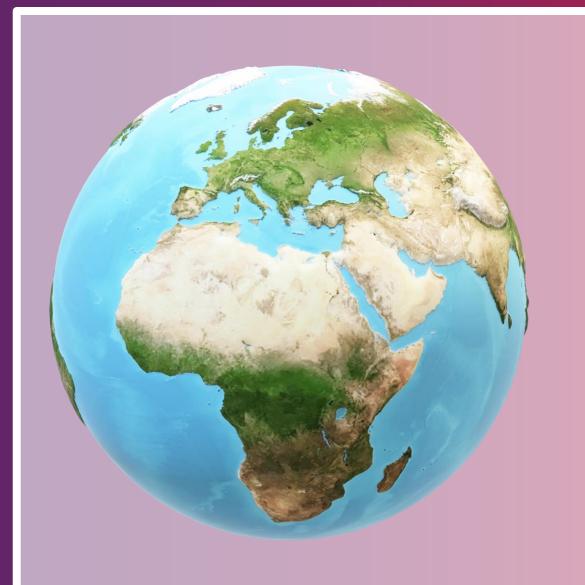












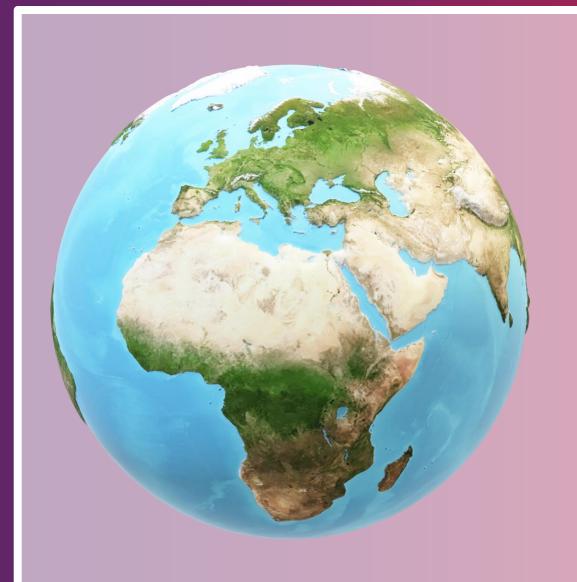


Societal changes worldwide reflect an increasing involvement of fathers in childcare activities.

For example, in the US in 2016, dads were almost 3x more involved in childcare than they were 50 years earlier.

(https://www.pewresearch.org/fact-tank/2019/06/12/fathers-day-facts/)







A similar pattern has been observed in other countries, including the UK, Canada, Germany, Denmark, Italy, The Netherlands, Slovenia, and Spain.

(https://ourworldindata.org/parents-time-with-kids; based on Dotti Sani, G. M., & Treas, J. (2016). Educational gradients in parents' child-care time across countries, 1965–2012. Journal of Marriage and Family, 78(4), 1083-1096.)







Early Child Development and Care

Publication details, including instructions for authors and subscription information: http://www.informaworld.com/smpp/title~content=t713640830

Fathers in attachment theory and research: a review

Inge Bretherton

a Human Development & Family Studies, University of Wisconsin-Madison, Wisconsin, USA

Online publication date: 22 January 2010



1950s

First description of attachment theory

Fathers were not even mentioned

1960s

 "Can fathers serve as attachment figures, and if so, is fathers' role secondary to mothers'?"

1970s

"What is fathers' place in the attachment hierarchy?"

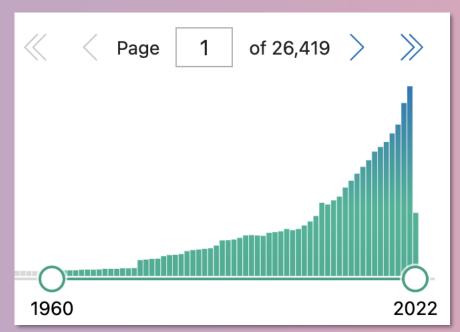
1980s

"What is the comparative quality (security) of an infant's attachment to mother and father?

1990s

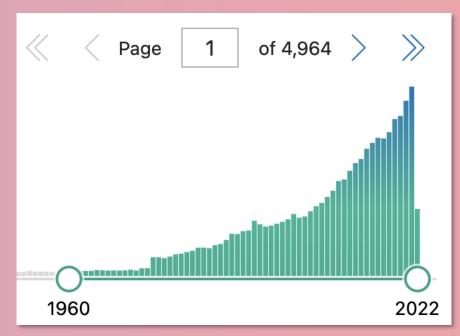
"Are the developmental outcomes of father and mother attachment different, even if both secure?"









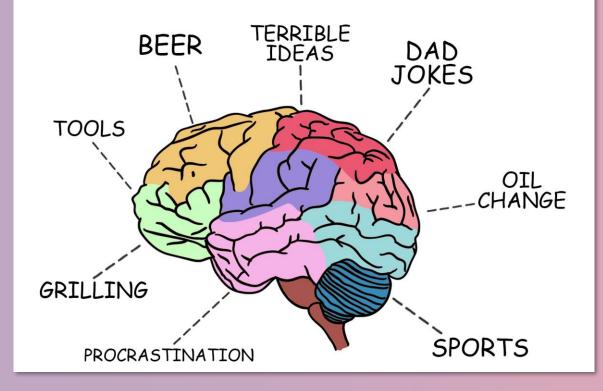








DAD'S BRAIN



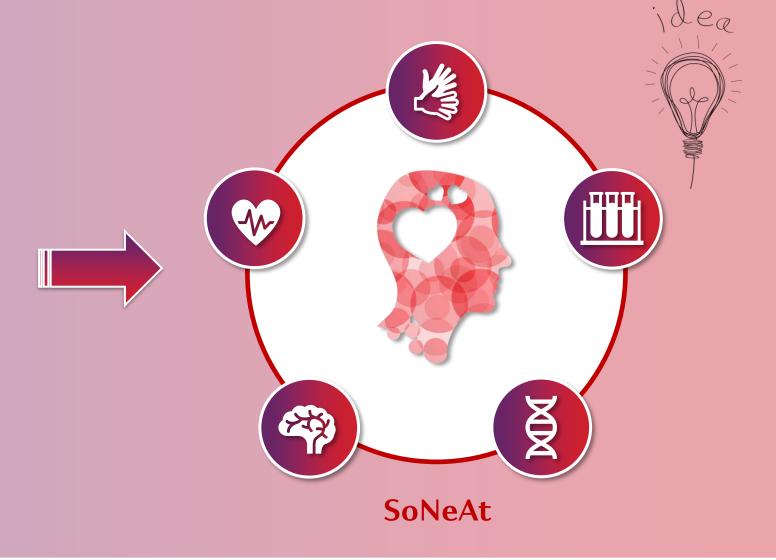






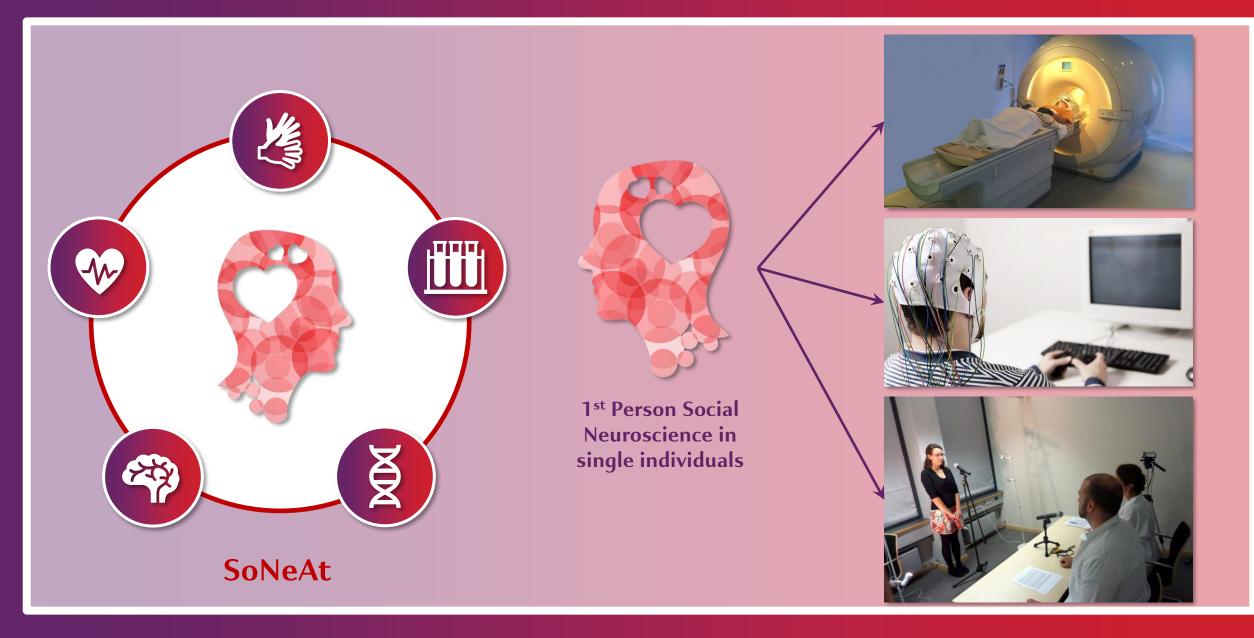


Not just added value but
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nature of attachment



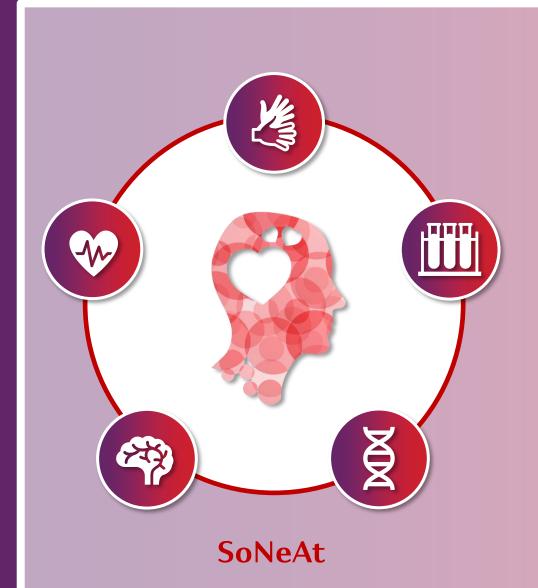






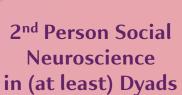








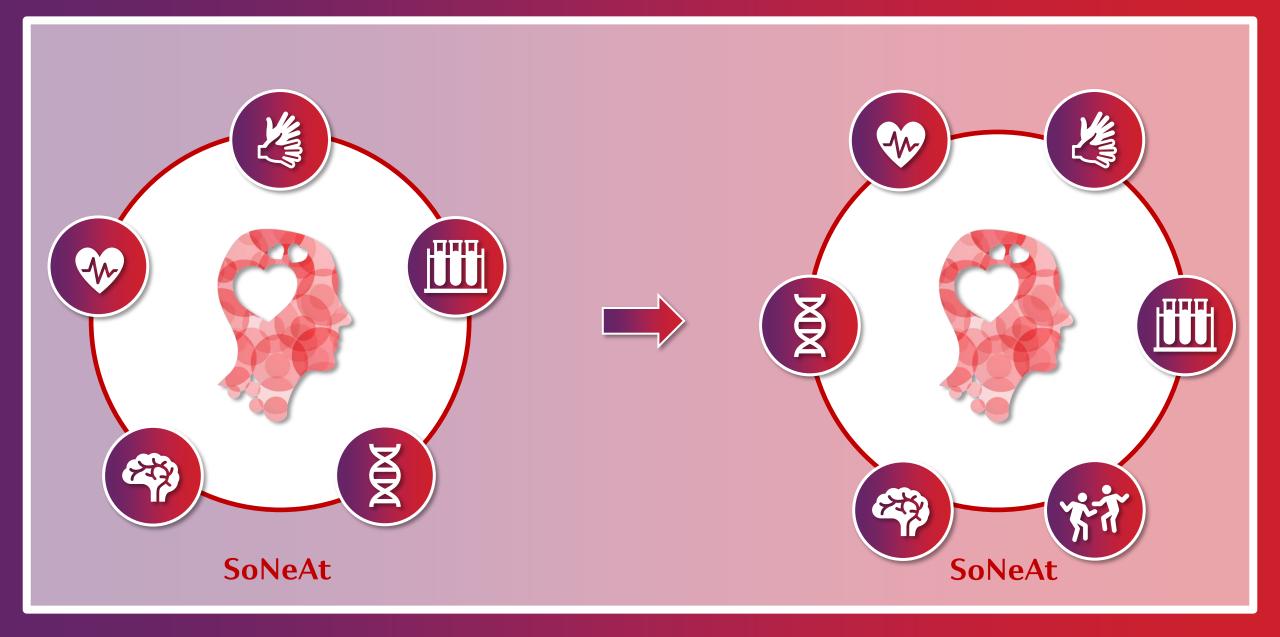




BIO-BEHAVIOURAL SYNCHRONY





















Babygro Book for Parents











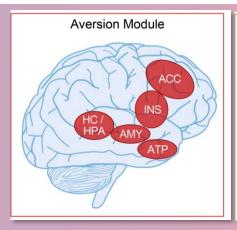
How do our babies' brains develop, and how does responsive communication between parent and baby lead to later life (mental) health and wellbeing?

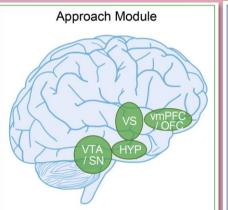
As part of infant mental health awareness week 2022, Dr Pascal Vrticka and the SoNeAt Lab are very happy to share this new, brilliant and completely free-of-charge resource for all parents – the Babygro Book. The book is made available by the **UK Charity Babygro** and can be downloaded from their website (https://babygro.org/about).

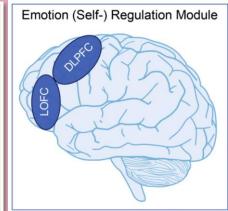
The book's aim is to empower parents by bringing them trusted, evidence-based information that enables them to feel reassured and confident in their parenting choices.

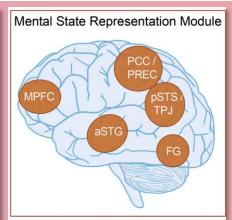










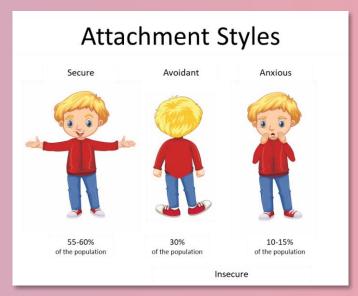


Stress-Fear-PainNetwork

ConnectionNetwork

RegulationNetwork

Self & Other Network















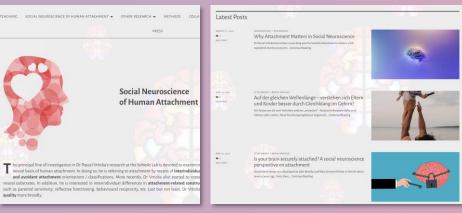
magnetic resonance imaging — (f)MRI — and electroencephalography—EEG. More recently, Dr Vrticka started to assess bio-behavioural synchrony in interacting dyads. The main question of this 2nd person social neuroscience approach is how romantic part and parents with their children get "in sync" when they solve problems together or talk to each other.

neurobiological responses to different kinds of social versus non-social information in individual participants. This 1st

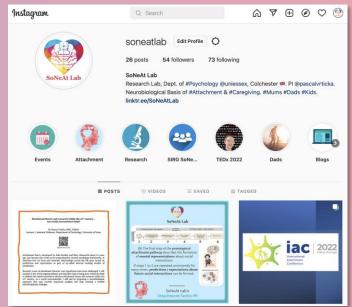
person social neuroscience approach relies on (functional)

behavioural observations, interviews, and self reports (i.e.,

research is attachment theory, which describes how we initiate and maintain social relationships across the life span. By adding a systematic 1st and 2nd person social neuroscience perspective to attachment theory and research – also in the form of new functional neuro-anatomical models of organised and disorganised human attachment (NAMA and NAMDA) -. neuroscience of human attachment.

















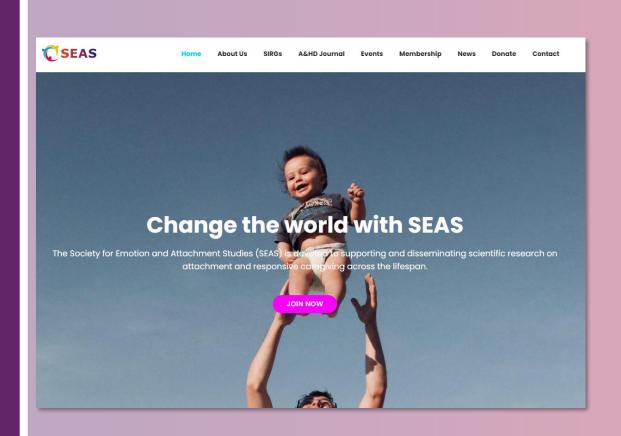


TEDx University of Essex May 14th, 2022

"Are you paying attention?"

Caring Dads: The Making of Involved and Confident Fathers







Special Interest Research Group

SoNeAt

Social Neuroscience of Human Attachment



SIRG SoNeAt Newsletter N°2

General Information

We, the Special Interest Research Group on the Social Neuroscience of Human Attachment (SIRG SoNeAt) within the Society for Emotion and Attachment Studies (SEAS), are very pleased to bring you the second edition of our newsletter.

With our newsletter, we aim at keeping you up to date regarding any relevant events, publications and other newsworthy occurrences, as well as available resources related to the social neuroscience of human attachment.

If you would like to share information from your own research or promote your own events that fall within the scope of our SIRC SoNeAt, please get in touch with us by email (sirg.soneat@gmail.com). Please also let us know by email if you want to be added to, or removed from our mailing list. Thank you.

2. Upcoming Events

2.1 International Attachment Conference IAC 2022

SEAS will be hosting its biannual IAC 2022 from July 14th to 16th in Lisbon, Portugal, in a hybrid format – i.e., attendance will be possible both in person as well as remotely. For more information and to register, please visit the conference website.

Besides many relevant keynotes and presentations focusing on other attachment topics, some data falling within the scope of SIRG SoNeAt will also be featured. More information will follow.

2.2 Free One-Day Hybrid Conference "Epigenetics Meets Social Neuroscience of Attachment"

Our SIRG SoNeAt is thrilled to host a free one-day hybrid conference "Epigenetics meets Social Neuroscience of Attachment" at the University of Essex (Colchester, UK) and on Zoom on July 5th. There will be four keynotes on epigenetic research in psychiatry and psychology and how such research can be combined with methods from social neuroscience and attachment theory to study couple and family relationships.

Conference attendance is free - registered participants can make a donation to SEAS.

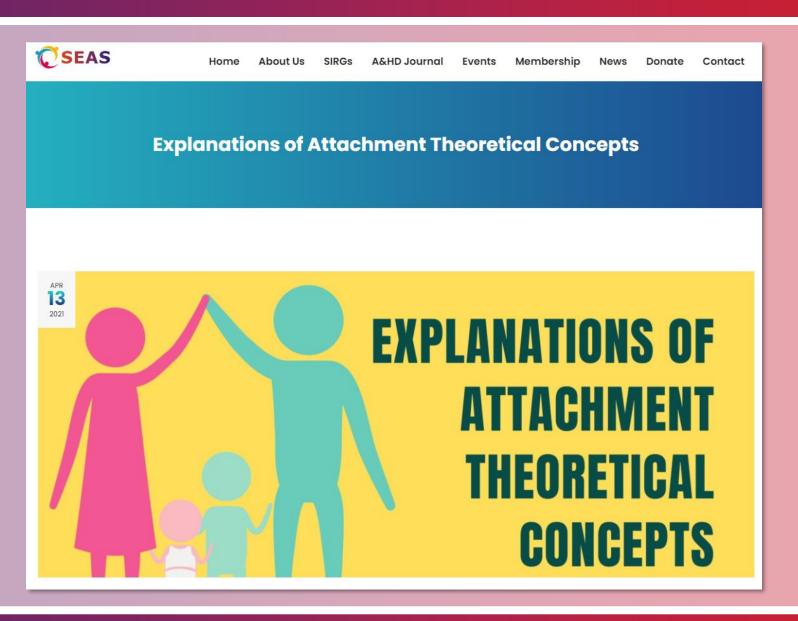
Abstract submission - particularly aimed at early career researchers - remains open until May 31*. There will be in-person or remote short oral presentation slots as well as an in-person poster session. Conference participation is also possible without presentation (registration deadline: June 30th). More information is available on the conference website

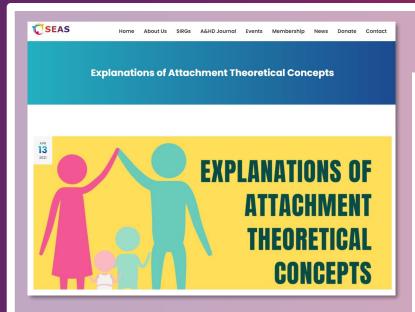
The Social Neuroscience of Human **Attachment**











Concepts Used By Developmental Attachment Researchers

Concept	Common misconceptions	Explanation, as accessible as possible
Adult Attachment Interview	Definitive test of individual differences in adult attachment; assessment of representations of parents or relationships	A semi-structured interview developed by Main and colleagues. The interview comprises 20 questions. These explore the interviewee's perceived childhood experiences with their parents, experiences of abuse and loss, the effect of those experiences in the formation of their adult personality, and the interviewee's current relationship with his or her parents. Main and colleagues discovered that there were patterns to the way interviewees talked about their attachment experiences. These patterns were termed 'adult's states of mind with respect to attachment'. They represent an adult's present-day capacity to think about and communicate attachment-relevant information about the past. The interview creates conditions that arouse and direct attention towards attachment-related experiences. The language of the interview is analysed for the speaker's capacity to integrate two kinds of information:episodic information, i.e., specific events and when they happened, such as an accidentsemantic information, i.e., beliefs about the world, such as whether people are generally caring Following the coding manual by Main and colleagues, interviews are transcribed verbatim and scored by certified coders. Several subscales are scored, after which the transcript is classified into one of four Attachment classifications.





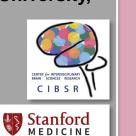


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Thank you

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Any Questions or Remarks?

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